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HPE 3PAR Web Services API 1.6.3 Developer Guide

Abstract

This guide provides the information you need to write a client that uses the HPE 3PAR Web Services API to manage HPE 3PAR StoreServ Storage Systems. 3PAR StoreServ Storage Systems include both hardware components that store data and software applications to manage data.

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Revision history

Part number	Publication date	Edition	Summary of changes
QL226-99803	September 2018	WSAPI 1.6.3	<p>Added support for target driven zoning and SmartSAN.</p> <p>Enabled HPE 3PAR System Reporter summary reports, and support for additional report types, including CPU statistics, QoS statistics, and Remote Copy and Remote Copy Volume statistics.</p> <p>Added filtering for volume queries by provisioning type.</p> <p>Disaster recovery management for 3-data center environments using HPE 3PAR Cluster Extension software and 3PAR Remote Copy.</p> <p>Added WSAPI event notification</p> <p>Added DOMAIN to QoS target type enumeration.</p>
QL226-99652	August 2017	WSAPI 1.6.1	<p>Added VLUN property object for serial number query.</p> <p>Added management tasks for iSCSI ports.</p> <p>Enabled HPE 3PAR System Reporter support for <code>compareby</code> function.</p>

Table Continued

Part number	Publication date	Edition	Summary of changes
QL226-99282	April 2017	WSAPI 1.6	<p>Enabled concurrent session operations, whether using one or multiple session keys.</p> <p>Added support for the following:</p> <ul style="list-style-type: none"> • Querying all host sets or all volume sets using filters. • Creating snapshot queries using filters. • Querying capacity efficiency related to compression, over provisioning, and data reduction. • Querying port devices by device name, including host name, port, physical disk, and cage number. <p>Enabled Disaster recovery management using HPE 3PAR Cluster Extension software and 3PAR Remote Copy</p>
QL226-98198	August 2015	WSAPI 1.5	<p>Added support for the following:</p> <ul style="list-style-type: none"> • Displaying virtual volume space distribution. • Updating virtual copies. • Creating snapshots for virtual volume groups. • Querying iSCSI ports. • Querying ports with type filters. • Managing and querying Remote Copy groups, and Remote Copy group PERIODIC 2 and ASYNC. Adds support for snap frequency. • Managing and querying AO configurations. <p>Introduces HTTP POST method for admitting a volume into a Remote Copy group, and HTTP DELETE method for removing a volume from a Remote Copy group.</p> <p>Added volume snap and volume synchronization objects to Remote Copy group query.</p> <p>Added target objects, policy objects, and group state enumeration to Remote Copy groups query.</p> <p>Included HPE 3PAR System Reporter at time and versus time report requests.</p> <p>QoS latency goal in microseconds</p>

Table Continued

Part number	Publication date	Edition	Summary of changes
QL226-98025	December 2014	WSAPI 1.4.2	<p>Added error messages 276 through 289, 291, and 292.</p> <p>Added volume and target objects to Remote Copy group query.</p> <p>Adds session time out to WSAPI system configuration query.</p> <p>Added support for the following:</p> <ul style="list-style-type: none"> • Querying hosts with CHAP secret. • Setting and querying vv-set Flash Cache and flash cache policy. • Creating and removing a flash cache, or query a flash cache. • Modifying and synchronizing Remote Copy groups. (HPE recommends using WSAPI 1.4.2 and later for Remote Copy support.)
QL226-97908	October 2014	WSAPI 1.4.1	<p>Added error messages 270 through 275.</p> <p>Added <code>numTDVVs</code> to CPG property objects.</p> <p>Added TDVV conversion and <code>keepVV</code></p> <p>Added support for capacity efficiency and deduplication queries</p>
QL226-98198	November 2015	WSAPI 1.4	<p>Added error messages 82, 186 through 201, 203 through 243, 245 through 262, 264 through 269</p> <p>Added support for some Remote Copy actions.</p> <p>Added flash cache policy enumeration to system information queries.</p> <p>Enabled querying of WSAPI roles</p>

Contents

Flexible storage management with HPE 3PAR Web Services API..... 20

WSAPI development basics.....21

Java and Perl client code samples for WSAPI.....	21
Basic CLI commands for WSAPI server configuration.....	21
WSAPI HTTP protocol.....	22
Supported HTTP methods for WSAPI.....	23
WSAPI Uniform Resource Identifier syntax.....	23
Enabling and disabling the WSAPI HTTP protocol.....	23
WSAPI request and response messages.....	23
WSAPI client request message headers.....	24
WSAPI client request message body content.....	25
JSON objects in WSAPI.....	25
WSAPI and null values in JSON object properties.....	26
JSON enumerated values in WSAPI.....	26
WSAPI JSON types	27
WSAPI JSON member suffixes.....	29
Supported JSON character encoding in WSAPI.....	29
WSAPI client request message body examples.....	30
WSAPI server response message headers.....	30
WSAPI query filter specification.....	30
WSAPI query syntax.....	31
WSAPI query operators.....	31
WSAPI query error causes.....	32
WSAPI zero (0) response causes.....	33
HTTP status codes for successful WSAPI operations.....	34
WSAPI error codes and descriptions.....	34
WSAPI error response code member descriptions.....	34
WSAPI error response desc member descriptions.....	64
WSAPI error response ref member descriptions.....	64
HTTP chunked transfer encoding in WSAPI.....	65
HTTP chunked transfer encoding errors.....	65

Starting and configuring the WSAPI server..... 66

Starting the WSAPI server.....	66
Configuring the WSAPI server.....	66
WSAPI security settings.....	66
Supported TLS 1.2 security ciphers.....	66
Enabling the TLC 1.2 protocol cyphers.....	67

Session keys and WSAPI system access..... 68

Creating a WSAPI session key.....	68
Success.....	69
Setting the session timeout value.....	69
Deleting a session key.....	70
Success.....	70

Errors.....	70
WSAPI session key information.....	70
WSAPI session key security.....	71
Multiple session keys	71
Maximum number of WSAPI sessions.....	71

System events.....74

Logged system events.....	74
Requesting all past events from system event logs.....	74
Success.....	74
Errors.....	77
Requesting specific past events using filters.....	77
Parameters and query expressions.....	78
Success.....	79
Errors.....	79
System event notification.....	79
Identifying SSE connections in WSAPI.....	80
Enabling and disabling event streaming in WSAPI.....	80
Establishing a communication channel.....	80
Success.....	80
Establishing event stream notifications using filters.....	81
WSAPI Server-Sent Events (SSE) functionality	81
WSAPI client request format for event streaming.....	82
WSAPI server response format and block descriptions.....	82
WSAPI notification data format.....	83
WSAPI Server-Sent Event (SSE) channel closure.....	83

Common Provisioning Groups (CPGs)..... 84

CPG enumeration and configuration objects.....	84
CPG LdLayout JSON objects.....	84
CPG RAIDType enumeration.....	85
CPG HA enumeration.....	85
CPG chunkletPosPref enumeration.....	85
CPG diskPatterns JSON objects.....	86
CPG diskType enumeration.....	87
CPG space usage objects.....	88
CPG growth objects.....	89
CPG state enumeration.....	89
CPG DetailedState enumeration.....	89
CPG creation and modification error codes.....	90
Creating a CPG.....	91
Success.....	92
Errors.....	93
Modifying a CPG.....	93
Success.....	93
Errors.....	93
Removing a CPG.....	94
Success.....	94
Errors.....	94
Querying CPGs.....	94
Querying a single CPG.....	94
Success.....	94
Errors.....	95
Querying all CPGs.....	95

Success.....	95
Errors.....	97
Storage volumes.....	98
License information.....	98
Volume enumeration and configuration objects.....	98
Volume compressionState enumeration	98
Volume provisioningType enumeration	99
Volume CopyType enumeration.....	99
Volume deduplicationState enumeration.....	100
Volume DetailedState enumeration.....	100
Volume policies configuration object.....	101
Volume hostDIF enumeration.....	102
Volume space objects.....	103
Managing storage volumes.....	103
Creating a base volume.....	103
Success.....	106
Errors.....	106
Modifying a virtual volume.....	107
Success.....	111
Errors.....	111
Displaying virtual volume space distribution for all volumes.....	113
Success.....	113
Errors.....	115
Displaying virtual volume space distribution for a volume.....	115
Success.....	115
Errors.....	115
Growing volumes.....	115
Success.....	116
Errors.....	117
Tuning virtual volumes.....	119
Success.....	120
Errors.....	121
Removing a storage volume.....	123
Success.....	123
Errors.....	123
Querying storage volumes.....	124
Querying all volumes.....	124
Success.....	124
Errors.....	128
Querying a single volume.....	128
Success.....	128
Errors.....	129
Querying volumes using WWN filters.....	129
Success.....	129
Errors.....	130
Querying volumes with multiple filters.....	130
Success.....	130
Errors.....	131
Querying volume copies.....	131
Success.....	131
Errors.....	131
Querying volumes by type.....	131

File Persona.....	133
File Services.....	133
Querying File Services information.....	133
Success.....	133
Errors.....	138
File Provisioning Groups.....	138
Creating an FPG.....	139
Success.....	140
Errors.....	140
Removing FPGs.....	141
Success.....	141
Errors.....	142
Querying FPGs.....	142
Querying all FPGs.....	142
Querying a single FPG.....	147
Querying FPGs using filters.....	147
Querying all FPG reclamation tasks.....	148
Success.....	148
Errors.....	150
Virtual File Servers.....	150
Creating a VFS.....	150
Success.....	152
Errors.....	153
Removing a VFS.....	153
Success.....	153
Errors.....	154
Querying a VFS.....	154
Querying all VFS.....	154
Querying a single VFS.....	157
Querying VFS using filters.....	157
File Stores.....	158
Creating File Stores.....	158
Success.....	159
Errors.....	160
Modifying File Stores.....	160
Success.....	161
Errors.....	161
Removing a File Store.....	161
Success.....	161
Errors.....	162
Querying File Stores.....	162
Querying all File Stores.....	162
Querying a single File Store.....	164
Querying File Stores using filters.....	165
File Store snapshots.....	166
Creating a File Store snapshot.....	166
Success.....	167
Errors.....	168
Removing a File Store snapshot.....	168
Success.....	168
Errors.....	168
Querying File Store snapshots.....	168
Querying all File Store snapshots.....	169
Querying a single File Store snapshot.....	170

Querying File Store snapshots using filters.....	171
File Shares.....	172
Creating File Shares.....	172
Success.....	179
Errors.....	180
Updating a File Share.....	180
Success.....	185
Errors.....	185
Updating File Share directory permissions.....	185
Success.....	186
Errors.....	186
Removing a File Share.....	186
Success.....	186
Errors.....	187
Querying File Shares.....	187
Querying all File Shares.....	187
Querying a single File Share.....	191
Querying File Shares using filters.....	192
Querying for directory permission properties.....	193
File Persona quotas.....	194
Creating a File Persona quota.....	194
Success.....	196
Errors.....	196
Modifying File Persona quota information.....	197
Success.....	199
Errors.....	200
Removing a File Persona quota.....	200
Success.....	200
Errors.....	200
Querying File Persona quotas.....	200
Querying all quotas.....	200
Querying a single File Persona quota.....	203
Querying File Persona quotas using filters.....	204
Archiving a File Persona quota.....	208
Success.....	208
Errors.....	209
Restoring a File Persona quota.....	209
Success.....	210
Errors.....	210

Host management.....211

Creating a host.....	211
Success.....	212
Errors.....	213
Add or remove a host WWN from target-driven zoning.....	214
Success.....	216
Errors.....	217
Modifying a host.....	217
Success.....	219
Errors.....	220
Removing a host.....	222
Success.....	222
Errors.....	223
Querying hosts.....	223
Querying all hosts.....	223

Success.....	223
Errors.....	223
Querying a single host.....	223
Success.....	223
Errors.....	228
Querying host information with WWN filtering.....	228
Success.....	229
Errors.....	229
Querying a single host persona.....	229
Success.....	229
Errors.....	229
Querying multiple host personas.....	229
Success.....	230
Errors.....	230
Querying persona information using filters.....	231
Success.....	231
Errors.....	231

Host sets and virtual volume sets.....232

Creating a host set or VV set.....	232
Success.....	233
Errors.....	233
Modifying a host set or VV set.....	234
Success.....	235
Errors.....	236
Removing a host set or VV set.....	237
Success.....	237
Errors.....	237
Setting and querying a VV-set Flash Cache policy.....	237
Success.....	238
Errors.....	238
Querying all host sets or all VV sets.....	238
Success.....	239
Errors.....	239
Querying a single host set or a single VV set.....	240
Success.....	240
Errors.....	240
Querying all host sets or all volume sets using filters.....	240
Success.....	241
Errors.....	241

Ports and switches.....242

Port configuration and enumeration objects.....	242
Querying ports.....	245
Querying all ports.....	245
Success.....	245
Errors.....	251
Querying a single port.....	251
Success.....	251
Errors.....	252
Querying iSCSI VLANs for an iSCSI port.....	252
Success.....	252
Errors.....	253
Querying an iSCSI VLAN for an iSCSI port.....	253

Success.....	253
Errors.....	253
Querying ports with type filtering.....	253
Success.....	253
Errors.....	254
Querying initiators in the unzoned name server.....	254
Success.....	254
Errors.....	254
Querying port devices.....	254
Querying all port devices.....	254
Success.....	254
Errors.....	256
Querying for port device target-driven zones.....	256
Success.....	256
Errors.....	259
Querying for a port device target-driven zone instance.....	259
Success.....	259
Errors.....	259
Querying FC switches.....	259
Success.....	260
Errors.....	261
Managing iSCSI ports.....	261
Configuring iSCSI ports.....	261
Success.....	261
Errors.....	262
Creating a VLAN on an iSCSI port.....	262
Success.....	262
Errors.....	263
Updating a VLAN configuration on an iSCSI port.....	263
Success.....	263
Errors.....	264
Using iSCSI ports to ping an IP address.....	264
Success.....	265
Errors.....	265
Resetting an iSCSI port configuration.....	265
Success.....	265
Errors.....	265
Removing an iSCSI port VLAN.....	265
Success.....	265
Errors.....	266

Virtual LUNs..... 267

VLUN configuration and enumeration objects.....	267
Creating a VLUN.....	268
Required VLUN elements.....	269
Success.....	270
Errors.....	270
Removing a VLUN.....	271
Parameters and examples.....	272
Success.....	273
Errors.....	273
Querying all VLUNs.....	273
Conditions and examples (query vlun all).....	273
Success.....	275
Errors.....	276

Querying a single VLUN.....	276
Success.....	276
Errors.....	277
Querying VLUNs using filters.....	277
Available filters for VLUN queries.....	278
Success.....	278
Errors.....	279

Copy operations..... 280

License information.....	280
Creating a volume snapshot.....	280
Success.....	282
Errors.....	282
Creating group snapshots of a virtual volumes list.....	283
Success.....	284
Errors.....	285
Creating a physical copy of a volume.....	285
Success.....	289
Errors.....	289
Resynchronizing a physical copy to its parent volume or stopping a physical copy.....	292
Success.....	293
Errors.....	293
Promoting a virtual copy.....	293
Success.....	294
Errors.....	294
Creating a VV-set snapshot.....	296
Success.....	296
Errors.....	297
Creating a physical copy of a VV set.....	299
Success.....	300
Errors.....	300
Resynchronizing or stopping a VV set physical copy.....	301
Success.....	302
Errors.....	302
Promoting a VV-set virtual copy.....	302
Success.....	303
Errors.....	304
Querying the status of a VV-set physical copy.....	305
Updating virtual copies or VV-sets.....	305
Success.....	306
Errors.....	306

HPE 3PAR Remote Copy..... 307

License information.....	307
Managing Remote Copy groups using WSAPI.....	307
Creating a Remote Copy group.....	307
Success.....	309
Errors.....	309
Modifying a Remote Copy group.....	312
Parameters for Remote Copy group modification.....	317
Success.....	318
Errors.....	318
Starting a Remote Copy group.....	320
Success.....	321

Errors.....	322
Stopping a Remote Copy group.....	322
Success.....	323
Errors.....	324
Synchronizing a Remote Copy group.....	324
Success.....	325
Errors.....	326
Removing a Remote Copy group.....	327
Success.....	327
Errors.....	327
Recovering a Remote Copy group.....	328
Success.....	330
Errors.....	331
Admitting a volume into a Remote Copy group.....	332
Success.....	335
Errors.....	336
Dismissing a volume from a Remote Copy group.....	339
Success.....	340
Errors.....	340
Managing Remote Copy targets using WSAPI.....	341
Creating a Remote Copy target.....	341
Success.....	343
Errors.....	343
Modifying a Remote Copy target.....	343
Success.....	344
Errors.....	344
Modifying a Remote Copy group target.....	344
Success.....	345
Errors.....	346
Admitting a target into a Remote Copy group.....	346
Success.....	347
Errors.....	347
Dismissing a target from a Remote Copy group.....	347
Success.....	347
Errors.....	347
Managing a quorum witness on a Remote Copy target.....	348
Success.....	349
Errors.....	349
Creating coordinated snapshots across all Remote Copy group volumes.....	349
Success.....	349
Errors.....	350
Creating a coordinated snapshot of a single Remote Copy group volume.....	351
Success.....	352
Errors.....	352
Querying Remote Copy groups and targets using WSAPI.....	352
Querying overall Remote Copy information.....	353
Success.....	353
Errors.....	355
Querying all Remote Copy targets.....	355
Success.....	355
Errors (query rc targets all).....	358
Querying a single Remote Copy target.....	358
Success.....	358
Errors.....	358
Querying all Remote Copy groups.....	358
Success.....	358
Errors.....	367

Querying a single Remote Copy group.....	367
Success.....	367
Errors.....	368
Querying Remote Copy groups using filters.....	368
Success.....	368
Errors.....	369
Querying a Remote Copy group target.....	369
Success.....	369
Errors.....	370
Querying a Remote Copy group volume.....	370
Success.....	370
Errors.....	371
Querying a single Remote Copy group target instance.....	371
Success.....	371
Errors.....	371
Querying a single Remote Copy group volume instance.....	371
Success.....	371
Errors.....	371
Querying Remote Copy links.....	372
Success.....	372
Errors.....	374
Querying a single Remote Copy link instance.....	374
Success.....	374
Errors.....	374

System information queries and management..... 375

Querying storage system information.....	375
Success.....	375
Errors.....	383
Updating storage system parameters.....	383
Success.....	386
Errors.....	386
Getting version information.....	387
Success.....	387
Errors.....	387
Getting WSAPI configuration information.....	387
Success.....	387
Errors.....	389
Querying the status of all tasks.....	389
Success.....	390
Errors.....	390
Querying the status of a single task.....	390
Success.....	390
Errors.....	395
Canceling a task.....	395
Success.....	396
Errors.....	396
Setting Flash Cache policy.....	396
Success.....	396
Errors.....	397

Disaster recovery management using HPE 3PAR Cluster Extension software and 3PAR Remote Copy..... 398

License requirements.....	398
---------------------------	-----

Synchronous Long Distance (SLD) three data center support.....	398
Enabling disaster recovery management.....	399
Success.....	404
Errors.....	405
Remote Copy group roles and VV permissions.....	406
Cluster Extension sync operation.....	406
Valid Remote Copy group roles and the sync operation.....	406
Cluster Extension recovery operation.....	407
Valid Remote Copy group roles and the recovery operation.....	407
Remote Copy group roles - local is Secondary, remote is Primary.....	407
Remote Copy group roles - local is Secondary-Rev, remote is Primary-Rev.....	408
Remote Copy group roles - local is Primary, remote is Secondary or Primary-Rev..	408
Remote Copy group roles - local is Primary-Rev, remote is Secondary-Rev or	
Primary.....	409
Troubleshooting.....	409
Recovery operation fails.....	409
Using log files for failure analysis.....	410
Flash cache operations.....	411
Creating a Flash Cache.....	411
Success.....	412
Errors.....	412
Removing a Flash Cache.....	412
Success.....	412
Errors.....	413
Querying Flash Cache information.....	413
Success.....	413
Errors.....	414
Available space.....	415
Overall system capacity.....	415
Success.....	415
Errors.....	419
Available space for a CPG or LDLayout object.....	419
Success.....	420
Errors.....	421
WSAPI user and role information.....	423
Querying all WSAPI users.....	423
Success.....	423
Errors.....	424
Querying a single WSAPI user.....	424
Success.....	424
Errors.....	425
Querying all WSAPI roles.....	425
Success.....	425
Errors.....	426
Querying a single WSAPI role.....	426
Success.....	426
Errors.....	426
AO configuration information.....	427

Querying all AO configurations.....	427
Success.....	427
Errors.....	428
Querying a single AO configuration.....	428
Success.....	428
Errors.....	429

HPE 3PAR System Reporter..... 430

Versus Time and At Time report requests.....	430
Versus Time and At Time common variable definitions.....	430
Mandatory sample frequency parameter.....	431
Optional parameter names and values.....	431
Query expression parameters.....	431
Versus Time and At Time groupby requests.....	433
Versus Time summary requests.....	433
At Time summary requests.....	434
Versus Time and At Time error handling.....	435
Query expression error handling	436
Cache memory statistical data reports	436
Requesting Versus Time cache memory statistics.....	436
Report parameters.....	436
Requesting At Time cache memory statistics.....	439
Report parameters.....	439
Query expression parameters.....	439
Success.....	440
Errors.....	440
Versus Time response.....	440
Versus Time summary response.....	443
At Time response.....	445
At Time summary response.....	445
CPG space data reports	447
Requesting Versus Time CPG space data.....	447
Report parameters.....	447
Requesting At Time CPG space data.....	448
Report parameters.....	448
Query expression parameters.....	449
Success.....	449
Errors.....	449
Versus Time response.....	449
Versus Time summary response.....	451
At Time response.....	453
At Time summary response.....	455
CPG statistical data reports.....	456
Requesting Versus Time CPG statistical data.....	456
Report parameters.....	456
Requesting At Time CPG statistical data.....	457
Report parameters.....	457
Query expression parameters.....	458
Success.....	458
Errors.....	458
Versus Time response.....	458
Versus Time summary response.....	459
At Time response.....	461
At Time summary response.....	462
CPU statistical data reports.....	463

Requesting Versus Time CPU statistical data.....	463
Report parameters.....	463
Requesting At Time CPU statistical data report.....	464
Report parameters.....	465
Query expression parameters.....	465
Success.....	465
Errors.....	465
Versus Time response.....	465
Versus Time summary response.....	467
At Time response.....	468
At Time summary response.....	469
Physical disk capacity reports.....	470
Requesting Versus Time physical disk capacity.....	470
Report parameters.....	470
Requesting At Time physical disk capacity.....	471
Report parameters.....	471
Query expression parameters.....	471
Success.....	471
Errors.....	472
Versus Time response.....	472
Versus Time summary response.....	473
At Time response.....	474
At Time summary response.....	476
Physical disk statistical data reports.....	477
Requesting Versus Time physical disk statistics.....	477
Versus Time physical disk statistics report parameters.....	477
Requesting At Time physical disk statistics.....	478
At Time physical disk statistics report parameters.....	478
Query expression parameters.....	479
Success.....	479
Errors.....	479
Versus Time response.....	479
Versus Time summary response.....	481
At Time response.....	483
At Time summary response.....	485
Physical disk space data reports.....	486
Requesting Versus Time physical disk space data.....	486
Report parameters.....	486
Requesting At Time physical disk space data.....	488
Report parameters.....	488
Query expression parameters.....	488
Success.....	488
Errors.....	488
Versus Time response.....	489
Versus Time summary response.....	490
At Time response.....	492
At Time summary response.....	493
Port statistical data reports.....	494
Requesting Versus Time port statistics.....	494
Report parameters.....	494
Requesting At Time port statistics.....	495
Report parameters.....	495
Query expression parameters.....	496
Success.....	496
Errors.....	496
Versus Time response.....	496
Versus Time summary response.....	498

At Time response.....	499
At Time summary response.....	501
QoS statistical data reports.....	502
Requesting Versus Time QoS statistics.....	502
Report parameters.....	502
Requesting At Time QoS statistics.....	504
Report parameters.....	504
Query expression parameters.....	505
Success.....	505
Errors.....	505
Versus Time response.....	505
Versus Time summary response.....	507
At Time response.....	509
At Time summary response.....	511
Remote Copy statistical data reports.....	512
Requesting Versus Time Remote Copy statistics.....	512
Report parameters.....	512
Requesting At Time Remote Copy statistics.....	514
Report parameters.....	514
Query expression parameters.....	514
Success.....	515
Errors.....	515
Versus Time response.....	515
Versus Time summary response.....	516
At Time response.....	518
At Time summary response.....	519
Remote Copy volumes statistical data reports.....	521
Requesting Versus Time Remote Copy volume statistics.....	521
Report parameters.....	521
Requesting At Time Remote Copy volume statistics.....	524
Report parameters.....	524
Query expression parameters.....	524
Success.....	525
Errors.....	525
Versus Time response.....	525
Versus Time summary response.....	527
At Time response.....	529
At Time summary response.....	532
VLUN statistical data reports.....	534
Requesting Versus Time VLUN statistics.....	534
Report parameters.....	534
Requesting At Time VLUN statistics.....	535
Report parameters.....	535
Query expression parameters.....	536
Success.....	536
Errors.....	536
Versus Time response.....	537
Versus Time summary response.....	538
At Time response.....	540
At Time summary response.....	542
Volume space data reports.....	543
Requesting Versus Time volume space data.....	543
Report parameters.....	543
Requesting At Time volume space data.....	544
At Time volume space data parameters.....	544
Query expression parameters.....	545
Success.....	545

Errors.....	545
Versus Time response.....	545
Versus Time summary response.....	548
At Time response.....	550
At Time summary response.....	552
WSAPI support for HPE 3PAR priority optimization.....	554
Creating QoS rules.....	554
QOS rule requirements.....	556
Success.....	557
Errors.....	557
Modifying QoS rules.....	558
Success.....	559
Errors.....	560
Deleting QoS rules.....	560
Success.....	560
Errors.....	560
Querying QoS rules.....	560
Querying all QoS rules.....	560
Success.....	560
Errors.....	562
Querying a single QoS rule.....	562
Success.....	563
Errors.....	563
Support and other resources.....	564
Support and other resources.....	564
Accessing Hewlett Packard Enterprise Support.....	564
Accessing updates.....	564
Customer self repair.....	565
Remote support.....	565
Warranty information.....	565
Regulatory information.....	566
Documentation feedback.....	566

Flexible storage management with HPE 3PAR Web Services API

The Web Services API (WSAPI) provides a more flexible and powerful way to perform storage management tasks than the HPE 3PAR Command Line Interface (CLI) or the HPE 3PAR OS Management Console software. Use WSAPI to automate your management tasks for hosts, ports, volumes, and more.

Unless otherwise stated, the features, commands, and operations described in this guide are available in all versions of WSAPI. Call outs within the text indicate any new operations provided in a given version of WSAPI.

Table 1: WSAPI and HPE 3PAR OS versions

HPE 3PAR OS	WSAPI	Introduction
3.1.2	1.1	March 2013
3.1.2 MU2	1.2	June 2013
3.1.3	1.3	March 2014
3.1.3 MU1	1.3.1	June 2014
3.2.1	1.4	September 2014
3.2.1 MU1	1.4.1	October 2014
3.2.1 MU2	1.4.2	December 2014
3.2.2	1.5	August 2015
3.2.2 MU2	1.5.2	January 2016
3.3.1	1.6	March 2017
3.3.1 MU1	1.6.1	August 2017
3.3.1 MU2	1.6.2	(OS Release Note only)
3.3.1 MU3	1.6.3	August 2018

More information

[WSAPI HTTP protocol](#) on page 22

[Java and Perl client code samples for WSAPI](#) on page 21

[Basic CLI commands for WSAPI server configuration](#) on page 21

WSAPI development basics

Java and Perl client code samples for WSAPI

WSAPI includes an example code base in Java and Perl that demonstrates the use of WSAPI. You can download these samples directly from [HPE Software Depot](#).

Java client code sample description

- Core `storage-entity` classes representing the attributes of 3PAR storage system objects, as well as input parameters (members) for creating objects.
- An example client interface that demonstrates the use of JavaScript Object Notation (JSON) processors with the base classes.
- Example programs to illustrate the creation and query of base entities. These examples rely on the accessory and base packages.

Java client code samples require certificate validation when using HTTPS (as opposed to HTTP). To change this behavior, see the `README.txt` file in the code sample Java folder.

For additional information about changing the certificate used by the 3PAR StoreServ storage system, see `createcert` help in the HPE 3PAR OS CLI Command Reference.

Perl client code sample description

- A module with methods for accessing the 3PAR storage system.
- Modules with mappings of the error codes and enumerated properties used by WSAPI.
- Example programs that demonstrate creating, querying, and deleting base entities.

More information

<http://www.hpe.com/info/storage/docs/>

Basic CLI commands for WSAPI server configuration

For CLI details, see *HPE 3PAR OS Command Line Interface Reference*.

Table 2: Basic WSAPI CLI commands

Command	Description	Authority
<code>removewsapisession</code>	Removes WSAPI user connections.	Super Any role granted <code>wsapisession_remove</code> permission. Use <code>removewsapisession</code> to remove all sessions and connections associated with a WSAPI user. The <code>removewsapisession</code> command is the only way to remove connections associated with a WSAPI user. The <code>removewsapisession -close_sse</code> command closes the Server Sent Event connection channel.
<code>setwsapi</code>	Sets properties of the WSAPI server.	Super, Service Any role granted <code>wsapi_set</code> permission
<code>showwsapi</code>	Displays the WSAPI server service configuration state.	Any role in the system.
<code>showwsapisession</code>	Shows the WSAPI server sessions information.	Any role in the system.
<code>startwsapi</code>	Starts the WSAPI server.	Super, Service Any role granted <code>wsapi_set</code> permission
<code>statwsapi</code>	Returns statistics for all WSAPI operations.	Any role in the system.
<code>stopwsapi</code>	Stops the WSAPI server.	Super, Service Any role granted <code>wsapi_set</code> permission

More information

<http://www.hpe.com/info/storage/docs/>

WSAPI HTTP protocol

WSAPI uses the HTTPS protocol to enable programmatic management of 3PAR storage servers, and provides client access to web services at specified HTTPS locations. Clients communicate with the WSAPI server using HTTPS methods and data structures represented with JSON.

You can use WSAPI with a series of HTTP or HTTPS requests to automate and manage many tasks. For security reasons, Hewlett Packard Enterprise recommends using HTTPS.

Unsupported HTTP versions

Because HTTP/1.0 does not support chunked transfer encoding, the WSAPI server does not support HTTP/1.0. If an HTTP/1.0 request comes in, the WSAPI server generates the following error message, indicating an unsupported HTTP version:

```
UNSUP_HTTP
```

More information

[HTTP chunked transfer encoding in WSAPI](#) on page 65

Supported HTTP methods for WSAPI

GET—Retrieve information identified by the request Uniform Resource Identifier (URI).

POST—Create an object, described in the body of the request, in the collection identified by the URI. Also used to complete a customized action described in the body of the request.

PUT—Modify an entity identified by the request URI.

DELETE—Delete a resource identified by the request URI.

More information

[WSAPI Uniform Resource Identifier syntax](#) on page 23

WSAPI Uniform Resource Identifier syntax

All WSAPI operations use an HTTPS operator (GET, POST, PUT, or DELETE) and a URI.

In the following example, the URI corresponds to the volume (`projectXvol`), which resides on the 3PAR storage system as the host name `storsys1.example.com`:

```
https://storsys1.example.com:8080/api/v1/volumes/projectXvol
```

Enabling and disabling the WSAPI HTTP protocol

The WSAPI HTTP protocol defaults to HTTPS.

Procedure

1. Log in to the CLI host as `Super`, `Service`, or any role granted the `wsapi_set` right.
2. Change the HTTPS protocol.

```
cli% setwsapi -https [enable | disable]
```
3. Change the HTTP protocol

```
cli% setwsapi -http [enable | disable]
```

WSAPI request and response messages

A system response message for a failed client request includes an HTTP error code and an associated WSAPI error code (see, [WSAPI error codes and descriptions](#)).

The following examples show an client request message with an invalid structure. The server response message shows the HTTP status code 403 `Forbidden` and the WSAPI error code 5, which describes the error.

HTTP client request message with invalid detail

```
POST /api/v1/credentials HTTP/1.1
Content-Type: application/json
Host: storsys1:8080
Content-Length: 44
```

```
Expect: 100-continue
Accept: application/json
{"password":"not bob's password","user":"bob"}
```

HTTP server response message showing failure

```
HTTP/1.1 403 Forbidden
Date: Tue, Wed, 31 Oct 2012 22:15:52 GMT
Server: hp3par-wsapi
Content-Type: application/json
Connection: close
{"code":5,"desc":"invalid user or password"}
```

WSAPI client request message headers

The HTTP requests that clients make to the WSAPI server include HTTP headers. The following table lists the required and optional HTTP headers supported in WSAPI. Optional headers, when present, must be one of the values listed in the **Values** column. For example, `Accept: application/json; charset=UTF-8`.

Header	Description	Values	Required
Accept	Acceptable client response formats.	One of the following ¹ : <ul style="list-style-type: none">• application/json• application/*• application/json*• application/<anything>+json• */json• */*• */json*• */<anything> +json• text/event-stream	No
Accept-Language	The response language the client can accept.	One of the following: <ul style="list-style-type: none">• *• en• en*	No
Content-Length	The length of the content in bytes.	Number of bytes	Yes, for requests with a message body.
Content-Type	The format of the body.	application/json	Yes, for requests with a message body.

Table Continued

Header	Description	Values	Required
	The format of the message body for an SSE request.	text/event-stream	Yes, for SSE requests.
Host	The host and port number of the resource being requested.	<hostname:http{s}_port>	Maybe ²
X-HP3PAR-WSAPI-SessionKey	A key associated with the user that created credentials.	The result of a credentials creation request.	Yes, except for a request to create credentials.

¹ In these examples, * is literally an asterisk (*), and <anything> means any string of characters.

² The Host header is optional if the request URI contains <hostname>:<http{s}_port>. If the request URI does not contain the host and port number, you must specify the Host header.

WSAPI client request message body content

Use an HTTP method from the client to make requests of the WSAPI server.

The HTTP POST or PUT methods usually require a request message body, and sometimes return a response message body. Both message bodies use JSON encoding.

The HTTP POST or PUT methods issued from the client pass a JSON object as the request message body. A request message body consists of a single JSON object, enclosed in braces ({...}). The object might contain sub-objects, also enclosed in braces. For example:

```
{ "action": "createSnapshot", "parameters":
  { "name": "t840-vv-ss", "id": null, "expirationHours": null, "retentionHours":
    null, "readOnly": true, "comment": "My first WSAPI-created snapshot." } }
```

The HTTP GET and HTTP DELETE methods ignore any request message body.

More information

<http://www.json.org/>

JSON objects in WSAPI

Required parameters or members

The JSON object includes required parameters for, or members of, the operation.

For example, when creating a volume, required members include:

- Volume name.
- CPG name (provides disk space for the volume).
- Volume size.

Optional members for the previous example include the ID of the volume and a comment.

Although the JSON object can include optional members, most operations do not have them.

Optional members and ignored values

When constructing a JSON object, you can omit optional members or set the member parameter to a value that tells the server to ignore it.

The WSAPI server considers the following objects and arrays as empty:

- A JSON object that has only ignored fields or null fields.
- A JSON array with no elements.
- Objects and arrays composed of empty subobjects or subarrays.

When empty arrays and objects are present, the server might return an error indicating that required members are missing.

For more information about JSON object format, see the [JSON.org](https://www.json.org) website.

WSAPI and null values in JSON object properties

WSAPI allows the use of a `null` value as a JSON object property. Clients written in languages that provide classes (or objects) as alternatives to JSON primitives might generate JSON objects with a property value of `null`. WSAPI ignores `null` properties.

Example

Jackson JSON processor -- Using this processor, a client written in Java that contains uninitialized `boolean` or `integer (int)` attributes, results in null-value JSON properties. Uninitialized attributes cast as `boolean` or `integer (int)` result in JSON properties with a value of 0 (zero), which might not be meaningful for the property.

Unset or no value JSON object properties -- The API server information returned does not include explicit null values in these JSON objects. For example, if you query a volume that is not in a domain, the system returns a JSON object with the domain field omitted rather than a `<domain>:null` entry.

More information

https://www.w3schools.com/js/js_json_datatypes.asp

JSON enumerated values in WSAPI

WSAPI uses the JSON `enum` keyword to create specific enumerations for a fixed set of values.

The enumeration states defined in the following table are variable. Clients can use any state or health symbols with the integers. Integer values representing the symbols appear in JSON objects.

When you include a State property in a JSON object, it represents the health of a storage volume numerically, or in enumerated form. The values defined for an enumeration start with 1; the value 0 is unused.

Table 3: State enumeration

State	Value	Description (Health)
NORMAL	1	Normal operation
DEGRADED	2	Degraded state
FAILED	3	Abnormal operation
UNKNOWN	99	Unknown state

Enumeration value parameters

Each enumeration can have the value of 99, 999, or -1. These values mean that the API server has encountered a state that it does not recognize and therefore cannot assign a value from the valid set. This representation usually means that the user entered an invalid enumeration value, or the API server has a defect.

Using tools that deserialize JSON into a class allows detection of an omitted enumeration property. Because the member is not assigned a nonzero value, the member retains its default or preset value of 0.

WSAPI JSON types

WSAPI uses the standard JSON **primitive types** and **structured types** as defined by IETF RFC 4627.

Primitive types are:

- `string`
- `number`
- `boolean`
- `null`

Structured types are `object` and `array`.

The properties that WSAPI returns in JSON output objects and the members provided in JSON input objects use JSON primitive types with additional restrictions on valid values. Restrictions on values or format use the names listed in the **Type** column of the following table.

Table 4: API types

Type	Description
8601	JSON string with time in ISO 8601 format: <code>YYYY-MM-DDThh:mm:ssTZD</code> , TZD indicates one of the following: <ul style="list-style-type: none">• <code>Z</code>• <code>+hh:mm</code>• <code>-hh:mm</code> For more information, see http://www.w3.org/TR/NOTE-datetime
epoch	The number of seconds since 00:00:00 on 1 January 1970 UTC/GMT. Also known as Unix epoch .
float	JSON number
hex	JSON string containing a hexadecimal value.
igint32	JSON number restricted to a 32-bit signed integer. The server ignores negative values, treating them as if not present.
int32	JSON number restricted to a 32-bit signed integer.

Table Continued

Type	Description
MAC	<p>JSON string containing six groups of two hexadecimal digits, with or without a hyphen (-):</p> <ul style="list-style-type: none"> AC-16-2D-36-06-F7 AC162D3606F7
name16	JSON string of 16 or fewer characters.
name27	<p>A string of 27 or fewer characters, where a character is 'a' 'z', 'A' 'Z', '0' '9', '.', '_', or '-'.</p> <p>a-z A-Z 1-9 .(dot) _(underscore) -(dash)</p> <p>A dash (-) is disallowed as the first character.</p> <p>A name of zero characters is represented in JSON as the empty string (""). An unset name is represented in JSON as "null" (without the quotes).</p>
name31	<p>JSON string of 31 or fewer characters, in which the following characters are allowed:</p> <p>a-z A-Z 0-9 .(dot) -(dash)</p> <p>A dash (-) is disallowed as the first character.</p> <p>An empty string enclosed in quotation marks ("") represents a name with no characters.</p> <p>JSON represents an unset name as <code>null</code>.</p>
name223	JSON string of 223 or fewer characters.
print255	JSON string of 255 or fewer characters.
print511	JSON string of 511 or fewer characters.
uint32	JSON number restricted to a 32-bit unsigned number.

Table Continued

Type	Description
<code>uuid string</code>	<p>Canonical form of UUID, represented by 32 hexadecimal digits. The digits are displayed in five groups, separated by hyphens, in the following form:</p> <p>8-4-4-4-12</p> <p>In all, the <code>uuid string</code> consists of 36 characters—32 alphanumeric characters and four hyphens. For example:</p> <p>0453A945-2B96-404F-92E6-F62D12492042</p>
<code>WWN</code>	<p>JSON string of 16 or 32 characters.</p> <p>For port and FC host, the WWN is always 16 characters.</p> <p>Possible characters are:</p> <p>0–9</p> <p>a–f</p> <p>A–F</p> <p>: (colon) used only in MAC addresses for host WWNs</p> <p>For example:</p> <ul style="list-style-type: none"> 50014380231C647A 50:01:43:80:23:1C:64:7A

WSAPI JSON member suffixes

- **MiB**, which represents size or space in mibibytes where 1 MiB = 1,048,576 bytes (2^{20} bytes).
- **MB**, which represents size or space in megabytes where 1 MB = 1,000,000 bytes (10^6 bytes).
- **Pct**, which are percentages.

Supported JSON character encoding in WSAPI

- ASCII
- ISO-8859-1
- US-ASCII
- UTF-8
- UTF-16
- UTF-32
- UTF-16BE
- UTF-32BE
- UTF-16LE
- UTF-32LE

WSAPI client request message body examples

Client HTTP query request

```
GET /api/v1/cpgs HTTP/1.1
Accept: application/json
Accept-Language: en
X-HP3PAR-WSAPI-SessionKey: 1-c86aedb2e7e98b4119cd74b624b8576b-b06d2d50
```

Client HTTP creation request

```
POST /api/v1/cpgs HTTP/1.1
X-HP3PAR-WSAPI-SessionKey: 1-c86aedb2e7e98b4119cd74b624b8576b-b06d2d50
Accept: application/json
Content-Type: application/json
Content-Length: 27
{
  "name" : "t887-cpg"
}
```

WSAPI server response message headers

HTTP Header	Value	Description
Server	HP3PAR-WSAPI	The 3PAR WSAPI Server.
Cache-Control	no-cache	Disables caching by mechanisms between the Web Services API server software and client (HTTP RFC 2616), for HTTP/1.0 and 1.1.
Pragma	no-cache	Disables caching by mechanisms between the WSAPI server software and client (HTTP RFC 2616), for HTTP/1.0 and 1.1.
Connection	close	Indicates that the connection will be closed after completion of the response (HTTP RFC 2616).
Content-Type	application/ json	Included when the message body, which is in JSON format, is not empty. Text/event stream for SSE response.
Location	Variable location	The path portion of the URI of a newly created or updated object, such as: /api/v1/volumes/foo Encoding is UTF-8 and percent-encoded per RFC 3986.
Date	Variable date	The date and time at which the message was originated, per RFC 2616.

WSAPI query filter specification

WSAPI query syntax

WSAPI query operators

WSAPI query errors and examples

WSAPI query syntax

One filter

```
?query="field_name COMPARISON_OPERATOR field_value"
```

Two filters

```
?query="field_name1 COMPARISON_OPERATOR field_value1 LOGICAL_OPERATOR  
field_name2 COMPARISON_OPERATOR field_value2"
```

Three filters

```
?query="field_name1 COMPARISON_OPERATOR field_value1 LOGICAL_OPERATOR  
field_name2 COMPARISON_OPERATOR field_value2 LOGICAL_OPERATOR field_name3  
COMPARISON_OPERATOR field_value3"
```

More filters

```
?query="field_name1 COMPARISON_OPERATOR field_value1 LOGICAL_OPERATOR  
field_name2 COMPARISON_OPERATOR field_value2 LOGICAL_OPERATOR field_name3  
COMPARISON_OPERATOR field_value3 COMPARISON_OPERATOR ....."
```

WSAPI query operators

COMPARISON_OPERATOR

Although WSAPI includes support for a particular `COMPARISON_OPERATOR`, some or all `field_names` within a particular feature might not support that same `COMPARISON_OPERATOR`. When WSAPI encounters a mismatch, the system produces a 0 response.

For example, WSAPI supports the `COMPARISON_OPERATOR`, `LIKE` for use with `remotecopygroups` only when using the `field_name` of `name`.

COMPARISON_OPERATOR	Supported features
LIKE	filestoresnapshots remotecopygroups
EQ	volumes vluns ports hosts portdevices fcswitches hostpersonas systemreporter virtualfileservers fpgs filestores fileshares filestoresnapshots filepersonaquotas remotecopygroups volumesets hostsets
GE	systemreporter
LE	systemreporter

LOGICAL_OPERATOR

WSAPI 1.6 supports one type of LOGICAL_OPERATOR for a given query. Using multiple operators is not supported and is considered incorrect grammar.

LOGICAL_OPERATORS are:

- AND
- OR

WSAPI query error causes

Incorrect grammar

Error Code: 148 INV_QUERY_STRING

Examples

```
/api/v1/<feature>?query=" "  
/api/v1/<feature>?query="fsfsfsggg"  
/api/v1/<feature>?query="field_name field_value"  
/api/v1/<feature>?query="field_name EQfield_value"  
/api/v1/<feature>?query="field_nameLIKE field_value"  
/api/v1/<feature>?query="field_name rfwLIKE field_value"
```



```
/api/v1/<feature>?query="field_name1 LIKE field_value1 AND field_name2 LIKE field_value2 AND"
/api/v1/<feature>?query="field_name1 LIKE field_value1 AND field_name2 LIKE field_value2 AND field_name3"
/api/v1/<feature>?query="field_name1 LIKE field_value1 AND field_name2 LIKE field_value2 OR field_name3 LIKE field_value3"
```

Invalid comparison operator

Error Code: 323 INV_COMP_OP

Examples

```
/api/v1/<feature>?query="field_name EQt field_value"
/api/v1/<feature>?query="field_name fsfsfLIKE field_value"
/api/v1/<feature>?query="field_name fsfsfs field_value AND field_name2 LIKE field_value2"
```

Unsupported logical operator for given feature

Error Code: 326 INV_LOGICAL_OP
desc: LOGICAL_OPERATOR invalid or not supported for this feature

Examples

```
/api/v1/volumes?query="field_name1 EQ field_value1 fssfs field_name2 EQ field_value2" ← Invalid Logical Op
/api/v1/volumes?query="field_name1 EQ field_value1 AND field_name2 EQ field_value2" ← Unsup Logical Op
/api/v1/volumes?query="field_name1 EQ field_value1 AND field_name2 EQ field_value2 OR field_name3" ← Unsup Logical Op
```

WSAPI zero (0) response causes

The following table lists the possible causes for a zero (0) response in WSAPI.

Cause	Example
Nonexistent field name	/api/v1/<feature>? query="nonexistent_field_name EQ field_value"
Nonexistent field value	/api/v1/<feature>?query="field_name EQ nonexistent_field_value"
Unsupported comparison operator for a given feature	/api/v1/Volumes?query="field_name LIKE field_value" /api/v1/remotecopygroups? query="field_name1 LIKE field_value1 OR field_name2 EQ field_value2"

Table Continued

Cause	Example
Invalid combination of comparison operator and field name	<pre>/api/v1/systemreporter/vstime/physicaldiskstatistics/daily?query="sampleTime EQ field_value"</pre> <p>1</p>
Valid query returns no objects	

¹ The `systemreporter` feature supports `sampleTime` as a `field_name`, and WSAPI supports `EQ` as a `COMPARISON_OPERATOR`. However, `sampleTime` as a `field_name` supports `GE` or `LE` only, as `COMPARISON_OPERATORS`. Therefore, using `EQ` with `sampleTime` is an invalid combination, and WSAPI produces a 0 response as a result.

HTTP status codes for successful WSAPI operations

- 200 OK
- 201 Created
- 202 Accepted
- 300 Multiple Choice

WSAPI error codes and descriptions

A failed WSAPI operation returns a response message body that contains an HTTP error code and a JSON object that contains information specific to WSAPI.

The response message body can include `code` members, `desc` members, and `ref` members. The `code` member is a number, and the `desc` and `ref` members are strings.

If a particular error causes your application to change behavior, the `code` member provides more stability than the `desc` member, which is subject to change.

In addition, although the documentation uses an API error name for each numerical code, WSAPI communications between client and server do not use that name. WSAPI uses only the numeric value for communication between client and server.

WSAPI error response code member descriptions

The WSAPI error response message contains a `code` member (a JSON numeric type) as described in the following tables.

WSAPI does not use the error naming convention shown in the tables. Although the naming convention provides readability for identification purposes, WSAPI uses only the WSAPI error code value for communication between the client and server.

Table 5: Generic WSAPI code member status and error codes

WSAPI error	WSAPI error code	HTTP error code	Description
INT_SERV_ERR	1	500 Internal Server Error	An internal error has occurred in the server. Memory allocation failure.
INV_SSL	2	400 Bad Request	An SSL protocol violation has occurred.
INPUT_EOF	3	400 Bad Request	The client has not sent a complete request.
INPUT_TOO_LONG	4	413 Request Entity Too Large	The client has sent a request that is too long.
INV_USER_PASS	5	403 Forbidden	The user name or password is invalid.
INV_SESS_KEY	6	403 Forbidden	The client request has an invalid session key.
TIMEOUT	7	408 Request Timeout	The client did not send or receive data within the time limit.
UNSUP_HTTP	8	505 HTTP Version Not Supported	The client request uses an unsupported HTTP version.
UNSUP_OP	9	501 NOT IMPLEMENTED	The resource does not support the operation. The operation name is not specified in the URI.
	10		(Not used by the 3PAR OS.)
URI_RES_NOT_FOUND	11	404 Not Found	The requested resource does not exist.
INV_INPUT	12	400 Bad Request	The client request contains an invalid value.
PERM_DENIED	13	403 Forbidden	Permission denied; insufficient privileges.
TOO_LARGE	28	400 Bad Request	The client request contains a value that is too large.
OTHER	29	400 Bad Request	A more specific error could not be determined.

Table Continued

WSAPI error	WSAPI error code	HTTP error code	Description
	30		Not used by the 3PAR OS.
SVC_UNAVAIL	31	503 Service Unavailable	Server reached the maximum number of connections.
HAS_CHILD	32	409 Conflict	Volume has a child.
NO_SNAP_CPG	33	409 Conflict	Volume has no snap CPG.
IN_USE	34	409 Conflict	Resource is in use.
UNSUP_REPRESENTATION	35	406 Not Acceptable	Unsupported representation specified in the client HTTP Accept header.
UNSUP_LANGUAGE	36	406 Not Acceptable	Unsupported language specified in the client HTTP Accept-Language header.
NON_EXISTENT_DOMAIN	38	404 Not Found	Domain does not exist.
INV_INPUT_WRONG_TYPE	39	400 Bad Request	JSON input object contains an unexpected name-value pair (for example, string expected; number found). The HTTP <code>ref</code> member contains the name of the name-value pair.
INV_INPUT_MISSING_REQUIRED	40	400 Bad Request	JSON input object is missing a required name-value pair. The HTTP <code>ref</code> member contains the expected name.
UNSUP_CONTENT	51	415 Unsupported Media Type	Unsupported content (as specified in the HTTP Content-Type header).
INV_INPUT_NOT_JSON_OBJ	52	400 Bad Request	Expected to find a JSON object but found another JSON type instead.
INV_URL_PERCENT_ENCODING	56	400 Bad Request	Invalid URL percent-encoding.
INV_INPUT_EXCEEDS_LENGTH	57	400 Bad Request	Invalid input: string length exceeds limit.

Table Continued

WSAPI error	WSAPI error code	HTTP error code	Description
JSON_SYNTAX_ERR	60	400 Bad Request	JSON syntax error. When the error is associated with an object member, the HTTP <i>ref</i> member contains the name of the member.
JSON_NOT_SUPPORTED	61	400 Bad Request	Too many levels of nesting in JSON; numbers too large to be represented; length restrictions exceeded. When the error is associated with an object member, the HTTP <i>ref</i> member contains the name of the member.
INV_HTTP_HEADER	62	400 Bad Request	Invalid HTTP header syntax.
INV_UTF	63	400 Bad Request	A request body contains a sequence of characters that is invalid for the supported UTF encoding.
INV_INPUT_NO_REQ	64	400 Bad Request	A POST request is missing a JSON request body.
INV_HTTP_REQ	65	400 Bad Request	The request line (first line) of an HTTP request does not comply with the form specified for “Request-Line” in RFC 2616.
INV_URI	66	400 Bad Request	The URI is not absolute, contains characters not allowed in a URI, contains invalid percent-encoding, or, after percent decoding, contains an invalid UTF-8 character sequence.
INV_POST_ACTION	67	400 Bad Request	An HTTP POST request contains an action member with an invalid value.
SYS_SVC_NOT_READY	68	503 Service Unavailable	Services the system requires to process the requested operation are not ready.
INV_INPUT_ILLEGAL_CHAR	69	400 Bad Request	Input contains one or more illegal characters.

Table Continued

WSAPI error	WSAPI error code	HTTP error code	Description
UNLICENSED_FEATURE	70	403 Forbidden	System is not licensed for this feature or functionality.
SYSTEM_ERR	95	500 Internal Server Error	A system service required by the server returned an unexpected error, preventing the server from fulfilling the request. (WSAPI 1.2 and later)
INV_INPUT_ALL_WHITE_SPACES_STR	182	400 Bad Request	Invalid input: All-white-spaces string. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
EMPTY_HTTP_HOST_HDR	186	503 Service Unavailable	The HTTP Host header is empty or missing. (WSAPI 1.4 and later)
SYS_TOO_BUSY	270	400 Bad Request	The system is busy. Try again later. (WSAPI 1.4.1 and later)
NO_HTTP_HDR	271	400 Bad Request	The HTTP header was not provided. (WSAPI 1.4.1 and later)
MEM_ALLOC_ERR	343	500 Internal Server Error	Memory allocation error.

Table 6: Operation-specific API code member status and error codes

API Error	API Error Code	HTTP Code	Description
EXISTENT_CPG	14	409 Conflict	The CPG exists.
NON_EXISTENT_CPG	15	404 Not Found	The CPG does not exist.
EXISTENT_HOST	16	409 Conflict	The host exists.
NON_EXISTENT_HOST	17	404 Not Found	The host does not exist.
EXISTENT_LUN	18	409 Conflict	The VLUN exists.
NON_EXISTENT_VLUN	19	404 Not Found	The VLUN does not exist.
NON_EXISTENT_PORT	20	404 Not Found	The port does not exist.

Table Continued

API Error	API Error Code	HTTP Code	Description
BAD_PORT_TYPE	21	400 Bad Request	Attempt to create VLUN with invalid port type.
EXISTENT_VOL	22	409 Conflict	The storage volume exists.
NON_EXISTENT_VOL	23	404 Not Found	The storage volume does not exist. Volume not found.
NO_SPACE	24	400 Bad Request	Not enough space is available for the operation. Varies based on the following circumstances: <ul style="list-style-type: none"> • In volume creation, when the CPG contains insufficient space for the specified volume size. • In CPG creation, when the storage hardware configuration does not support the requested LD layout. • In CPG creation, when the chunklets required for the requested LD layout are in the process of being cleaned.
HAS_RO_CHILD	25	409 Conflict	The volume has a read-only child.
EXPORTED_VLUN	26	409 Conflict	The VLUN is still exported.
RETAINED	27	409 Conflict	Volume retention time has not expired.
HAS_CHILD	32	409 Conflict	The volume has a child volume.
NO_SNAP_CPG	33	409 Conflict	No snapshot CPG has been configured for the volume.
INV_SET_SIZE	37	400 Bad Request	Invalid RAID set size.
INV_INPUT_DUP_NAME	41	400 Bad Request	A JSON input object contains more than one name-value pair with the same name. The HTTP <code>ref</code> member contains the name.

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_INPUT_UNREC_NAME	42	400 Bad Request	A JSON input object contains a name-value pair with a name that is unrecognized. The HTTP <code>ref</code> member contains the name.
INV_INPUT_EXCEEDS_RANGE	43	400 Bad Request	A JSON input object contains a name-value pair with a numeric value that exceeds the expected range. The HTTP <code>ref</code> member contains the name.
INV_INPUT_PARAM_CONFLICT	44	400 Bad Request	A JSON input object contains a name-value pair that cannot be present with another name-value parameter that is present. The HTTP <code>ref</code> member contains the name.
INV_INPUT_EMPTY_STR	45	400 Bad Request	JSON input object contains a name-value pair with an empty string (distinct from a null string) that requires a string of length greater than zero.
INV_INPUT_BAD_ENUM_VALUE	46	400 Bad Request	A JSON input object contains an <code>enum</code> property with a value that is not in the valid range.
INV_INPUT_WARN_GT_LIMIT	47	400 Bad Request	The allocation warning level is higher than the allocation limit.
INV_INPUT_USR_ALRT_NON_TPVV	48	400 Bad Request	User space allocation alerts are valid only with a TPVV.
INV_INPUT_RETAIN_GT_EXPIRE	49	400 Bad Request	The volume retention time is greater than the expiration time.
INV_INPUT_VV_POLICY	50	400 Bad Request	An invalid policy (for example, system or caching) is specified for the volume.
BAD_CPG_PATTERN	53	400 Bad Request	A pattern in a CPG specifies illegal values.
MISSING_VLUN_EXPORT_INFO	54	400 Bad Request	Missing both hostname and port position.
INV_INPUT_PORT_SPECIFICATION	55	400 Bad Request	Incorrect port specification.
INV_INPUT_TIME	58	400 Bad Request	Invalid time specified.
EXISTENT_ID	59	409 Conflict	An ID exists.

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_INPUT_TOO_MANY_WWN_OR_iSCSI	71	400 Bad Request	Too many World Wide Names (WWNs) or iSCSI names are specified. (WSAPI 1.2 and later)
AUTO_LUN_ID_UNAVAILABLE	72	409 Conflict	LUN ID cannot be assigned within the specified range. (WSAPI 1.2 and later)
EXISTENT_PATH	73	409 Conflict	Host WWN/iSCSI name is already used by another host. (WSAPI 1.2 and later)
NON_EXISTENT_CHAP	74	404 Not Found	No CHAP has been configured for host. (WSAPI 1.2 and later)
NON_UNIQUE_CHAP_SECRET	75	409 Conflict	Target CHAP and initiator CHAP are the same. Target CHAP secret and initiator CHAP secret must be unique. (WSAPI 1.2 and later)
NO_INITIATOR_CHAP	76	404 Not Found	The host CHAP must be enabled before the target CHAP is set. (WSAPI 1.2 and later)
HOST_IN_SET	77	409 Conflict	Host is a member of a set. (WSAPI 1.2 and later)
INV_INPUT_ONE_REQUIRED	78	400 Bad Request	Invalid input: one of the parameters is required. The HTTP <code>ref</code> member contains a comma-separated list of parameters. (WSAPI 1.2 and later)
INV_INPUT_BAD_LENGTH	79	400 Bad Request	Invalid input: The string length is not within in valid range. (WSAPI 1.2 and later)
NON_EXISTENT_PATH	80	400 Bad Request	Path does not exist. (WSAPI 1.2 and later)
INV_OPERATION_VV_MODIFY_USR_CPG_TPVV	81	403 Forbidden	Cannot modify user CPG of a TPVV. (WSAPI 1.2 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
CPG_NOT_IN_SAME_DOMAIN	82	403 Forbidden	The snap CPG is not in the same domain as the user CPG. The CPG is not in the current domain. (WSAPI 1.2 and later) The CPG is not in the same domain as the Remote Copy group. (WSAPI 1.4 and later)
INV_OPERATION_VV_PEER_VOLUME	83	403 Forbidden	Operation not allowed on peer volume. (WSAPI 1.2 and later)
INV_OPERATION_VV_INTERNAL_VOLUME	84	403 Forbidden	Operation not allowed on internal volume. (WSAPI 1.2 and later)
INV_OPERATION_VV_SYS_VOLUME	85	403 Forbidden	Operation not allowed on system volume. (WSAPI 1.2 and later)
INV_OPERATION_VV_VOLUME_NOT_DEFINED_ALL_NODES	86	409 Conflict	Invalid operation. Volume is not defined on all nodes. (WSAPI 1.2 and later)
INV_OPERATION_VV_ONLINE_COPY_IN_PROGRESS	87	409 Conflict	Invalid operation. Online copy is in progress. (WSAPI 1.2 and later)
INV_OPERATION_VV_VOLUME_CONVERSION_IN_PROGRESS	88	409 Conflict	Invalid Operation. Volume conversion is in progress. (WSAPI 1.2 and later)
INV_OPERATION_VV_SNAPSPACE_NOT_MOVED_TO_CPG	89	409 Conflict	Invalid operation. Snapshot space must be moved first. (WSAPI 1.2 and later)
INV_OPERATION_VV_VOLUME_ACCOUNTING_IN_PROGRESS	90	409 Conflict	Invalid operation. Volume accounting is in progress. (WSAPI 1.2 and later)
INV_OPERATION_VV_ZERO_DETECT_TPVV	91	403 Forbidden	Invalid operation. Zero detect policy on TPVV. (WSAPI 1.2 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_OPERATION_CPG_RAID0_DISABLED	92	403 Forbidden	Invalid operation. RAID-0 must be enabled. (WSAPI 1.2 and later)
INV_OPERATION_CPG_RAID5_NL_DISABLED	93	403 Forbidden	Invalid operation. RAID-5 on NL drives must be enabled. (WSAPI 1.2 and later)
INV_OPERATION_GROW_SIZE_TOO_SMALL	94	400 Bad Request	CPG grow size is too small. (WSAPI 1.2 and later)
INV_OPERATION_VV_CPG_ON_SNAPSHOT	96	409 Conflict	CPG cannot be assigned to a snapshot.
INV_OPERATION_VLUN_PCOPY_TARGET_VV	97	409 Conflict	Volume is a target of physical copy.
INV_INPUT_DUP_PATH	98	400 Bad Request	Duplicate path specified.
LUN_HOSTPERSONA_CONFLICT	99	409 Conflict	LUN number and persona capability conflict.
NON_EXISTENT_QOS_RULE	100	404 Not Found	QoS rule does not exist. (WSAPI 1.3 and later)
EXISTENT_SET	101	409 Conflict	The set exists. (WSAPI 1.3 and later)
NON_EXISTENT_SET	102	404 Not Found	The set does not exist. (WSAPI 1.3 and later)
VVSET_QOS_TARGET	103	409 Conflict	The VV set is a target of a QoS rule. (WSAPI 1.3 and later)
MEMBER_IN_SET	104	409 Conflict	The object is already part of the set. (WSAPI 1.3 and later)
MEMBER_IN_DOMAINSET	105	409 Conflict	The host is in a domain set. (WSAPI 1.3 and later)
MEMBER_NOT_IN_SET	106	404 Not Found	The object is not part of the set. (WSAPI 1.3 and later)
MEMBER_NOT_IN_SAME_DOMAIN	107	409 Conflict	Objects must be in the same domain to perform the operation. (WSAPI 1.3 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
VV_IN_INCONSISTENT_STATE	108	403 Forbidden	The volume has an internal inconsistency error. (WSAPI 1.3 and later)
VV_IS_BEING_REMOVED	109	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
LUN_ID_CONFLICT	110	409 Conflict	LUN ID conflict. (WSAPI 1.3 and later)
INVALID_CURSOR_ID	111	400 Bad Request	Invalid cursor ID for chunking. (WSAPI 1.3 and later)
INV_INPUT_IO_MIN_GOAL_GRT_M AX_LIMIT	112	400 Bad Request	Requires an I/O maximum limit greater than the minimum goal. (WSAPI 1.3 and later)
INV_INPUT_BW_MIN_GOAL_GRT_M AX_LIMIT	113	400 Bad Request	Requires a bandwidth maximum limit greater than the minimum goal. (WSAPI 1.3 and later)
EXISTENT_QOS_RULE	114	400 Bad Request	The QoS rule exists. (WSAPI 1.3 and later)
INV_INPUT_BELOW_RANGE	115	400 Bad Request	The number entered is outside the expected range. (WSAPI 1.3 and later)
INV_INPUT_QOS_PATTERN	116	400 Bad Request	Invalid QoS rule pattern. (WSAPI 1.3 and later)
INV_INPUT_QOS_TARGET_OBJECT	117	400 Bad Request	Invalid QoS target object. (WSAPI 1.3 and later)
VV_NOT_IN_SAME_DOMAIN	118	403 Forbidden	The volume is not in the current domain. (WSAPI 1.3 and later)
INV_OPERATION_VV_NON_BASE_V OLUME	119	403 Forbidden	The volume is not a base volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_IN_REMOTE_ COPY	120	403 Forbidden	The volume is involved in Remote Copy. (WSAPI 1.3 and later)
INV_OPERATION_VV_EXPORTED	121	403 Forbidden	The volume is exported. (WSAPI 1.3 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_OPERATION_VV_COPY_TO_SELF	122	403 Forbidden	The destination volume is the same as the parent volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_COPY_TO_BASE	123	403 Forbidden	The destination volume is the base of the parent volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_READONLY_SNAPSHOT	124	403 Forbidden	The destination volume is a read-only snapshot. (WSAPI 1.3 and later)
INV_OPERATION_VV_NO_SNAPSHOT_ALLOWED	125	403 Forbidden	The parent volume must allow snapshots. (WSAPI 1.3 and later)
INV_OPERATION_VV_COPY_PARENT_TOO_BIG	126	409 Conflict	The parent volume is larger in size than the destination volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_CLEANUP_IN_PROGRESS	127	403 Forbidden	Internal volume cleanup is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_CIRCULAR_COPY	128	403 Forbidden	The parent volume is a copy of the destination copy. (WSAPI 1.3 and later)
INV_OPERATION_VV_NOT_IN_NORMAL_STATE	129	403 Forbidden	The volume state is not normal. (WSAPI 1.3 and later)
INV_OPERATION_VV_PCOPY_IN_PROGRESS	130	409 Conflict	The volume has a copy in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_FAILED_ONLINE_COPY	131	409 Conflict	The volume has a failed online copy. (WSAPI 1.3 and later)
INV_OPERATION_VV_NO_PARENT	132	403 Forbidden	The volume has no physical parent. (WSAPI 1.3 and later)
NON_EXISTENT_VVCOPY	133	404 Not Found	Physical copy not found. (WSAPI 1.3 and later)
VV_LIMIT_REACHED	134	503 Service Unavailable	Maximum number of volumes has been reached. (WSAPI 1.3 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
SNAPSHOT_LIMIT_REACHED	135	503 Service Unavailable	Maximum number of snapshots has been reached. (WSAPI 1.3 and later)
VV_ID_LIMIT_REACHED	136	503 Service Unavailable	Maximum number of volume IDs has been reached. (WSAPI 1.3 and later)
INVALID_INPUT_VV_PATTERN	137	400 Bad Request	Invalid volume pattern specified. (WSAPI 1.3 and later)
EMPTY_SET	138	404 Not Found	The set is empty. (WSAPI 1.3 and later)
INV_OPERATION_VV_READONLY_T O_READONLY_SNAP	139	403 Forbidden	Creating a read-only copy from a read-only volume is not permitted. (WSAPI 1.3 and later)
INV_OPERATION_VV_SNAP_PAREN T_SAME_BASE	140	403 Forbidden	Two-parent snaps share same base volume. (WSAPI 1.3 and later)
VV_IN_STALE_STATE	141	403 Forbidden	The volume is stale. (WSAPI 1.3 and later)
VV_NOT_STARTED	142	403 Forbidden	The volume is not started. (WSAPI 1.3 and later)
VV_UNAVAILABLE	143	403 Forbidden	The volume is not accessible. (WSAPI 1.3 and later)
CPG_ALLOCATION_WARNING_REAC HED	144	503 Service Unavailable	The CPG has reached the allocation warning. (WSAPI 1.3 and later)
NON_EXISTENT_TASK	145	404 Not Found	Task not found. (WSAPI 1.3 and later)
INV_INPUT_EMPTY_VVSET	146	400 Bad Request	The VV set is empty. (WSAPI 1.3 and later)
INV_INPUT_MATCHED_HOSTSET	147	400 Bad Request	Cannot export host sets with port (matched set). (WSAPI 1.3 and later)
INV_QUERY_STRING	148	400 Bad Request	Invalid query string. (WSAPI 1.3 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
SET_SIZE_NOT_SAME	149	409 Conflict	The set sizes are different. (WSAPI 1.3 and later)
INV_OPERATION_UNSUPPORTED_V V_TYPE	150	403 Forbidden	Invalid operation: Cannot grow this type of volume.(WSAPI 1.3 and later)
INV_OPERATION_VV_TUNE_IN_PR OGRESS	151	409 Conflict	Invalid operation: Volume tuning is in progress. (WSAPI 1.3 and later)
INV_INPUT_VV_GROW_SIZE	152	400 Bad Request	Invalid grow size.(WSAPI 1.3 and later)
VV_NEW_SIZE_EXCEED_CPG_LIMI T	153	403 Forbidden	New volume size exceeds CPG limit.(WSAPI 1.3 and later)
VV_NEW_SIZE_IS_SMALLER	154	403 Forbidden	New volume size is smaller than current size. (WSAPI 1.3 and later)
VV_NEW_SIZE_EXCEED_LIMIT	155	403 Forbidden	New volume size exceeds the limit. (WSAPI 1.3 and later)
INV_OPERATION_VV_SA_SD_SPAC E_REMOVED	156	403 Forbidden	Invalid operation. Volume SA or SD space is being removed. (WSAPI 1.3 and later)
INV_OPERATION_VV_PROMOTE_IN _PROGRESS	157	409 Conflict	Invalid operation: Volume promotion is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_PARENT_OF_ PCOPY	158	409 Conflict	Invalid operation: Volume is the parent of a physical copy. (WSAPI 1.3 and later)
INV_OPERATION_VV_IS_BUSY	159	409 Conflict	Invalid operation: Volume is busy. (WSAPI 1.3 and later)
INV_INPUT_VV_TARGET_OF_QOS_ RULE	160	409 Conflict	The volume is the target of a QoS rule. (WSAPI 1.3 and later)
INV_OPERATION_CPG_NOT_IN_AO _CONFIG	161	409 Conflict	Invalid operation: CPG is not in an 3PAR AO configuration. (WSAPI 1.3 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_OPERATION_AO_CONFIG_CONFLICT	162	409 Conflict	Invalid operation: AO configuration conflict between CPGs. (WSAPI 1.3 and later)
INV_OPERATION_VV_MODIFY_SNP_CPG_TPVV	163	409 Conflict	Invalid operation: Cannot change snap CPG of a TPVV. (WSAPI 1.3 and later)
INV_OPERATION_VV_MODIFY_USR_CPG_CPVV	164	409 Conflict	Invalid operation: Cannot change USR CPG of an FPVV. (WSAPI 1.3 and later)
INV_OPERATION_VV_IS_PCOPY	165	409 Conflict	Invalid operation: The volume is a physical copy.
INV_OPERATION_CANNOT_STOP_ONLINE_PROMOTE	166	403 Forbidden	Invalid operation: The online promote cannot be stopped. Instead, use <code>canceltask</code> . (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_PARENT_PCOPY_IN_PROGRESS	167	403 Forbidden	Invalid operation: The parent is involved in a physical copy. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_BASE_VOLUME	168	409 Conflict	Invalid operation: The volume is a base volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_PROMOTE_TARGET_NOT_BASE_VV	169	403 Forbidden	Invalid operation: The promote target is not a base volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_PARENT_SIZE_HAS_INCREASED	170	409 Conflict	Invalid operation: The parent volume size has increased. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_PARENT_VV_EXPORTED	171	403 Forbidden	Invalid operation: The parent volume is exported. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_OPERATION_CANNOT_CANCEL_TASK	172	409 Conflict	Invalid operation: The task cannot be canceled. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_RC_TASK	173	409 Conflict	Invalid operation: Remote copy synchronizations can be canceled only by using a stoprcopygroup operation. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
	174		Not used by the 3PAR OS.
NON_ACTIVE_TASK	175	400 Bad Request	The task is not active at this time. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INVALID_TASK_ID	176	400 Bad Request	Invalid task ID specified. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_TASK_CANCEL_IN_PROGRESS	177	409 Conflict	Invalid operation: A task involving the volume is being canceled. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
VV_NEEDS_TO_BE_CHECKED	178	403 Forbidden	Check the volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
NODE_DOWN	179	403 Forbidden	The node is down. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
NON_EXISTENT_OBJECT_KEY	180	404 Not Found	Object key does not exist.
EXISTENT_OBJECT_KEY	181	409 Conflict	The object key exists.
INV_INPUT_ALL_WHITE_SPACES_STR	182	400 Bad Request	Invalid input: Using all white spaces in string.
INV_INPUT_VV_IS_TPVV	183	403 Forbidden	Volume is already thinly provisioned. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_INPUT_VV_IS_FPVV	184	403 Forbidden	Volume is already fully provisioned. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_PROMOTE_IS_NOT_IN_PROGRESS	185	409 Conflict	Invalid operation: Volume promotion is not in progress. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
NON_EXISTENT_RCOPY_GROUP	187	404 Not Found	The Remote Copy group does not exist. (WSAPI 1.4 and later)
NON_EXISTENT_SNAPSHOT	188	404 Not Found	The specified snapshot does not exist. The Remote Copy group target is not unique.
RCOPY_GROUP_SNAPSHOT_IS_RW	189	403 Forbidden	The specified snapshot can only be read-only. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_IS_RO	190	403 Forbidden	The volume to be admitted to the Remote Copy group cannot be read-only. (WSAPI 1.4 and later)
RCOPY_GROUP_HAS_NO_CPG	191	403 Forbidden	The volume on the target cannot be created automatically because no CPG has been defined in the Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_EXISTENT_VOL	192	409 Conflict	The specified volume is already in the Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_EXISTENT_VOL_ON_TARGET	193	409 Conflict	The secondary volume specific for auto creation exists on the target. (WSAPI 1.4 and later)
RCOPY_GROUP_INV_TARGET	194	403 Forbidden	The specified target is not a target of the Remote Copy group. (WSAPI 1.4 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_GROUP_VOL_SIZE_NOT_MATCH	195	403 Forbidden	The size of the volume added to the Remote Copy group does not match the size of the volume on the target. (WSAPI 1.4 and later)
RCOPY_GROUP_NON_EXISTENT_VOLUME_ON_TARGET	196	404 Not Found	The specified secondary volume does not exist on the target. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_NO_SNAPSHOT_SPACE	197	403 Forbidden	The volume to be admitted into the Remote Copy group requires allocation of snapshot space. (WSAPI 1.4 and later)
RCOPY_GROUP_TARGET_VOL_NO_SNAPSHOT_SPACE	198	403 Forbidden	The specified secondary volumes on the target require snapshot space. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_IS_PHYSICAL_COPY	199	403 Forbidden	A physical copy cannot be added to a Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_MAX_VOL_REACHED_PERIODIC	200	403 Forbidden	The number of periodic-mode volumes on the system has reached the limit. (WSAPI 1.4 and later)
RCOPY_GROUP_MAX_VOL_REACHED_SYNC	201	403 Forbidden	The number of synchronous-mode volumes on the system has reached the limit. (WSAPI 1.4 and later)
RCOPY_GROUP_MAX_VOL_REACHED_ASYNC	202	403 Forbidden	(Not used by the 3PAR OS.) The number of asynchronous-mode volumes on the system has reached the limit. (WSAPI 1.5)
RCOPY_GROUP_MAX_VOL_REACHED_MIXED	203	403 Forbidden	The number of mixed-mode volumes on the system has reached the limit. (WSAPI 1.4 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_IS_NOT_READY	204	403 Forbidden	The Remote Copy configuration is not ready for commands. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_INTERNAL_CONSISTENCY_ERR	205	403 Forbidden	The volume to be admitted into the Remote Copy group has an internal consistency error. (WSAPI 1.4 and later)
RCOPY_GROUP_IS_BEING_REMOVED	206	403 Forbidden	The volume to be admitted into the Remote Copy group is being removed. (WSAPI 1.4 and later)
RCOPY_GROUP_TARGET_VOL_EXPORTED	207	403 Forbidden	Secondary volumes cannot be admitted when they are exported. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_IS_PEER_PROVISIONED	208	403 Forbidden	A peer-provisioned volume cannot be admitted into a Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_ONLINE_CONVERSION	209	403 Forbidden	Online volume conversions do not support Remote Copy. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_ONLINE_PROMOTE	210	403 Forbidden	Online promote operations do not support Remote Copy. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_ONLINE_COPY	211	403 Forbidden	Online volume copy operations do not support Remote Copy. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_CLEAN_UP	212	403 Forbidden	Cleanup of internal volume is in progress. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_IS_INTERNAL	213	403 Forbidden	Internal volumes cannot be admitted into a Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_NOT_IN_SAME_DOMAIN	214	403 Forbidden	The Remote Copy group has a different domain than the volume. (WSAPI 1.4 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_GROUP_STARTED	215	403 Forbidden	The Remote Copy group has already been started. (WSAPI 1.4 and later)
RCOPY_GROUP_IS_BUSY	216	403 Forbidden	The Remote Copy group busy. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_IN_OTHER_GROUP	217	403 Forbidden	The volume is already in another Remote Copy group. A volume cannot be in more than one Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_INV_TARGET_NUMBER	218	403 Forbidden	The wrong number of targets is specified for the Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_NOT_SUPPORT_VOLUME_ID	219	403 Forbidden	The target for the Remote Copy group does not support volume IDs. (WSAPI 1.4 and later)
RCOPY_GROUP_IS_SELF_MIRRORED	220	403 Forbidden	The target is self-mirrored. Volumes cannot be self-mirrored. (WSAPI 1.4 and later)
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	221	403 Forbidden	Perform this operation on the primary side. (WSAPI 1.4 and later)
RCOPY_TARGET_IS_NOT_READY	222	403 Forbidden	The Remote Copy group target is not ready. (WSAPI 1.4 and later)
RCOPY_UNSUPPORTED_TARGET_VERSION	223	501 NOT IMPLEMENTED	The target 3PAR OS version is not supported. (WSAPI 1.4 and later)
RCOPY_GROUP_MULTIPLE_VOLUMES_IN_SAME_FAMILY	224	403 Forbidden	A Remote Copy group cannot contain multiple volumes in the same family tree. (WSAPI 1.4 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_GROUP_MULTIPLE_RW_SNAPSHOT_IN_SAME_FAMILY	225	403 Forbidden	Only one read/write snapshot in the same family can be added to a Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_SYNC_SNAPSHOT_IN_MULTIPLE_TARGET	226	403 Forbidden	A synchronization snapshot cannot be set with multiple targets. (WSAPI 1.4 and later)
RCOPY_GROUP_ADD_VOL_FAILED	227	403 Forbidden	Failed to add volume to the Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_ADD_VOL_FAILED_PARTIAL	228	403 Forbidden	Adding volume to Remote Copy group succeeded on some targets. An attempt is being made to clean up. (WSAPI 1.4 and later)
RCOPY_GROUP_EMPTY	229	403 Forbidden	The Remote Copy group does not contain any volumes. (WSAPI 1.4 and later)
RCOPY_TARGET_NOT_SPECIFIED	230	403 Forbidden	A target must be specified to complete this operation. (WSAPI 1.4 and later)
RCOPY_GROUP_NOT_ALL_VOLUMES_SPECIFIED	231	403 Forbidden	All the volumes in the Remote Copy group must be specified to complete this operation. (WSAPI 1.4 and later)
RCOPY_GROUP_VOL_NOT_IN_GROUP	232	404 Not Found	The volume is not in a Remote Copy group. (WSAPI 1.4 and later)
RCOPY_GROUP_RENAME_RESYNC_SNAPSHOT_FAILED	233	403 Forbidden	Renaming of the Remote Copy group resynchronization snapshot failed. (WSAPI 1.4 and later)
RCOPY_REMOVE_REMOTE_VOLUME_FAILED	234	400 Bad Request	Removal of the volume from the Remote Copy group failed. (WSAPI 1.4 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_GROUP_CREATED_MIRROR_CONFIG_OFF	235	400 Bad Request	<p>The Remote Copy group was created when the configuration mirroring policy was turned off on the target. However, this policy is now turned on. Turn off the configuration mirroring policy before dismissing a volume from the Remote Copy group.</p> <p>The Remote Copy group must be started before the policy can be turned on again.</p> <p>(WSAPI 1.4 and later)</p>
RCOPY_GROUP_MIXED_MODES_ON_ONE_TARGET	236	400 Bad Request	<p>Remote Copy groups with different modes on a single target are not supported.</p> <p>(WSAPI 1.4 and later)</p>
EXISTENT_RCOPY_GROUP	237	404 Not Found	<p>The Remote Copy group exists.</p> <p>(WSAPI 1.4 and later)</p>
RCOPY_GROUP_TOO_MANY_TARGETS	238	400 Bad Request	<p>Too many Remote Copy group targets have been specified.</p> <p>(WSAPI 1.4 and later)</p>
RCOPY_GROUP_TARGET_NOT_UNIQUE	239	400 Bad Request	<p>The Remote Copy group target is not unique.</p> <p>(WSAPI 1.4 and later)</p>
RCOPY_GROUP_MODE_NOT_SUPPORTED	240	403 Forbidden	<p>The Remote Copy group mode is not supported.</p> <p>(WSAPI 1.4 and later)</p>
RCOPY_GROUP_NOT_STARTED	241	403 Forbidden	<p>The Remote Copy group is not started.</p> <p>(WSAPI 1.4 and later)</p>
RCOPY_GROUP_MAX_GROUP_REACHED_PERIODIC	242	503 Service Unavailable	<p>The maximum number of Remote Copy groups in periodic mode has been reached.</p> <p>(WSAPI 1.4 and later)</p>
RCOPY_GROUP_MAX_GROUP_REACHED_SYNC	243	503 Service Unavailable	<p>The maximum number of Remote Copy groups in synchronous mode has been reached.</p> <p>(WSAPI 1.4 and later)</p>

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_GROUP_MAX_GROUP_REACHED_ASYNC	244	503 Service Unavailable	(Not used by the 3PAR OS.) The maximum number of Remote Copy groups in asynchronous mode has been reached. (WSAPI 1.5)
RCOPY_GROUP_SECONDARY_GROUP_MORE_THAN_ONE_BACKUP_TARGET	245	403 Forbidden	Secondary groups may have only one target that is not a backup. (WSAPI 1.4 and later)
RCOPY_GROUP_MORE_THAN_ONE_SYNC_TARGET	246	503 Service Unavailable	Remote Copy groups can have no more than one mode in synchronous mode. (WSAPI 1.4 and later)
RCOPY_GROUP_MORE_THAN_ONE_PERIODIC_TARGET	247	503 Service Unavailable	Remote Copy groups can have no more than one mode in periodic mode. (WSAPI 1.4 and later)
RCOPY_GROUP_ONE_TO_ONE_CONFIG_FOR_MIXED_MODE	248	403 Forbidden	Mixed mode is supported for only in a 1-to-1 Remote Copy configuration. (WSAPI 1.4 and later)
RCOPY_TARGET_MODE_NOT_SUPPORTED	249	501 NOT IMPLEMENTED	The Remote Copy target mode is not supported. (WSAPI 1.4 and later)
RCOPY_TARGET_IN_PEER_PERSISTENCE_SYNC_GROUP_ONLY	250	501 NOT IMPLEMENTED	The Remote Copy target is configured with peer persistence; only synchronous groups can be added. (WSAPI 1.4 and later)
RCOPY_TARGET_MULTI_TARGET_NOT_SUPPORTED	251	501 NOT IMPLEMENTED	The Remote Copy target was created in an earlier version of the 3PAR OS that does not support multiple targets. (WSAPI 1.4 and later)
RCOPY_TARGET_VOL_AUTO_CREATION_NOT_SUPPORTED	252	501 NOT IMPLEMENTED	The Remote Copy target is in an older version of the 3PAR OS that does not support autocreation of volumes. (WSAPI 1.4 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_GROUP_TARGET_VOL_IS_READ_ONLY	253	403 Forbidden	The Remote Copy target volume cannot be read-only. (WSAPI 1.4 and later)
RCOPY_GROUP_SNAPSHOT_PARENT_MISMATCH	254	403 Forbidden	The names of the snapshot and its parent do not match. (WSAPI 1.4 and later)
RCOPY_GROUP_IN_FAILOVER_STATE	255	403 Forbidden	The Remote Copy group is in failover state; both the source system and the target system are in the primary state. (WSAPI 1.4 and later)
RCOPY_GROUP_SECONDARY_DOES_NOT_MATCH_PRIMARY	256	403 Forbidden	The Remote Copy group is in the failover state. Both systems are in the primary state. (WSAPI 1.4 and later)
RCOPY_GROUP_TARGET_VOLUME_MISMATCH	257	404 Not Found	Secondary group on target system has a mismatched volume configuration. (WSAPI 1.4 and later)
RCOPY_GROUP_EXISTENT_VOLUME_WWN_ON_TARGET	258	404 Not Found	Secondary volume WWN exists on the target. (WSAPI 1.4 and later)
RCOPY_GROUP_VOLUME_ALREADY_SYNCED	259	404 Not Found	Volume is already synchronized. (WSAPI 1.4 and later)
RCOPY_GROUP_INCORRECT_SNAPSHOT_OR_VOLUME_SPECIFIED	260	400 Bad Request	An incorrect starting snapshot or volume was specified, or the snapshot or volume does not exist. (WSAPI 1.4 and later)
RCOPY_MAX_SYNC_TARGET_REACHED	261	503 Service Unavailable	The maximum number of Remote Copy synchronous targets has been reached. (WSAPI 1.4 and later)
RCOPY_MAX_PERIODIC_TARGET_REACHED	262	503 Service Unavailable	The maximum number of Remote Copy periodic targets has been reached. (WSAPI 1.4 and later)

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_MAX_ASYNC_TARGET_REACHED	263	503 Service Unavailable	(Not used by the 3PAR OS.) The maximum number of Remote Copy asynchronous targets has been reached. (WSAPI 1.5 and later)
INV_OPERATION_SET_AUTO_CREATED	264	403 Forbidden	The set was created automatically Members cannot be added or removed. (WSAPI 1.4 and later)
INV_OPERATION_SNAPSHOT_NOT_SAME_TYPE	265	403 Forbidden	Tune the snapshot CPG. Some snapshots in the volume set are read-only, some are read/write. (WSAPI 1.4 and later)
INV_OPERATION_SNAPSHOT_CPG_TUNE_NEEDED	266	403 Forbidden	Tune the snapshot CPG. (WSAPI 1.4 and later)
NON_EXISTENT_ROLE	267	404 Not Found	The role does not exist. (WSAPI 1.4 and later)
NON_LOCAL_USER	268	404 Not Found	User not a local user. (WSAPI 1.4 and later)
NON_EXISTENT_USER	269	400 Bad Request	User not found. (WSAPI 1.4 and later)
DEDUP_OPERATION_NOT_SUPPORTED	272	403 Forbidden	The system does not support deduplication operations. (WSAPI 1.4.1 and later)
INV_INPUT_VV_IS_TDVV	273	403 Forbidden	The volume is already deduplicated. (WSAPI 1.4.1 and later)
INV_OPERATION_VV_MODIFY_USR_CPG_TDVV	274	403 Forbidden	Cannot change USR CPG of a TDVV to a different CPG. (WSAPI 1.4.1 and later)
TDVV_COUNT_EXCEED_CPG_LIMIT	275	403 Forbidden	The TDVV count has exceeded the limit per CPG. (WSAPI 1.4.1 and later)
RCOPY_GROUP_NOT_STARTED	276	403 Forbidden	Remote Copy group not started. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Table Continued

API Error	API Error Code	HTTP Code	Description
RCOPY_GROUP_INVOLVED_IN_SYNC_CHRONIZATION	277	403 Forbidden	Remote Copy group is already involved in synchronization. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RCOPY_GROUP_INV_POLICY_FOR_SYNC_GROUP	278	403 Forbidden	Invalid policy for a synchronous target. The <code>over_per_alert</code> and <code>no_over_per_alert</code> policies are valid for asynchronous periodic groups only. The target is not in asynchronous periodic mode. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RCOPY_GROUP_INV_POLICY_FOR_PERIODIC_GROUP	279	403 Forbidden	Invalid policy for a periodic group. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RCOPY_GROUP_IS_NOT_PERIODIC	280	403 Forbidden	Target in group is not periodic. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RCOPY_GROUP_INV_OPERATION_ON_MULTIPLE_TARGETS	281	403 Forbidden	The operation is not supported on multiple targets. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
INV_OPERATION_RCOPY_GROUP_ROLE_CONFLICT	282	403 Forbidden	The Remote Copy group is not in the correct role for this operation. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RCOPY_GROUP_OPERATION_ONLY_ON_SECONDARY_SIDE	283	403 Forbidden	Perform this operation on the secondary side only. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RCOPY_GROUP_NOT_STOPPED	284	403 Forbidden	The Remote Copy group is not stopped. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Table Continued

API Error	API Error Code	HTTP Code	Description
NON_EXISTENT_FLASH_CACHE	285	404 Not Found	The Flash Cache does not exist. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
EXISTENT_FLASH_CACHE	286	409 Conflict	The Flash Cache exists. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
FLASH_CACHE_NOT_SUPPORTED	287	403 Forbidden	Flash Cache is not supported. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
FLASH_CACHE_IS_BEING_REMOVED	288	403 Forbidden	The Flash Cache is being removed. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
INV_FLASH_CACHE_SIZE	289	400 Bad Request	Invalid Flash Cache size. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
NO_DISK_PRESENT	290	400 Bad Request	The specified disks are not present in the system.
NON_EXISTENT_TEMPLATE	291	404 Not Found	The specified template does not exist. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
INV_OPERATION_RCOPY_GROUP_MODE_CONFLICT	292	403 Forbidden	The group mode is not supported for this operation. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
NON_EXISTENT_AO	293	404 Not Found	Specified AO configuration does not exist.
RCOPY_GROUP_VOLUME_NOT_SYNCED	294	403 Forbidden	Volume not synced. Target does not exist in the Remote Copy group.
RCOPY_GROUP_TARGET_NOT_IN_GROUP	295	404 Not Found	Invalid system reporter parameter name or value.
INV_REPORT_PARAM	296	400 Bad Request	Invalid system reporter parameter name or its value.
SYSTEM_REPORTER_DATA_NOT_AVAILABLE	297	404 Not Found	System reporter data not available.

Table Continued

API Error	API Error Code	HTTP Code	Description
NON_EXISTENT_PERSONA	298	404 Not Found	Host persona does not exist. Attributes partially set successfully, but there might be some errors.
PARTIAL_EXECUTION_SUCCESS	299	400 Bad Request	Partially successful setting attributes. Errors possible.
ALL_EXECUTION_FAILED	300	400 Bad Request	All attribute setting failed.
RCOPY_TARGET_NOT_ASYNC	301	403 Forbidden	The target in the Remote Copy group is not asynchronous.
RCOPY_GROUP_INV_POLICY_FOR_GROUP_TARGET	302	403 Forbidden	The policy is not valid for a Remote Copy group target.
PARAMETER_ALREADY_SPECIFIED	303	400 Bad Request	Parameter already specified.
NON_EXISTENT_RCOPY_TARGET	304	404 Not Found	Remote copy target does not exist.
NON_EXISTENT_VFS	305	404 Not Found	Specified virtual file system does not exist.
FS_NOT_CONFIGURED	306	400 Bad Request	File Services is not configured/started on the system.
NON_EXISTENT_FPG	307	404 Not Found	The FPG does not exist.
NON_EXISTENT_FSTORE	308	404 Not Found	The File Store does not exist.
NON_EXISTENT_RCOPY_LINK	309	404 Not Found	Remote Copy link does not exist.
NON_EXISTENT_FSNAP	310	404 Not Found	The File Store snapshot does not exist.
NON_EXISTENT_FSHARE	311	404 Not Found	The File Share does not exist.
INV_INPUT_OUTSIDE_RANGE	312	400 Bad Request	Invalid input: number is outside of expected range.
CLX_ACTIVE_TASK	313	409 Conflict	Active CLX operation already is in progress for the specified Remote Copy group.
EXISTENT_FSQUOTA	314	409 Conflict	The File Persona quota exists.
NON_EXISTENT_FSQUOTA	315	404 Not Found	Specified quota does not exist.
INV_FPG_RECLAIM_TASK_ID	316	400 Bad Request	Invalid FPG reclaim task id.
INV_OPERATION_CPG_RAID5_FC_DISABLED	317	403 Forbidden	Invalid operation: enable RAID-5 on FC drives.
INV_OPERATION_VV_COMPRESSION_ALREADY_ENABLED	318	403 Forbidden	Compression is already enabled on a volume.
INV_OPERATION_VV_COMPRESSION_ALREADY_DISABLED	319	403 Forbidden	Compression is already disabled on a volume.

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_OPERATION_VV_IS_NOT_COMPRESSED	320	403 Forbidden	A volume is not compressed.
CLX_SLD_GRP_NOT_SUPPORTED	321	501 NOT IMPLEMENTED	Specified Remote Copy Group is part of a Synchronous Long-Distance configuration, which is unsupported.
CLX_PP_GRP_NOT_SUPPORTED	322	501 NOT IMPLEMENTED	Specified Remote Copy Group is part of Peer Persistence configuration, which is unsupported.
INV_COMP_OP	323	400 Bad Request	Invalid <code>COMPARISON_OPERATOR</code> in Query String
INV_LOGICAL_OP	324	400 Bad Request	<code>LOGICAL_OPERATION</code> invalid or not supported for this feature.
INV_INPUT_SECMODE_CONFLICTS_ERRSUPPRESS	325	400 Bad Request	Use <code>suppressSecOpErr</code> with NTFS <code>securityMode</code> only.
VV_POLICY_NOT_SUPPORTED	326	403 Forbidden	This class of systems does not support VV policy.
INV_OPERATION_SYSTEM_TYPE_NOT_SUPPORTED	327	403 Forbidden	This class of systems does not support this operation.
DEDUP_COMPR_VOLUME_NOT_SUPPORTED	328	403 Forbidden	This deduplication version of CPG does not support compressed volumes.
SYSTEM_REPORTER_RESPONSE_TOO_LARGE	329	403 Forbidden	System reporter response is too large. Reduce the scope of the request.
CLX_AUTO_FAILOVER_GRP_NOT_SUPPORTED	330	501 Not Implemented	Specified remote copy group is <code>auto_failover</code> policy enabled.
CLX_RECOVERY_REMOTE_WITHOUT_PP_GRP_NOT_SUPPORTED	331	501 Not Implemented	Specified remote copy group is not <code>path_management</code> enabled.
INV_COMPAREBY_FORMAT	332	400 Bad Request	Invalid <code>compareby</code> format.
INV_INPUT_UNSUPP_COMPAREBY_FIELD	333	400 Bad Request	Unsupported <code>compareby</code> format.
INV_INPUT_COMPAREBY_REQ_GROUPBY_UPBY	334	400 Bad Request	<code>compareby</code> requires <code>groupby</code> parameter.
INV_INPUT_UNSUPP_GROUPBY_FIELD	335	400 Bad Request	Unsupported <code>groupby</code> field.

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_SESS_KEY_TYPE	336	403 Forbidden	Invalid session key type for the request.
INV_FIELD_NAME	337	400 Bad Request	Field name invalid or not supported for the resource filtering.
INV_FIELD_VALUE	338	400 Bad Request	Invalid value for the specified field.
EVT_STREAM_DISABLED	339	400 Bad Request	Event stream is disabled
HOST_NOT_REACHABLE	340	400 Bad Request	Host is not reachable.
NON_EXISTENT_VLAN	341	404 Not Found	Vlan does not exist on the specified port.
EXISTENT_VLAN	342	409 Conflict	Vlan exists on the specified port.
EXISTENT_FSHARE	344	409 Conflict	File share already exists.
CLX_SLD_GRP_NO_TARGET_SPECIFIED	345	501 Not Implemented	Specified Remote Copy Group is part of a Synchronous Long Distance configuration, and the target name is not specified as part of the CLX operation.
CLX_SLD_GRP_MT_PP_NOT_SUPPORTED	346	501 Not Implemented	Specified Remote Copy Group is part of a Synchronous Long Distance configuration with the mt_pp policy and is not supported.
CLX_SLD_GRP_CLX_OPERATION_NOT_BETWEEN_SYNC_TARGETS	347	501 Not Implemented	Not implemented in SLD configuration. The CLX operation is supported between synchronous mode targets only.
INVALID_PORT_CONFIG	348	400 Bad Request	Port is not configured for target driven zoning.
NON_EXISTENT_TZONE	349	404 Not Found	No TDPZ found for specified port.
INV_OPERATION_VV_PCOPY_ONLINE	350	409 Conflict	Only valid for online operation.
QUORUM_WITNESS_STATUS_CHECK_FAILED	351	404 Not Found	Quorum witness status check failed.
INV_INPUT_UNSUPP_SUMMARY_FIELD	352	400 Bad Request	Unsupported summary field.
INV_INPUT_PER_TIME_REQ_GROUPBY	353	400 Bad Request	Summary perTime request requires the groupby parameter.

Table Continued

API Error	API Error Code	HTTP Code	Description
INV_SUMMARY_FORMAT	354	400 Bad Request	Invalid summary format.
INV_INPUT_PER_GROUP_UNSUPP_ ATTIME	355	400 Bad Request	Summary perGroup reuest is not valid with At Time reports.
INV_INPUT_ONLY_COMPAREBY_RE Q_COMPAREBY	356	400 Bad Request	Summary only. Comparison requires compareby parameter.
VV_HAS_SNAPSHOTS_KEEPPV_REQ	357	400 Bad Request	Request requires keepvv because volume has snapshots.

WSAPI error response desc member descriptions

The `desc` member provides supplementary information that helps explain the reason for the error code. Hewlett Packard Enterprise recommends avoiding parsing the `desc` member and using it only for display purposes.

For example, the `desc` member for an error might change from `No snap CPG specified in one storage system version` to `Error: The volume must have a snap CPG in another version`. The associated WSAPI error code does not change.

❗ IMPORTANT: The text in the `desc` member is subject to change between releases.

Examples of `desc` include:

```
{"code":28,"desc":"client request contains values that are too large"}
{"code":24,"desc":"insufficient space for requested operation"}
```

WSAPI error response ref member descriptions

If an error occurs, the system can return a `ref` member to provide specific reasons for the error.

The following examples show the request and response to an incorrect value for a JSON member. The system response includes a `ref` tag that identifies the member with the incorrect value. The `ref` information is not always necessary or useful, so it does not appear for all errors.

Request message header with incorrect value

```
POST /api/v1/hosts
HTTP/1.1
Content-Type: application/json
Host: storsys1:8080
Accept: application/json
{"name":abc}
```

Response message header including ref

```
HTTP/1.1 400 Bad Request
Date: Tue, 21 May 2013 22:15:52 GMT
Server: hp3par-wsapi
Content-Type: application/json
```



```
Connection: close
{"code":60,"desc":"JSON syntax error","ref":"name"}
```

HTTP chunked transfer encoding in WSAPI

Chunked encoding allows the server to send data of unknown size as smaller chunks of data in a known size. WSAPI 1.3 and later uses HTTP chunked transfer encoding to send responses in chunks.

Each chunk begins with a size field, which is a string of hexadecimal digits, and a terminating CRLF sequence. The final chunk has a length of zero, which indicates the end of the transmission.

HTTP volume query response in chunked format (WSAPI 1.3 and later)

```
HTTP/1.1 200 OK
Date: Fri, 22 May 2013 18:05:43 GMT
Server: hp3par-wsapi
Cache-Control: no-cache
Pragma: no-cache
Content-Type: application/json
Connection: close
Transfer-Encoding: chunked
```

HTTP chunked transfer encoding errors

During a query for all volumes or all VLUNs, the WSAPI server might encounter either of the following errors related to chunked encoding.

Error retrieving first data chunk

When the WSAPI server cannot retrieve the first chunk of data, WSAPI sends the HTTP error to the client, and then stops sending the subsequent chunks of data.

```
HTTP/1.1 <http error code> <http error msg>
Date: Fri, 22 May 2013 18:05:43 GMT
Server: hp3par-wsapi
Cache-Control: no-cache
Pragma: no-cache
Content-Type: application/json
Connection: close
{
  : <API error code code>
  desc:
}
```

Error retrieving subsequent data chunks

An error occurs while WSAPI attempts to retrieve the second or any subsequent chunk of data.

After sending HTTP headers to the client (a header is always sent with the first successful chunk of data), the system must complete the intended response. If an error occurs midway through the response process, the system has no way to report the error to the client.

WSAPI must close the connection, and the client does not receive the terminating zero-length CRLF chunk at the end of the response. The client has the option of catching or ignoring the exception.

WSAPI sends the API error code and its description as part of the JSON response message body when the error occurs.

```
"success":false,"message":{"code":101,
"desc":"Invalid cursor id for chunking"}
```

Starting and configuring the WSAPI server

WSAPI uses HPE 3PAR CLI commands to start, configure, and modify the WSAPI server.

For more information about using the CLI, see:

- *HPE 3PAR Command Line Interface Administrator Guide*
- *HPE 3PAR Command Line Interface Reference*

More information

<http://www.hpe.com/info/storage/docs/>

Starting the WSAPI server

The WSAPI server does not start automatically.

Prerequisites

- Requires access to all domains.
- **Enable HTTP requests**, if necessary (WSAPI defaults to HTTPS).

Procedure

1. Log in to the CLI as `Super`, `Service`, or any role granted the `wsapi_set` right.

2. Start the WSAPI server.

```
cli% startwsapi
```

Configuring the WSAPI server

To configure WSAPI, enter `setwsapi` in the CLI.

WSAPI security settings

The WSAPI server security protocol defaults to Transport Layer Security (TLS) 1.0, 1.1, and 1.2 with a limited set of high security ciphers. WSAPI does not support Secure Sockets Layer (SSL) 3.0.

Supported TLS 1.2 security ciphers

For a more secure TLS connection, the WSAPI `tls_strict` policy supports TLS 1.2 with the following set of ciphers. With HTTPS enabled, WSAPI accepts TLS 1.2 connections with secure ciphers only:

DHE-RSA-AES256-GCM-SHA384

DHE-RSA-AES128-GCM-SHA256

ECDHE-RSA-AES256-GCM-SHA384

ECDHE-RSA-AES256-SHA384

ECDHE-RSA-AES256-SHA

Enabling the TLC 1.2 protocol cyphers

Procedure

1. Log in to the CLI host as `Super`, `Service`, or any role granted the `wsapi_set` right.
2. Depending on your security requirements, enable or disable HTTPS.
`cli% setwsapi -https [enable | disable]`

With HTTPS enabled, WSAPI allows connections from TLS 1.2 secure cyphers only.

3. Set the WSAPI security policy.
`cli% setwsapi -policy tls_strict`

Session keys and WSAPI system access

To use Web Services, you must create a session key (credential). Unused sessions keys expire after 15 minutes (default). To change the default timeout value, see *Setting the session timeout value*.

WSAPI allows you to create credentials for two types of sessions: REGULAR and EVENT.

A REGULAR session allows the use of typical HTTP methods, such as POST, GET, DELETE, or PUT. Using this authorization, you can complete the same operations on your storage arrays using WSAPI as you would when using the CLI or StoreServ Management Console (SSMC).

An EVENT session opens a communication channel between client and server. This channel allows the server to stream event notifications to the client when a system resource event occurs.

More information

[Setting the session timeout value](#) on page 69

Creating a WSAPI session key

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/credentials`

The request message body is a JSON object, with members as described in the following table.

When creating a credential for either `sessionType`, use the same username and password that you use to access the 3PAR storage server through the 3PAR CLI or SSMC.

Table 7: Request message body JSON objects for Session key

Member	JSON type	API type	Description
<code>user</code>	string	name31	User name.
<code>password</code>	string	name31	User password.
<code>sessionType</code>	enum	<u>sessionType enumeration</u>	Specifies the type of session the credential supports. Defaults to 1 (REGULAR) if not specified.

Table 8: sessionType enumeration

Symbol	Value	Description
REGULAR	1	Default. Creates a credential for regular WSAPI HTTP requests, such as POST/GET/DELETE/PUT. An attempt to use this credential with an SSE request returns an error message.
EVENT	2	Creates a credential for event notification use only. An attempt to use this credential for regular WSAPI HTTP requests returns an error message.

More information

[WSAPI session key information](#) on page 70

[Session keys and WSAPI system access](#) on page 68

Success

A successful session key creation returns the HTTP code 201 Created. The Location header in the output shows the URI of the newly created session key, and the message body includes the JSON object "key".

Session key creation output

```
HTTP/1.1 201 Created
Date: Thu, 28 Jul 2011 00:00:38 GMT
Server: hp3par-wsapi
Cache-Control: no-cache
Pragma: no-cache
Content-Type: application/json
Location: /api/v1/credentials/48A70B8A8301C458037E0821
Connection: close
{"key":"48A70B8A8301C458037E0821"}
```

Setting the session timeout value

The session idle timeout period defaults to 15 minutes. You can view and change the timeout period using the following procedure. WSAPI limits the number of active event sessions to 5.

Procedure

1. View the current timeout value using the following command:

```
showwsapi -d
```

```
showwsapi -d
-----WSAPI Server Configuration-----
service State           : Enabled
server State            : Active
HTTP State              : Enabled
HTTP Port               : 8008
HTTPS State             : Enabled
HTTPS Port              : 8080
Number of Sessions Created : 0
System Resource Usage   : 192
```

```
Number of Sessions Active      : 0
Version                      : 1.6.3
Event Stream State           : Enabled
Max Number of SSE Sessions Allowed: 5
Number of SSE Sessions Created : 0
Number of SSE Sessions Active  : 0
Session Timeout               : 15 Minutes
API URL                      : https://s2217.cxo.storage.hpecorp.net:8080/api/v1
```

2. Change the session timeout value using the following command:

```
setwsapi -timeout
```

The range is 3 to 1,440 minutes.

Deleting a session key

When a client finishes making requests to the server it should delete the session keys it created.

! **IMPORTANT:** Unused session keys expire automatically after the configured session times out.

Procedure

1. Delete a session key using the HTTP DELETE method with the following URI:

```
https://<storage_system>:8080/api/v1/credentials/<session key>
```

The `<session key>` parameter contains the session key you want to delete. For more information, see [Creating credentials](#).

2. Use cURL to delete credentials. Enter the following command (as a single line):

```
curl -X DELETE -H "Accept: application/json" https://<storage_system>:8080/api/v1/credentials/<1-c86aedb2e7e98b41-b06d2d50>
```

Success

A successful session key deletion returns the HTTP status code `200 OK` without a message body.

Errors

API error	API error code	HTTP code	Description
INV_SESS_KEY	6	403 Forbidden	The client request has an invalid session key.
PERM_DENIED	13	403 Forbidden	The request came from a different IP address.
IN_USE	34	409 Conflict	Session key is being used.

WSAPI session key information

Except when querying the API version or creating a session key, all operations require a session key. The system passes the session key in an HTTP header with the following name:

```
X-HP3PAR-WSAPI-SessionKey
```

Each session key is associated with the IP address of the client that originally requested it. Subsequent use is restricted to requests from that same IP address. If the client has multiple IP addresses, the system only accepts requests with the IP address used in the session request.

The following examples show a session key request using cURL (a command-line utility available for most Linux distributions), and the response message.

cURL session key request

```
curl -s -H "X-HP3PAR-WSAPI-SessionKey: 48A70B8A8301C458037E0821" \  
https://<storage_system>:8080/api/v1/volumes
```

cURL session key response

```
GET /api/v1/volumes HTTP/1.1  
User-Agent: curl/7.21.3 (i686-pc-linux-gnu) libcurl/7.21.3 OpenSSL/0.9.8ozlib/  
1.2.3.4 libidn/1.18  
Host: InServ1:8080  
Accept: */*  
X-HP3PAR-WSAPI-SessionKey: 48A70B8A8301C458037E0821
```

See, [Client HTTP headers](#) for the supported JSON subobjects used in the `Accept: */*` header.

More information

[WSAPI request and response messages](#) on page 23

[Creating a WSAPI session key](#) on page 68

WSAPI session key security

Because session keys allow access to the storage server, do not allow client applications to display session keys or otherwise make them visible to end users. Revealing a session key is similar to revealing a password. An unauthorized person who obtains a session key can use it to access the storage server until the key is deleted.

Beginning with WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2, protocol connections accept TLS v1. Beginning with WSAPI 1.5.2 with 3PAR OS 3.2.2 MU2, protocol connections also accept TLS v1.1 and v1.2. WSAPI no longer supports SSL v3.

Multiple session keys

A multithreaded client application can use one session key concurrently in multiple threads. Prior to WSAPI 1.6, the server serialized requested operations, so to obtain true concurrency, a client could create a session key for each concurrent thread.

WSAPI 1.6 and later allows the system to handle the requested operations concurrently, whether the client application uses one or multiple session keys. Hewlett Packard Enterprises recommends reusing the session key.

Maximum number of WSAPI sessions

Starting with 3PAR OS 3.1.3, WSAPI server uses a processing scheme that is distributed across nodes and can handle a higher number of concurrent sessions.

The maximum number of WSAPI sessions that can be accommodated concurrently depends several factors, including:

- Number of nodes in the storage system
- System memory
- Location of the master and network nodes

Table 9: Maximum WSAPI sessions per node

HPE 3PAR StoreServ system	Number of nodes in cluster	Maximum number of sessions per node	Total WSAPI sessions
StoreServ 7200/7200c	2	36	36
StoreServ 7400/7400c/7440c/7450/7450c	2	36	36
	4	36	72 to 108
StoreServ 8200	2	36	36
StoreServ 8400	2	36	36
	4	36	72 to 108
StoreServ 8440	2	96	96
	4	96	192 to 288
StoreServ 8450	2	84	84
	4	84	168 to 252
StoreServ 10400	2	48	48
	4	48	96 to 144
StoreServ 10800	2	72	72
	4	72	144 to 216
	6	72	288 to 360
	8	72	432 to 504
StoreServ 20450/9450	2	96	96
	4	96	192 to 288
StoreServ 20800/20840/20850/20800 R2/20840 R2/20850 R2	2	96	96
	4	96	192 to 288
	6	96	384 to 480
	8	96	576 to 672

The maximum number of WSAPI sessions on a cluster depends on the following factors:

- Number of nodes in the cluster
- Maximum number of sessions per node

- Two-node clusters:

Although there are 2 nodes, the total WSAPI sessions is equal to (1 * max number of sessions per node), as opposed to (2 * max number of sessions per node), so as not to overload the array.

- Four-node, six-node, or eight-node clusters:

If n is the number of nodes on these systems, then:

- If the master and network nodes are the same, then the number of nodes processing the request is $n - 1$. The total number of WSAPI sessions is $(n - 1) * (\text{maximum number of sessions per node})$.
- If the master and network nodes are on separate nodes, then the number of nodes processing the request is $n - 2$. The total number of WSAPI sessions is $(n - 2) * (\text{maximum number of sessions per node})$.

On arrays that have 4 to 8 nodes, the WSAPI server excludes the network and master nodes from processing HTTP requests. (The sole exception is that the network node processes an HTTP GET request for WSAPI configuration information.) Consequently, these nodes do not enter the maximum-session calculation.

The maximum number of sessions that the WSAPI server can handle at any given time can be queried by using an HTTP GET operation on `/api/v1/wsapiconfiguration` and looking at the value of `systemResourceUsage`.

System events

System events signal significant changes in the state of system resources, and are asynchronous. WSAPI allows you to fetch logged events related to specific resources. You can also take advantage of WSAPI event streaming capabilities using the Server Sent Events (SSE) protocol.

-
- ❗ **IMPORTANT:** The WSAPI server forwards all storage system events or alerts based on resource type or other filters specified by the client. The server does not consolidate these events or make any correlations.
-

See, <https://www.w3.org/TR/eventsource> for more information about SSE.

More information

[WSAPI Server-Sent Events \(SSE\) functionality](#) on page 81

<https://www.w3.org/TR/eventsource/>

Logged system events

Using the HTTP GET method in WSAPI, you can fetch all logged events or fetch specific logged events using filters.

More information

[Requesting all past events from system event logs](#) on page 74

[Requesting specific past events using filters](#) on page 77

Requesting all past events from system event logs

Use the HTTP GET method with the following URI and an empty request message body:

`https://<storage_system>:8080/api/v1/eventlog`

The response includes all logged event information for the available resources (see, [resource enumeration](#) for currently supported resources).

Success

A successful request returns HTTP code 200 OK. The response message includes the members shown in the following table, and contains chunked information (see, [HTTP chunked transfer encoding in WSAPI](#)).

Table 10: Response message body JSON objects for event log query

Member	JSON type	API type	Description
total	number	int32	Total number of events.
members	array of objects	event property objects	Event properties.

Table 11: event property objects

Member	JSON type	API type	Description
time	string	8601	Time of the event.
timeSecs	number	epoch	Time of the event in seconds.
id	string	string	Event sequence id.
category	number	<u>category enumeration</u>	Category of the event.
class	number	<u>class enumeration</u>	Class of the event.
severity	number	<u>severity enumeration</u>	Severity of the event.
type	string	string	Event type.
resource	number	<u>resource enumeration</u>	Resource associated with the event.
resourceId	string	string	Resource ID.
resourceName	string	name31	Resource name.
isDataChanged	boolean	boolean	Data changed.
component	number	<u>component enumeration</u>	Component type.
componentId	string	string	Component ID.
componentName	string	name31	Name of the component.
container	number	<u>component enumeration</u>	Container type.
containerId	string	string	Container ID.
containerName	string	name31	Name of the container.
description	string	print511	Additional information for the event.
alertInfo	alertInfo	<u>alertInfo objects</u>	Object Alert information - Applicable only for Alerts.
links	array of links	array of URI links	URI links for the resource part of the events.

Table 12: component enumeration

Symbol	Value	Description
VLUN	2	Events related to VLUNs.
PORT	3	Events related to ports.
VOLUME	4	Events related to volumes.
SFP	41	Events related to SFP.

Table 13: resource enumeration

Symbol	Value	Description
VLUN	2	Events related to VLUNs.
PORT	3	Events related to ports.
VOLUME	4	Events related to volumes.

Table 14: severity enumeration

Symbol	Value	Description
FATAL	1	Fatal event.
CRITICAL	2	Critical event.
MAJOR	3	Major event.
MINOR	4	Minor event.
DEGRADED	5	Degraded warning event.
INFORMATIONAL	6	Informational event.
DEBUG	7	Debug severity.
UNKNOWN	99	Unknown severity.

Table 15: category enumeration

Symbol	Value	Description
LIFECYCLE	1	Identifies a lifecycle event.
ALERT	2	Identifies an alert.

Table 16: class enumeration

Symbol	Value	Description
ALERT	1	Alert.
CREATION	2	Resource created.
REMOVAL	3	Resource removed.
MODIFICATION	4	Resource modified.
STATUS_CHANGE	5	Resource status changed.
UNKNOWN	99	Unknown severity.

Table 17: alertInfo objects

Member	JSON type	API type	Description
alertId	string	string	Alert ID.
messageCode	string	string	Message code.

Table 18: class enumeration

Symbol	Value	Description
NEW	1	New.
ACKED	2	Acknowledged state.
FIXED	3	Alert issue fixed.
UNKNOWN	99	Unknown state.

Errors

Table 19: Query event log error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error.
OTHER	400 Bad Request	Could not determine a more specific error.

Requesting specific past events using filters

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/eventlog/[minutes:<value>][?query="<query expression>"]
```

See, *Parameters and query expressions* for parameter and query expression descriptions

More information

[Parameters and query expressions](#) on page 78

Parameters and query expressions

Parameters include the following:

minutes: <value>

Displays events occurring within the specified number of minutes only. The value is an integer from 1 through 2147483647.

[?query="<query expression>"]

Defines the system event to return to the client. The <query expression> can include the following. Use the AND operator to use more than one query expression.

category EQ <event category>

There are two event categories generated in a system (see, [category enumeration](#)):

- **Life cycle events**

Life cycle events occur when resources are created, modified, or deleted, or when a resource state changes. This type of event indicates the resource that changed as well as any attributes associated with the change.

- **Alert events**

Alert events indicate a resource change of some significance. These events signal that the state of the resource object has changed in some way, and with some level of severity.

resource EQ <event resource>

Identifies the type of resource to report (see, [resource enumeration](#) for currently supported resources).

severity EQ <event severity>

Identifies the severity of the event to report (see, [severity enumeration](#)).

time [GE | LE] <time format>

Shows events that occurred after a specific time (GE) or before a specific time (LE). Define the <time format> parameter in ISO 8601 format: YYYY-MM-DDThh:mm:ssZ

YYYY—Year

MM—Month

DD—Day

hh—Hour

mm—Minutes

ss—Seconds

Z—Timezone offset. Required. Use 'Z' or '+00:00' for UTC and hour and minute offset from UTC for other timezones.

Examples

Separate multiple values using a comma, and multiple expressions using the AND operator. All examples use the HTTP GET method with the referenced URI.

- Request Critical events that occurred within the last 10 minutes:
`https://<storage_system>:8080/api/v1/eventlog/minutes:10?query="severity EQ 2"`
- Request notification of events in last 5 minutes using resource and category filters:
`https://<storage_system>:8080/api/v1/eventlog/minutes:5?query="resource EQ 1,2,3 AND category EQ 1,2"`
- Request event information for multiple categories:
`https://<storage_system>:8080/api/v1/eventlog?query="category EQ 1,2"`
- Request event information for multiple resources:
`https://<storage_system>:8080/api/v1/eventlog?query="resource EQ 1,3"`
- Request event information within a specific time frame:
`https://<storage_system>:8080/api/v1/eventlog?query="time GE 2017-03-20 02:30:00 AND time LE 2017-03-20 02:35:00"`

Success

A successful operation returns the HTTP status code `200 OK` with a response message body with members as described in [Response message body JSON objects for event log query](#).

Errors

API error	HTTP code	Description
INT_SERV_ERR	500 Internal Server Error	internal server error.
INV_QUERY_STRING	400 Bad Request	Invalid query string.
INV_INPUT_PARAM_CONFLICT	400 Bad Request	Invalid request. Parameters cannot be present at the same time.

System event notification

WSAPI uses Server-Sent Events (SSE) protocol to enable asynchronous push notifications from the WSAPI server to the client.

Tasks required to enable WSAPI system event notification are:

Creating a WSAPI session key for an EVENT

Event notification with WSAPI requires an `EVENT` session key. You can issue an HTTP GET request from the client using the `EVENT` session key to establish the client/server SSE connection channel. Each WSAPI `EVENT` session key is associated with only one SSE connection request.

Establishing a communication channel

Open a communication channel between client and server to facilitate system event notification as events occur.

- ❗ **IMPORTANT:** The WSAPI server sends events or alerts associated with all resources, regardless of domain permission settings.

More information

[Enabling and disabling event streaming in WSAPI](#) on page 80

[Establishing a communication channel](#) on page 80

Identifying SSE connections in WSAPI

To identify existing SSE connections and the corresponding session key, use the following command:

```
showwsapisession
```

Enabling and disabling event streaming in WSAPI

The WSAPI event subsystem defaults to enabled.

Procedure

1. Log in to the CLI as `Super`, `Service`, or any role granted the `wsapi_set` right.
2. Start the WSAPI server.

```
cli% setwsapi -evtstream [enable | disable]
```

More information

[Establishing a communication channel](#) on page 80

Establishing a communication channel

Prerequisites

Create a WSAPI session key for an EVENT

Procedure

1. Use the HTTP GET method with the following URI and a request message header:
`https://<storage_system>:8080/api/v1/eventstream`
2. Include the following in the request message header:

```
Accept: text/event-stream
```

```
x-hp3par-wsapi-sessionkey
```

The `x-hp3par-wsapi-sessionkey` is the `EVENT` session key you created for SSE.

Success

A successful operation returns the HTTP status code `200 OK` with a response message similar to the following example:

WSAPI response message body

```
HTTP/1.1 200 OK
Date: Fri, 22 May 2016 18:05:43 GMT
Server: hp3par-wsapi
Cache-Control: no-cache
Pragma: no-cache
Content-Type: text/event-stream
```

With the communication channel open, the WSAPI server can send event notification data to the client.

More information

[Logged system events](#) on page 74
[System event notification](#) on page 79

Establishing event stream notifications using filters

Prerequisites

Create a WSAPI session key for an EVENT

Procedure

Use the HTTP GET method with one of the following URIs:

- To establish an event notification stream for a specific event category:
`https://<storage_system>:8080/api/v1/eventstream?query="category EQ <eventCategory>"`

See, [category enumeration](#) for `<eventCategory>` details.

- To establish an event notification stream for a specific resource:
`https://<storage_system>:8080/api/v1/eventstream?query="resource EQ <eventResource>"`

See, [resource enumeration](#) for `<eventResource>` details.

- To establish an event notification stream for both an event category and an event resource: `https://<storage_system>:8080/api/v1/eventstream?query="category EQ <eventCategory> AND resource EQ <eventResource>"`
- To establish an event notification stream for multiple event categories: `https://<storage_system>:8080/api/v1/eventstream?query="category EQ 1,2"`
- To establish an event notification stream for multiple resources: `https://<storage_system>:8080/api/v1/eventstream?query="resource EQ 2,3"`

More information

[Success](#) on page 74

WSAPI Server-Sent Events (SSE) functionality

Using SSE, the WSAPI server can establish a communication channel between server and client. The WSAPI server uses the communication channel to asynchronously push notification data to the client whenever new event information becomes available.

The active node processes the HTTP GET request to create the SSE connection channel.

After the client and server establish a communication channel, the channel remains open indefinitely. This eliminates the need to reauthenticate the server when it transmits data to the client. However, the performance of event notification can vary depending on the number of concurrent SSE connections. The maximum number of concurrent SSE sessions is 5. Because the SSE connection channel never times out, the WSAPI server can enforce the maximum number of SSE sessions to prevent overuse of WSAPI session resources.

Certain events can prevent the WSAPI server from returning events to the client, such as a server reset or an unreachable event manager. The WSAPI server cannot guarantee that all events or alerts are sent to the client.

More information

<https://www.w3.org/TR/eventsource/>

WSAPI client request format for event streaming

After creating the event session key, the client can send a standard HTTP GET request to establish a long lived connection with the storage system. Request headers include `Accept: text/event-stream` and the `x-hp3par-wsapi-sessionkey`.

```
GET /api/v1/eventstream HTTP/1.1
HOST: s710.storagsystem.com:8008
Accept: text/event-stream
x-hp3par-wsapi-sessionkey: 0-80f5a8f88d1ff8ac . . . . . e3c9c60e9-f8713b57
```

WSAPI server response format and block descriptions

The following examples of event data show the WSAPI server response format.

After the client makes the request, the WSAPI server sends the Server HTTP Response header, indicating success, and followed by a `text/event-stream` of event notification data.

```
<= Server HTTP Response
HTTP/1.1 200 OK
Connection: keep-alive
Content-Type: text/event-stream
Cache-Control: no-cache
```

Event notification data examples

A lifecycle event.

```
event:lifecycle\n
id:6775\n
data:{\"time8601\":\"2017-03-22T16:26:37-07:00\",
\"timeSec\":1490225197,\"id\":\"5616\",\"class\":1,\"severity\":5,
\"type\":\"Component state change\", \"isDataChanged\":true,
\"components\":\"sw_port:02:1\", \"resource\":3,\"resourceId\":\"0:2:1\",
\"component\":3,\"componentId\":\"0:2:1\", \"description\":
\"Port 0:2:1 Degraded (Target Mode Port Went Offline {0x3})\",
\"alertInfo\":{\"alertId\":\"63\", \"messageCode\":\"0x00300de\"},
\"links\": [{\"href\":
\"https://s710.3pardata.com:8080/api/v1/ports/0:2:1\", \"rel\":
\"port\"}]]\n\n
```

An event alert.

```
event:alert\n
id:5616\n
data:{\"time8601\":\"2017-03-22T16:26:37-07:00\", \"timeSec\":1490225197,\"id\":\"5616\", \"class\":1,
\"severity\":5,\"type\":\"Component state change\", \"isDataChanged\":true,\"components\":
\"sw_port:02:1\", \"resource\":3,\"resourceId\":\"0:2:1\", \"component\":3,\"componentId\":\"0:2:1\",
\"description\":\"Port 0:2:1 Degraded (Target Mode Port Went Offline {0x3})\", \"alertInfo\":
{\"alertId\":\"63\", \"messageCode\":\"0x00300de\"}, \"links\":
[{\"href\":\"https://s710.3pardata.com:8080/api/v1/ports/0:2:1\", \"rel\":\"port\"}]]\n\n
```

Event lifecycle container information.

```
Event:lifecycle\n
id:3889\n
data: {\"time\":\"2017-05-17T21:24:40-07:00\", \"timeSecs\":1495081480,\"id\":\"3889\", \"category\":2,
\"class\":1,\"severity\":5,\"type\":\"Component state change\", \"isDataChanged\":true,\"components\":
\"sw_port:1:1:2,hw_sfp\", \"resource\":3,\"resourceId\":\"1:1:2\", \"component\":41,\"container\":3,
\"containerId\":\"1:1:2\", \"description\":\"Port 1:1:2, SFP Degraded (Unqualified, check for
unsupported SFP or cable {0x0})\", \"links\":
[{\"href\":\"http://s99274.3pardata.com:8008/api/v1/ports/1:1:2\", \"rel\":\"port\"}]] \n\n
```

WSAPI notification data format

Event notification data includes one or more lines of text represented by one or more of the following field names:

event

Supports two event types: lifecycle and alert. Each event notification message includes an event tag.

data

Includes a JSON object and is delivered as a data value.

id

Identifies the last event received. Does not track or store past event information.

retry

Not supported.

:

:WSAPI Server Heart Beat

Used to send information to the client, usually indicating that the SSE connection channel is active according to WSAPI.

WSAPI Server-Sent Event (SSE) channel closure

A benefit of using the SSE channel for event notification is that the channel remains open indefinitely. Because the channel remains open, the client does not need to reauthenticate the server each time the server sends event information.

! **IMPORTANT:** Event notification performance can vary depending on the number of concurrent SSE connections. The maximum number of concurrent SSE sessions is 5.

Circumstances that might cause WSAPI to close a communication channel include the following:

- A client-initiated call, implicit (`close()`) or explicit (`ctrl-C`) closes the underlying socket, or the underlying socket closes because of a failure condition. In either case, when WSAPI server detects that the socket is gone, it cleans up the SSE connection channel.
- If the WSAPI server experiences an internal error, the server might close the SSE connection channel by sending HTTP response code other than HTTP 200 OK, as shown in the following example.

```
HTTP/1.1 503 Service Unavailable
Date: Thu, 23 Mar 2017 17:58:18 GMT
Server: hp3par-wsapi
Cache-Control: no-cache
Pragma: no-cache
Connection: close
```

- The user issues a CLI command (`removewsapisession -close_sse_conn`) to close a specific SSE connection channel.

Common Provisioning Groups (CPGs)

Common Provisioning Groups (CPGs) allow you to create a virtual pool of logical disks. These virtual volumes share the resources of the CPG and allocate space on demand. In addition, you can create FPVVs and TPVVs that draw space from the logical disk pool.

CPG enumeration and configuration objects

Many of the CPG operation objects have enumerations or contain sub-objects, as described in the following topics:

- [CPG LAYOUT JSON objects](#)
- [CPG RAIDType enumeration](#)
- [CPG HA enumeration](#)
- [CPG chunkletPosPref enumeration](#)
- [CPG diskPatterns JSON objects](#)
- [CPG diskType enumeration](#)
- [CPG space usage objects](#)
- [CPG growth objects](#)
- [CPG state enumeration](#)
- [CPG DetailedState enumeration](#)

CPG LAYOUT JSON objects

LAYOUT is a subobject of the CPG creation and modification objects. The CPG objects SAGrowth and SDGrowth also return LAYOUT upon query of CPGs.

Table 20: LAYOUT objects

Member	JSON type	API type	Ignored values	Description
RAIDType	number	See, <u>RAIDType enumeration</u>	Negative values	Specifies the RAID type for the logical disk.
setSize	number	igint32	Negative values	Specifies the set size in the number of chunklets.
HA	number	See, <u>HA enumeration</u>	Negative values	Specifies that the layout must support the failure of one port pair, one cage, or one magazine.

Table Continued

Member	JSON type	API type	Ignored values	Description
<code>chunkletPosPref</code>	number	See, <u>chunkletPosPref enumeration</u>	Negative values	Specifies the chunklet location preference characteristics.
<code>diskPatterns</code>	array of objects	See, <u>diskPatterns objects</u>	None	Specifies patterns for candidate disks.

CPG RAIDType enumeration

Table 21: RAIDType enumeration

Symbol	Value	Description
R0	1	RAID level 0
R1	2	RAID level 1
R5	3	RAID level 5
R6	4	RAID level 6

CPG HA enumeration

When creating, modifying, or querying a CPG, specify the HA setting as JSON object `HA` with one of the following enumerations.

Table 22: HA enumeration

Symbol	Value	Description
PORT	1	Support failure of a port.
CAGE	2	Support failure of a drive cage.
MAG	3	Support failure of a drive magazine.

CPG chunkletPosPref enumeration

When creating, modifying, or querying, use the enumeration values in the following table to specify the chunklet location preference.

Table 23: chunkletPosPref enumeration

Symbol	Value	Description
FIRST	1	Lowest numbered available chunklets, where transfer rate is the fastest.
LAST	2	Highest numbered available chunklets, where transfer rate is the slowest.

CPG diskPatterns JSON objects

The JSON object `diskPatterns` is a subobject of the `LDLayout` object for creation and modification of CPG objects. The `diskPatterns` object, which the `LDLayout` object also returns, specifies a pattern for candidate disks.

Table 24: diskPatterns objects

Member	JSON type	Ignored values	Description
<code>nodeList</code>	string	Null	Specifies one or more nodes. Nodes are identified by one or more integers. Multiple nodes are separated with a single comma (1,2,3). A range of nodes is separated with a hyphen (0–7). The primary path of the disks must be on the specified node number.
<code>slotList</code>	string	Null	Specifies one or more PCI slots. Slots are identified by one or more integers. Multiple slots are separated with a single comma (1,2,3). A range of slots is separated with a hyphen (0–7). The primary path of the disks must be on the specified PCI slot number(s).
<code>portList</code>	string	Null	Specifies one or more ports. Ports are identified by one or more integers. Multiple ports are separated with a single comma (1,2,3). A range of ports is separated with a hyphen (0–4). The primary path of the disks must be on the specified port number(s).
<code>cageList</code>	string	Null	Specifies one or more drive cages. Drive cages are identified by one or more integers. Multiple drive cages are separated with a single comma (1,2,3). A range of drive cages is separated with a hyphen (0–3). The specified drive cage(s) must contain disks.

Table Continued

Member	JSON type	Ignored values	Description
<code>magList</code>	string	Null	Specifies one or more drive magazines. Drive magazines are identified by one or more integers. Multiple drive magazines are separated with a single comma (1,2,3). A range of drive magazines is separated with a hyphen (0–7). The specified magazine(s) must contain disks.
<code>diskPosList</code>	string	Null	Specifies one or more disk positions within a drive magazine. Disk positions are identified by one or more integers. Multiple disk positions are separated with a single comma (1,2,3). A range of disk positions is separated with a hyphen (0–3). The specified portion(s) must contain disks.
<code>diskList</code>	string	Null	Specifies one or more physical disks. Disks are identified by one or more integers. Multiple disks are separated with a single comma (1,2,3). A range of disks is separated with a hyphen (0–3). Disks must match the specified ID(s).
<code>totalChunkletsGreater Than</code>	number	Negative values	Specifies that physical disks with total chunklets greater than the number specified be selected.
<code>totalChunkletsLessTh an</code>	number	Negative values	Specifies that physical disks with total chunklets less than the number specified be selected.
<code>freeChunkletsGreater Than</code>	number	Negative values	Specifies that physical disks with free chunklets less than the number specified be selected.
<code>freeChunkletsLessTha n</code>	number	Negative values	Specifies that physical disks with free chunklets greater than the number specified be selected.
<code>diskModels</code>	array of string	Null array elements	Specifies that PDs identified by their models are selected.
<code>diskType</code>	number	Negative values	Specifies that physical disks must have the specified device type. See diskType enumeration
<code>RPM</code>	number	Negative values	Disks must be of the specified speed.

CPG `diskType` enumeration

When you create, modify, or query, specify the `diskType` JSON member in one of the enumerated formats.

Table 25: diskType enumeration

Symbol	Value	Description
FC	1	Fibre Channel
NL	2	Near Line
SSD	3	SSD

CPG space usage objects

The `SDUsage`, `SAUsage` and `UsrUsage` objects use the same members and are sub-objects of the CPG object.

Table 26: Space usage objects (SDUsage, SAUsage, and UsrUsage)

Member	JSON type	API type	Description
<code>totalMiB</code>	number	uint64	Total logical disk space in MiB.
<code>rawTotalMiB</code>	number	uint64	Total physical (raw) logical disk space in MiB.
<code>usedMiB</code>	number	uint64	Amount of logical disk used, in MiB.
<code>rawUsedMiB</code>	number	uint64	Amount of physical (raw) logical disk used, in MiB.
<code>privateSpaceMiB</code>	object	<u>privateSpaceMiB objects</u>	Private space in MiB.
<code>sharedSpaceMiB</code>	number	unit64	Shared space in MiB.
<code>rawSharedSpaceMiB</code>	number	unit64	Raw shared space in MiB
<code>freeSpaceMiB</code>	number	unit64	Free space in MiB.
<code>rawFreeSpaceMiB</code>	number	unit64	Raw free space in MiB
<code>totalSpaceMiB</code>	number	unit64	Total space in MiB.
<code>rawTotalSpaceMiB</code>	number	unit64	Raw total space in MiB

Table 27: privateSpaceMiB objects

Member	JSON type	API type	Description
<code>base</code>	number	unit64	Base space in MiB
<code>rawBase</code>	number	unit64	Raw base space in MiB

Table Continued

Member	JSON type	API type	Description
snapshot	number	unit64	Snapshot space in MiB
rawSnapshot	number	unit64	Raw snapshot space in MiB

CPG growth objects

The `SAGrowth` and `SDGrowth` objects use the same members, and are sub-objects of the CPG object returned by queries.

Table 28: SAGrowth and SDGrowth objects

Member	JSON type	API type	Description
warningMiB	number	uint32	Threshold of used logical disk space, when exceeded, results in a warning alert.
limitMiB	number	uint32	The auto-grow operation is limited to the specified storage amount that sets the growth limit.
incrementMiB	number	uint32	The growth increment, the amount of logical disk storage created on each auto-grow operation.
LDLayout	object	See, LDLayout objects	Logical disk types for this CPG

CPG state enumeration

Table 29: State enumeration

Health	Value	Description
NORMAL	1	Normal operation
DEGRADED	2	Degraded state
FAILED	3	Abnormal operation
UNKNOWN	99	Unknown state

CPG DetailedState enumeration

Multiple arrays use the `DetailedState` enumeration values, including `failedStates`, `degradedStates`, and `additionalStates`.

Table 30: DetailedState enumeration

Symbol	Value	Description
SA_LIMIT_REACHED	1	Administrative space is at limit.
SD_LIMIT_REACHED	2	Copy space is at limit.
SA_GROW_FAILED	3	Administrative space grow failed.
SD_GROW_FAILED	4	Copy space grow failed.
SA_WARN_REACHED	5	Administrative space is at warning level.
SD_WARN_REACHED	6	Copy space is at warning level.
INVALID	7	Invalid

CPG creation and modification error codes

Table 31:

API Error	HTTP Code	Description
BAD_CPG_PATTERN	400 Bad Request	A pattern in a CPG LdLayout specifies illegal values.
CPG_NOT_IN_SAME_DOMAIN	403 Forbidden	The snap CPG is not in the same domain as the user CPG. (WSAPI 1.2 and later)
EXISTENT_CPG	409 Conflict	CPG exists.
IN_USE	409 Conflict	The CPG cannot be removed because it is in use by a volume.
INV_INPUT	400 Bad Request	Missing CPG name.
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	Invalid input: string length exceeds limit.
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	Invalid input: number exceeds expected range.
INV_OPERATION_GROW_SIZE_TOO_SMALL	400 Bad Request	CPG grow size is too small. (WSAPI 1.2 and later)
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Input contains one or more illegal characters.

Table Continued

API Error	HTTP Code	Description
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Invalid input: Some or all required parameters are missing.
INV_INPUT_WARN_GT_LIMIT	400 Bad Request	The allocation warning level is higher than the allocation limit.
INV_OPERATION_CPG_RAID0_DISABLED	403 Forbidden	Invalid operation. RAID-0 must be enabled. (WSAPI 1.2 and later)
INV_OPERATION_CPG_RAID5_NL_DISABLED	403 Forbidden	Invalid operation. RAID-5 on NL drives must be enabled. (WSAPI 1.2 and later)
INV_SET_SIZE	400 Bad Request	The set size is invalid for the selected RAID type.
NO_SPACE	400 Bad Request	Insufficient space for requested operation. (WSAPI 1.3 and later)
NON_EXISTENT_CPG	404 Not Found	The CPG does not exist. This error applies only to CPG modification, not creation.
NON_EXISTENT_DOMAIN	404 Not Found	The domain does not exist.
NO_DISK_PRESENT	400 Bad Request	The specified disks are not present in the system. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
NON_EXISTENT_TEMPLATE	404 Not Found	The specified template does not exist. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Creating a CPG

! **IMPORTANT:** This operation requires access to all domains, as well as Super or Edit roles, or any role granted `cpg_create` permissions.

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/cpgs`

The request message body includes JSON objects from the following tables.

Table 32: Request message body JSON objects for CPG creation only

Member	JSON type	API type	Ignored Values	Description
name	string	name31	Required field.	Specifies the name of the CPG.
domain	string	name31	Null.	Specifies the name of the domain in which the object will reside.
template	string	name31	Null.	Specifies the name of the template from which the CPG is created. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Table 33: Request message body JSON objects for CPG creation and modification

Member	JSON type	API type	Ignored values	Description
growthIncrementMiB	number	igint32	Zero and negative values. WSAPI 1.2 and later.	Specifies the growth increment, in MiB, the amount of logical disk storage created on each auto-grow operation.
growthLimitMiB	number	igint32	Negative values. WSAPI 1.2 and later, zero and negative values.	Specifies that the auto-grow operation is limited to the specified storage amount, in MiB, that sets the growth limit.
usedLDWarningAlertMiB	number	igint32	Negative values. WSAPI 1.2 and later, zero and negative values.	Specifies that the threshold of used logical disk space, in MiB, when exceeded results in a warning alert.
LDLayout	object	See, <u>LDLayout objects</u>	Null.	Specifies logical disk types to be used for this CPG.

Success

A successful operation returns the HTTP status code 201 `Created` with no response message body.

Upon successful creation of the CPG, the Location item in the response header contains the URI for the newly created CPG in the following format:

/api/v1/cpgs/<cpg name>

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

[CPG creation and modification error codes](#) on page 90

Modifying a CPG

❗ **IMPORTANT:** This operation requires access to all domains, as well as Super, Service, or Edit roles, or any role granted `cpg_set` permission.

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/cpgs/<cpg name>`

The request message body contains JSON objects as defined in the following table, and in [Request message JSON objects for CPG creation and modification](#).

Table 34: Request message body JSON objects for CPG modification only

Member	JSON type	API type	Ignored values	Description
<code>newName</code>	string	name31	Null	Specifies the name of the CPG to update.
<code>disableAutoGrow</code>	boolean	boolean	None	Enables (<code>false</code>) or disables (<code>true</code>) CPG auto grow. Defaults to <code>false</code> .
<code>rmGrowthLimit</code>	boolean	boolean	None	Enables (<code>false</code>) or disables (<code>true</code>) auto grow limit enforcement. Defaults to <code>false</code> .
<code>rmWarningAlert</code>	boolean	boolean	None	Enables (<code>false</code>) or disables (<code>true</code>) warning limit enforcement. Defaults to <code>false</code> .

Success

A successful modification returns the HTTP code `200 OK` without a message body. The `Location` portion of the JSON response header indicates the URI of the updated CPG in the following format:

`/api/v1/cpgs/<new name>`

A successful name modification shows the `<new name>`. Otherwise, the URI contains the original CPG name.

Errors

More information

[CPG creation and modification error codes](#) on page 90

Removing a CPG

❗ **IMPORTANT:** This operation requires access to all domains, as well as Super, or Edit roles, or any role granted `cpg_remove` permission.

Use the HTTP DELETE method with the following URI:

`https://<storage_system>:8080/api/v1/cpgs/<cpg name>`

Success

A successful removal returns the HTTP code `200 OK` with no message body.

Errors

Table 35: CPG removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_CPG	404 Not Found	CPG not found.
IN_USE	409 Conflict	The CPG cannot be removed because it is in use by a volume.

More information

[WSAPI error codes and descriptions](#) on page 34

Querying CPGs

Query for information from a single CPG or all CPGs on the storage system.

Querying a single CPG

Use the HTTP GET method with the following URI and no request message body:

`https://<storage_system>:8080/api/v1/cpgs/<cpg name>`

The `<cpg name>` is the name of the CPG to query.

Success

A successful query returns the HTTP code `200 OK`. Unless an error occurs, the response includes JSON objects as specified in [CPG property objects](#).

Errors

Table 36: Single-CPG query error codes

API Error	HTTP Code	Description
NON_EXISTENT_CPG	404 Not Found	CPG does not exist. (WSAPI 1.2 and later)
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	CPG name contains invalid character. (WSAPI 1.2 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying all CPGs

Use the HTTP GET method with the following URI and no request message body:

`https://<storage_system>:8080/api/v1/cpgs`

Success

A successful query returns HTTP status code 200: OK. The body of the response is a JSON object with `total` and `members`, as defined in the following table.

Table 37: Response message body JSON objects for CPG query

Member	JSON type	API type	Description
<code>total</code>	number	int32	Returns the total number of objects in the collection.
<code>members</code>	Array of objects	<u>CPG property objects</u>	CPG properties. Returns a JSON array of zero or more JSON objects.

Table 38: CPG property objects

Member	JSON type	API type	Description
<code>domain</code>	string	name31	Domain to which the CPG belongs.
<code>id</code>	number	uint32	CPG ID.
<code>name</code>	string	name31	CPG name.
<code>numFPVVs</code>	number	uint32	Number of FPVVs allocated in the CPG.

Table Continued

Member	JSON type	API type	Description
numTDVVs	number	uint32	Number of TDVVs created in the CPG. (WSAPI 1.4.1 and later.)
numTPVVs	number	uint32	Number of TPVVs allocated in the CPG.
SAUsage	object	<u>Space usage objects (SDUsage, SAUsage, and UsrUsage)</u>	Snapshot administration usage.
SDUsage	object	<u>Space usage objects (SDUsage, SAUsage, and UsrUsage)</u>	Snapshot data space usage.
UsrUsage	object	<u>Space usage objects (SDUsage, SAUsage, and UsrUsage)</u>	User data space usage.
uuid	string	uuid string	The UUID that was automatically assigned to the CPG at creation.
warningPct	number	uint32	Percentage usage at which to issue an alert.
SAGrowth	object	<u>SAGrowth and SDGrowth objects</u>	Snapshot administration space auto-growth parameters.
SDGrowth	object	<u>SAGrowth and SDGrowth objects</u>	Snapshot data space auto-growth parameters.
state	number	<u>State enumeration</u>	Overall state of the CPG.
failedStates	number	<u>DetailedState enumeration</u>	Detailed state of the CPG.
degradedStates	number	<u>DetailedState enumeration</u>	Detailed state of the CPG.
additionalStates	number	<u>DetailedState enumeration</u>	Detailed state of the CPG.
dedupCapable	boolean	boolean	A read-only attribute that indicates whether a TDVV creation is enabled (<code>true</code> : can be created) or disabled (<code>false</code> : cannot be created).
tdvvVersion	number	uint32	Deduplication version used by volumes in the CPG.

Table Continued

Member	JSON type	API type	Description
ddsRsvdMiB	number	uint32	Maximum size of the deduplication store Volume in the CPG.
privateSpaceMiB	object	<u>privateSpaceMiB objects</u>	Private CPG space in MiB
sharedSpaceMiB	number	uint64	Shared CPG space in MiB
freeSpaceMiB	number	uint64	Free CPG space in MiB
totalSpaceMiB	number	uint64	Total CPG space in MiB
rawSharedSpaceMiB	number	uint64	Raw shared space in MiB
rawFreeSpaceMiB	number	uint64	raw free space in MiB
rawTotalSpaceMiB	number	uint64	Raw total space in MiB

Errors

Table 39: Query error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error.

More information

[WSAPI error codes and descriptions](#) on page 34

Storage volumes

License information

Fully provisioned virtual volumes

A fully provisioned virtual volume is provisioned storage space from LDs that belong to a CPG. Fully provisioned virtual volumes are the default system volume and do not require any additional licenses.

Reducing volume size using HPE 3PAR Thin Persistence Software

Maintaining TPVV and read/write snapshot size with the Thin Persistence feature requires 3PAR StoreServ 10000 or 3PAR StoreServ 7000 Storage System, 3PAR Thin Provisioning Software license, 3PAR Thin Conversion Software license, and 3PAR Thin Persistence Software license.

Setting retention times for virtual volumes

3PAR Virtual Lock Software is an optional feature that enforces the retention period of any volume or copy of a volume. You must purchase the Virtual Lock license to use the `retentionHours` field. For more information, see the [HPE 3PAR Virtual Lock Software website](#).

Volume enumeration and configuration objects

WSAPI uses several enumerations and configuration objects for the various volume API operations.

Volume compressionState enumeration

Table 40: compressionState enumeration

Symbol	Value	Description
YES	1	Compression is enabled on the volume.
NO	2	Compression is disabled on the volume.
OFF	3	Compression is turned off.
NA	4	Compression is not available on the volume.

Volume provisioningType enumeration

Table 41: provisioningType enumeration values

Symbol	Value	Description
FULL	1	<ul style="list-style-type: none">FPVV, with no snapshot space or with statically allocated snapshot space.A commonly provisioned VV with fully provisioned user space and snapshot space associated with the <code>snapCPG</code> property.
TPVV	2	<ul style="list-style-type: none">TPVV, with base volume space allocated from the user space associated with the <code>userCPG</code> property.Old-style, thinly provisioned VV (created on a 2.2.4 release or earlier). Both the base VV and snapshot data are allocated from the snapshot space associated with <code>userCPG</code>.
SNP	3	The VV is a snapshot (Type vcopy) with space provisioned from the base volume snapshot space.
PEER	4	Remote volume admitted into the local storage system.
UNKNOWN	5	Unknown.
TDVV	6	The volume is a deduplicated volume.
DDS	7	A system maintained deduplication storage volume shared by TDVV volumes in a CPG.

Volume CopyType enumeration

Table 42: CopyType enumeration

Symbol	Value	Description
BASE	1	Base volume (not a copy).
PHYSICAL_COPY	2	Physical copy (full copy).
VIRTUAL_COPY	3	Snapshot copy (virtual copy).

Volume deduplicationState enumeration

Table 43: deduplicationState enumeration

Symbol	Value	Description
YES	1	Enables deduplication on the volume.
NO	2	Disables deduplication on the volume.
NA	3	Deduplication is not available.

Volume DetailedState enumeration

The `DetailedState` is an enumeration that applies to multiple JSON objects, including `failedStates`, `degradedStates`, and `additionalStates`.

Table 44: DetailedState enumeration

Symbol	Value	Description
LDS_NOT_STARTED	1	LDs not started.
NOT_STARTED	2	VV not started.
NEEDS_CHECK	3	Check for consistency.
NEEDS_MAINT_CHECK	4	Maintenance check is required.
INTERNAL_CONSISTENCY_ERR OR	5	Internal consistency error.
SNAPDATA_INVALID	6	Invalid snapshot data.
PRESERVED	7	Unavailable LD sets due to missing chunklets. Preserved remaining VV data.
STALE	8	Parts of the VV contain old data because of a copy-on-write operation.
COPY_FAILED	9	A promote or copy operation to this volume failed.
DEGRADED_AVAIL	10	Degraded due to availability.
DEGRADED_PERF	11	Degraded due to performance.
PROMOTING	12	Volume is the current target of a promote operation.
COPY_TARGET	13	Volume is the current target of a physical copy operation.

Table Continued

Symbol	Value	Description
RESYNC_TARGET	14	Volume is the current target of a resynchronized copy operation.
TUNING	15	Volume tuning is in progress.
CLOSING	16	Volume is closing.
REMOVING	17	Removing the volume.
REMOVING_RETRY	18	Retrying a volume removal operation.
CREATING	19	Creating a volume.
COPY_SOURCE	20	Copy source.
IMPORTING	21	Importing a volume.
CONVERTING	22	Converting a volume.
INVALID	23	Invalid.
EXCLUSIVE	24	Local storage system has exclusive access to the volume.
CONSISTENT	25	Volume is being imported consistently along with other volumes in the VV set.
STANDBY	26	Volume in Standby mode.
SD_META_INCONSISTENT	27	SD Meta Inconsistent.
SD_NEEDS_FIX	28	SD needs fix.
SD_META_FIXING	29	SD meta fix.
UNKNOWN	999	Unknown state.
NOT_SUPPORTED_BY_WSAPI	1000	State not supported by WSAPI.

Volume policies configuration object

The `policies` JSON object specifies the policies of a volume.

Table 45: Volume policies configuration objects

Member	Value	Description
staleSS	boolean	<p><code>true</code>—Stale snapshots. If there is no space for a copy-on-write operation, the snapshot can go stale but the host write proceeds without an error.</p> <p><code>false</code>—No stale snapshots. If there is no space for a copy-on-write operation, the host write fails.</p>
oneHost	boolean	<p><code>true</code>—Volume constrained to export to one host or one host cluster.</p> <p><code>false</code>—Volume exported to multiple hosts for use by a cluster-aware application, or when using <code>port presents</code> VLUNs.</p>
zeroDetect	boolean	<p><code>true</code>—Storage system scans for zeros in the incoming write data.</p> <p><code>false</code>—Storage system does not scan for zeros in the incoming write data.</p>
system	boolean	<p><code>true</code>— Special volume used by the system.</p> <p><code>false</code>—Normal user volume.</p>
caching	boolean	<p>Read-only policy (cannot be set).</p> <p><code>true</code>—Storage system is enabled for write caching, read caching, and read ahead for the volume.</p> <p><code>false</code>—Storage system is disabled for write caching, read caching, and read ahead for the volume.</p>
fsvc	boolean	<p>Read-only policy (cannot be set).</p> <p><code>true</code> —File Services uses this volume.</p> <p><code>false</code> —File Services does not use this volume.</p>
hostDIF	See, hostDIF enumeration	Type of host-based DIF policy.

Volume hostDIF enumeration

Table 46: hostDIF enumeration

Symbol	Value	Description
3PAR_HOST_DIF	1	3PAR host-based DIF supported.
STD_HOST_DIF	2	Standard SCSI host-based DIF supported.
NO_HOST_DIF	3	Volume does not support host-based DIF.

Volume space objects

Use the following three subobjects to specify the volume space:

- `adminSpace`
- `snapshotSpace`
- `userSpace`

Each subobject uses the same members.

Table 47: space objects

Member	JSON type	API type	Description
<code>reservedMiB</code>	number	uint32	Reserved space in MiB.
<code>rawReservedMiB</code>	number	uint32	Raw reserved space in MiB.
<code>usedMiB</code>	number	uint32	Used space in MiB.
<code>freeMiB</code>	number	uint32	Free space in MiB.

Managing storage volumes

! **IMPORTANT:** Any user with Super or Edit role, or any role granted `vv_create` permission (for base volumes), `vvcopy_create` permission (for physical copies of volumes), or `sv_create` permission (for snapshots), can create a volume.

Storage volume actions include:

- **Creating a base volume**
- **Modifying a virtual volume** (WSAPI 1.2 and later)
- **Displaying virtual volume space distribution**
- **Growing volumes**
- **Tuning virtual volumes**
- **Removing a virtual volume** (WSAPI 1.2 and later)

More information

Querying virtual volumes

License information

Creating a physical copy of a volume

Creating a volume snapshot

Creating a base volume

Use the HTTP POST method with the following URI. The request message body includes JSON objects as described in the following table.

`https://<storage_system>:8080/api/v1/volumes`

The `<storage_system>` parameter is the storage system host name or IP address.

Table 48: Request message body JSON objects for base volume creation

Member	JSON type	API type	Ignored values	Description
name	string	name31	None. Required field.	Specifies a volume name up to 31 characters in length.
cpg	string	name31	None. Required field.	Specifies the name of the CPG from which the volume user space will be allocated.
sizeMiB	number	uint32	None. Required field.	Specifies the size for the volume in MiB. Rounds the volume size to the next multiple of 256 MiB.
id	number	igint32	Negative values.	Specifies the ID of the volume. If not specified, chooses the next available ID.
comment	string	print511	None.	Specifies any additional information up to 511 characters for the volume.
policies	object	<u>Volume policies configuration on objects</u>	Caching and system, if <code>false</code> .	Specifies volume policies. The <code>policies</code> object sets policies for <code>staleSS</code> , <code>oneHost</code> , <code>tpZeroFill</code> , or <code>zeroDetect</code> . Setting the system or cache policy boolean values to <code>true</code> results in an error.
snapCPG	string	name31	None.	Specifies the name of the CPG from which the snapshot space will be allocated.
ssSpcAllocWarningPct	number	igint32	Negative values.	Enables a snapshot space allocation warning. A warning alert is generated when the reserved snapshot space of the volume exceeds the indicated percentage of the volume size.

Table Continued

Member	JSON type	API type	Ignored values	Description
ssSpcAllocLimitPct	number	igint32	Negative values.	Sets a snapshot space allocation limit. The snapshot space of the volume is prevented from growing beyond the indicated percentage of the volume size.
tpvv	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) TPVV creation. Defaults to <code>false</code> . With both <code>tpvv</code> and <code>tdvv</code> set to <code>false</code> or unspecified, defaults to <code>FPVV</code> .
tdvv	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) TDVV creation. Defaults to <code>false</code> . With both <code>tpvv</code> and <code>tdvv</code> set to <code>FALSE</code> or unspecified, defaults to <code>FPVV</code> .
usrSpcAllocWarningPct	number	igint32	Negative values.	Enables user space allocation warning. Generates a warning alert when the TPVV reserved user space exceeds the specified percentage of the VV size.
usrSpcAllocLimitPct	number	igint32	Negative values.	Sets the user space allocation limit and prevents TPVV user space from growing beyond the indicated percentage of the VV size. After reaching the specified size, any new writes to the VV fail.
expirationHours	number	igint32	Negative values.	Specifies the relative time (from the current time) that the volume expires. Value is a positive integer with a range of 1–43,800 hours (1825 days).

Table Continued

Member	JSON type	API type	Ignored values	Description
retentionHours	number	igint32	Negative values.	Specifies the amount of time relative to the current time that the volume is retained. Value is a positive integer with a range of 1–43,800 hours (1825 days).
compression	boolean	boolean	Ignored if the value is <code>false</code> .	Enables (<code>true</code>) or disables (<code>false</code>) creating thin provisioned volumes with compression. Defaults to <code>false</code> (create volume without compression).

Success

A successful operation returns the HTTP status code 201 `Created` with no response message body.

The `Location` portion of the response header contains the URI for the newly created volume in the following format:

```
/api/v1/volumes/<volume name>
```

Errors

Table 49: Base-volume and snapshot creation error codes

API Error	HTTP Code	Description
DEDUP_OPERATION_NOT_SUPPORTED	403 Forbidden	The system does not support deduplication operations. (WSAPI 1.4.1 and later)
EXISTENT_ID	409 Conflict	ID exists.
EXISTENT_VOL	409 Conflict	The volume already exists.
INV_INPUT	400 Bad Request	Invalid parameter or JSON object.
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	Invalid input: string length exceeds limit.
INV_INPUT_RETAIN_GT_EXPIRE	400 Bad Request	Retention time is greater than expiration time.
INV_INPUT_TIME	400 Bad Request	Invalid time specified.
INV_INPUT_USR_ALRT_NON_TPVV	400 Bad Request	User space allocation alerts are valid only with TPVVs.

Table Continued

API Error	HTTP Code	Description
INV_INPUT_VV_POLICY	400 Bad Request	Invalid policy specification (for example, caching or system set to <code>true</code>).
INV_INPUT_WARN_GT_LIMIT	400 Bad Request	Allocation warning level is higher than the limit.
NO_SNAP_CPG	409 Conflict	No snapshot space is available.
NO_SPACE	400 Bad Request	Not enough space is currently available. (WSAPI 1.3 and later)
TDVV_COUNT_EXCEED_CPG_LIMIT	403 Forbidden	The TDVV count has exceeded the limit per CPG. (WSAPI 1.4.1 and later)
TOO_LARGE	400 Bad Request	Volume size is above the architectural limit.
VV_POLICY_NOT_SUPPORTED	403 Forbidden	This class of systems does not support VV policy.

More information

[WSAPI error codes and descriptions](#) on page 34

Modifying a virtual volume

! **IMPORTANT:** See, [License information](#)

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/volumes/<volume_name>`

The `<volume_name>` variable is the name of the volume being modified.

The request message body includes a JSON object, with members as described in the following table.

Table 50: Request message body JSON objects for volume modification

Member	JSON type	API type	Ignored Values	Description
<code>newName</code>	string	name31	None.	New name of the volume. (WSAPI 1.2 and later)
<code>comment</code>	string	print511	None.	Comment about the volume. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Ignored Values	Description
WWN	string	string	None.	Specifies changing the WWN of the virtual volume a new WWN. If the value of WWN is <code>auto</code> , the system automatically chooses the WWN based on the system serial number, the volume ID, and the wrap counter.
expirationHours	number	igint32	Zero and negative values.	Remaining time, in hours, before the volume expires. (WSAPI 1.2 and later)
retentionHours	number	igint32	Zero and negative values.	Sets the number of hours to retain the volume. (WSAPI 1.2 and later)
policies	object	See, <u>Volume policies configuration objects</u>	Caching and system, if policies indicate <code>false</code> . Otherwise, none.	Specify virtual volume policies. (WSAPI 1.2 and later)
snapCPG	string	name31	None.	Snap CPG name. (WSAPI 1.2 and later)
ssSpcAllocWarningPct	number	igint32	Zero and negative values.	Generates a warning alert when the reserved snapshot space of the virtual volume exceeds the indicated percentage of the virtual volume size. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Ignored Values	Description
ssSpcAllocLimitPct	number	igint32	Zero and negative values.	Prevents the snapshot space of the virtual volume from growing beyond the indicated percentage of the virtual volume size. (WSAPI 1.2 and later)
userCPG	string	name31	None	User CPG name. (WSAPI 1.2 and later)
usrSpcAllocWarningPct	number	igint32	Zero and negative values.	Generates a warning alert when the user data space of the TPVV exceeds the specified percentage of the virtual volume size. (WSAPI 1.2 and later)
usrSpcAllocLimitPct	number	igint32	Zero and negative values.	Prevents the user space of the TPVV from growing beyond the indicated percentage of the virtual volume size. After reaching this limit, any new writes to the virtual volume will fail. (WSAPI 1.2 and later)
rmSsSpcAllocWarning	boolean	boolean	Setting ignored If false, and warning value is 0. Otherwise, none.	Enables (false) or disables (true) removing the snapshot space allocation warning. If false, and warning value is a positive number, then set. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Ignored Values	Description
rmUsrSpcAllocWarning	boolean	boolean	Setting ignored If <code>false</code> , and warning value is 0. Otherwise, none.	<p>Enables (<code>false</code>) or disables (<code>true</code>) removing the user space allocation warning.</p> <p>If <code>false</code>, and warning value is a positive number, then set.</p> <p>(WSAPI 1.2 and later)</p>
rmExpTime	boolean	boolean	Setting ignored If <code>false</code> , and expiration time value is 0. Otherwise, none.	<p>Enables (<code>false</code>) or disables (<code>true</code>) resetting the expiration time.</p> <p>If <code>false</code>, and expiration time value is a positive number, then set.</p> <p>(WSAPI 1.2 and later)</p>
rmSsSpcAllocLimit	boolean	boolean	Setting ignored If <code>false</code> , and limit time value is 0. Otherwise, none.	<p>Enables (<code>false</code>) or disables (<code>true</code>) removing the snapshot space allocation limit.</p> <p>If <code>false</code>, and limit value is 0, setting ignored.</p> <p>If <code>false</code>, and limit value is a positive number, then set.</p> <p>(WSAPI 1.2 and later)</p>
rmUsrSpcAllocLimit	boolean	boolean	Setting ignored If <code>false</code> , and limit value is 0. Otherwise, none.	<p>Enables (<code>false</code>) or disables (<code>true</code>) the allocation limit.</p> <p>If <code>false</code>, and limit value is a positive number, then set.</p> <p>(WSAPI 1.2 and later)</p>

Success

A successful request to modify a volume returns the HTTP code 200 OK.

The `Location` portion of the response header contains the new URI for the updated volume in the following format:

`/api/v1/volumes/<volume_name>`

Errors

Table 51: Virtual volume modification error codes

API Error	HTTP Code	Description
INV_INPUT_WARN_GT_LIMIT	400 Bad Request	Allocation warning level is higher than the limit. (WSAPI 1.2 and later)
INV_INPUT_USR_ALRT_NON_TPVV	400 Bad Request	User space allocation alerts are valid only with a TPVV.
INV_INPUT_RETAIN_GT_EXPIRE	400 Bad Request	Retention time is greater than expiration time.
INV_INPUT_VV_POLICY	400 Bad Request	Invalid policy specification (for example, caching or system is set to <code>true</code>). (WSAPI 1.2 and later)
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	Invalid input: string length exceeds limit. (WSAPI 1.2 and later)
INV_INPUT_TIME	400 Bad Request	Invalid time specified.
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Invalid character in WWN.
INV_OPERATION_VV_MODIFY_USR_CPG_TPVV	403 Forbidden	<code>usr_cpg</code> cannot be modified on a TPVV. (WSAPI 1.2 and later)
UNLICENSED_FEATURE	403 Forbidden	Retention time cannot be modified on a system without the Virtual Lock license.
CPG_NOT_IN_SAME_DOMAIN	403 Forbidden	Snap CPG is not in the same domain as the user CPG. (WSAPI 1.2 and later)

Table Continued

API Error	HTTP Code	Description
INV_OPERATION_VV_PEER_VOLUME	403 Forbidden	Cannot modify a peer volume. (WSAPI 1.2 and later)
INT_SERV_ERR	500 Internal Server Error	Metadata of the VV is corrupted.
INV_OPERATION_VV_SYS_VOLUME	403 Forbidden	Cannot modify retention time on a system volume. (WSAPI 1.2 and later)
INV_OPERATION_VV_INTERNAL_VOLUME	403 Forbidden	Cannot modify an internal volume (WSAPI 1.2 and later)
INV_OPERATION_VV_VOLUME_NOT_DEFINED_A LL_NODES	409 Conflict	Cannot modify a volume until the volume is defined on all volumes. (WSAPI 1.2 and later)
INVALID_OPERATION_VV_ONLINE_COPY_IN_P ROGRESS	409 Conflict	Cannot modify a volume when an online copy for that volume is in progress. (WSAPI 1.2 and later)
INVALID_OPERATION_VV_VOLUME_CONV_IN_P ROGRESS	409 Conflict	Cannot modify a volume in the middle of a conversion operation. (WSAPI 1.2 and later)
INVALID_OPERATION_VV_SNAPSPACE_NOT_MO VED_TO_CPG	409 Conflict	Snapshot space of a volume needs to be moved to a CPG before the user space. (WSAPI 1.2 and later)
INV_OPERATION_VV_VOLUME_ACCOUNTING_IN _PROGRESS	409 Conflict	The volume cannot be renamed until snapshot accounting has finished. (WSAPI 1.2 and later)
INV_OPERATION_VV_ZERO_DETECT_TPVV	403 Forbidden	The zero_detect policy can be used only on TPVVs. (WSAPI 1.2 and later)
INV_OPERATION_VV_CPG_ON_SNAPSHOT	409 Conflict	CPG cannot be assigned to a snapshot.

Table Continued

API Error	HTTP Code	Description
INV_INPUT_VV_IS_TPVV	403 Forbidden	Volume is already thinly provisioned. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_SNAPSHOT_NOT_SAME_TYPE	403 Forbidden	Snapshot CPG should be tuned. (WSAPI 1.4 and later)
INV_OPERATION_VV_COMPRESSION_ALREADY_ENABLED	403 Forbidden	Compression is already enabled on a volume
INV_OPERATION_VV_COMPRESSION_ALREADY_DISABLED	403 Forbidden	Compression is already disabled on a volume
INV_OPERATION_VV_IS_NOT_COMPRESSED	403 Forbidden	A volume is not compressed
OTHER	400 Bad Request	Other miscellaneous errors, including <code>WWN <wwn></code> is already in use.

More information

[WSAPI error codes and descriptions](#) on page 34

Displaying virtual volume space distribution for all volumes

Display volume space distribution for all virtual volumes among CPGs.

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/volumespacedistribution`

Success

A successful request returns the HTTP code 200 OK and a response message body with JSON objects as defined in the following table.

Table 52: Response message body JSON object members for virtual volume space distribution

Member	JSON type	API type	Description
total	number	int32	Number of data (WSAPI 1.5 and later)
members	Array of objects	<u>volume space distribution data objects</u>	Virtual volume space distribution among CPGs (WSAPI 1.5 and later)
links	Array of URL links	Array of URL links	Links include the self URL (WSAPI 1.5 and later)

Table 53: volume space distribution data objects

Member	JSON type	API type	Description
volumeName	string	name31	Name of the virtual volume. (WSAPI 1.5 and later)
CPGs	object	<u>spaceDistribution objects</u>	Array of CPGs to which the virtual volume space is allocated. (WSAPI 1.5 and later)
links	URL links	URL links	Link to the single instance of virtual volume, volumeName. (WSAPI 1.5 and later)

Table 54: spaceDistribution objects

Member	JSON type	API type	description
cpgName	string	name31	CPG name. (WSAPI 1.5 and later)
current	object	<u>CPGSpace objects</u>	Current space distribution for a CPG. (WSAPI 1.5 and later)
new	object	<u>CPGSpace objects</u>	<p>New space distribution for a CPG during the regional move. Object numbers display as 0 unless you are moving some regions from one CPG to another.</p> <p>The space being moved appears under both the current space object for the old CPG and under the new space object for the new CPG.</p> <p>After completing the move, the system removes the space from the old CPG and the volumes appear under the current space object for the new CPG only.</p> <p>(WSAPI 1.5 and later)</p>
links	URL links	URL links	<p>Link to the single instance of CPG name.</p> <p>(WSAPI 1.5 and later)</p>

Table 55: CPGSpace objects

Member	JSON type	API type	description
adminSpaceMiB	number	uint64	Admin space in MiB (WSAPI 1.5 and later)
snapshotSpaceMiB	number	uint64	Snapshot space in MiB (WSAPI 1.5 and later)
userSpaceMiB	number	uint64	User space in MiB (WSAPI 1.5 and later)

Errors

API error	HTTP code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error (WSAPI 1.5 and later)

Displaying virtual volume space distribution for a volume

Display space distribution for a specific virtual volume or a volume set.

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/volumespacedistribution/<name>`

The *<name>* variable is either a single virtual volume name or a volume set name. (Start with **set:** to use a volume set name. For example **set:vvset1.**) If you use a volume set name, the system displays the space distribution for all volumes in that volume set.

Success

A successful request returns the HTTP code 200 OK and a response message body with JSON objects as defined in **Response message body JSON object members for virtual volume space distribution.**

Errors

API error	HTTP code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error (WSAPI 1.5 and later)

Growing volumes

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/volumes/<volume_name>`

The *<volume_name>* is the name of the volume to be grown.

The request message body is a JSON object with two members as described in the following table.

Table 56: Request message body JSON object members for growing volumes

Member	JSON type	API type	Ignored Values	Description
action	number	See, Volume custom action enumeration	Required field	Specifies the action to be taken for the specified volume.
sizeMiB	number	uint32	Required field	Specifies the size (in MiB) to add to the volume user space. Rounded up to the next multiple of chunklet size (256 MiB or 1,000 MiB).

Table 57: Volume custom action enumeration

Symbol	Value	Description
STOP_PHYSICAL_COPY	1	Stop the physical copy operation. (WSAPI 1.3 and later)
RESYNC_PHYSICAL_COPY	2	Resynchronize the physical copy. (WSAPI 1.3 and later)
GROW_VOLUME	3	Increase the size of a virtual volume. (WSAPI 1.3 and later)
PROMOTE_VIRTUAL_COPY	4	Promote a virtual copy. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
STOP_PROMOTE_VIRTUAL_COPY	5	Stop the promote virtual copy task. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
TUNE_VOLUME	6	Tune a volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
UPDATE_VIRTUAL_COPY	7	Update a virtual copy or vvset. (WSAPI 1.5 and later)
SNAPSHOT_ENUM_ACTION	8	Create a snapshot for a group of volumes. (WSAPI 1.5 and later)

Success

A successful growth request returns the HTTP status code 200 OK.

The `Location` portion of the response header contains a URI to the volume in the following format:

`/api/v1/volumes/<volume_name>`

Errors

Table 58: Volume growth error codes

API Error	HTTP Code	Description
VV_NOT_IN_SAME_DOMAIN	403 Forbidden	The volume is not in the same domain. (WSAPI 1.3 and later)
NON_EXISTENT_VOL	404 Not Found	The volume does not exist. (WSAPI 1.3 and later)
INV_OPERATION_UNSUPPORTED_VV_TYPE	403 Forbidden	Invalid operation: Cannot grow this type of volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_TUNE_IN_PROGRESS	409 Conflict	Invalid operation: Volume tuning is in progress. (WSAPI 1.3 and later)
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	Invalid input: String length exceeds limit. (WSAPI 1.3 and later)
INV_INPUT_VV_GROW_SIZE	400 Bad Request	Invalid grow size. (WSAPI 1.3 and later)
VV_NEW_SIZE_EXCEED_CPG_LIMIT	403 Forbidden	The new volume size exceeds the CPG limit. (WSAPI 1.3 and later)
INV_OPERATION_VV_INTERNAL_VOLUME	403 Forbidden	This operation is not allowed on an internal volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_VOLUME_CONV_IN_PROGRESS	409 Conflict	Invalid operation: Volume conversion is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_ONLINE_COPY_IN_PROGRESS	409 Conflict	Invalid operation: online copy is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_CLEANUP_IN_PROGRESS	403 Forbidden	Internal volume cleanup is in progress. (WSAPI 1.3 and later)

Table Continued

API Error	HTTP Code	Description
VV_IS_BEING_REMOVED	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
VV_IN_INCONSISTENT_STATE	403 Forbidden	The volume has an internal consistency error. (WSAPI 1.3 and later)
VV_SIZE_CANNOT_REDUCE	403 Forbidden	New volume size is smaller than the current size. (WSAPI 1.3 and later)
VV_NEW_SIZE_EXCEED_LIMIT	403 Forbidden	The new volume size exceeds the limit. (WSAPI 1.3 and later)
INV_OPERATION_VV_SA_SD_SPACE_REMOVED	409 Conflict	Invalid operation: Volume SA/SD space is being removed. (WSAPI 1.3 and later)
INV_OPERATION_VV_IS_BUSY	409 Conflict	Invalid operation: The volume is currently busy. (WSAPI 1.3 and later)
VV_NOT_STARTED	403 Forbidden	The volume is not started. (WSAPI 1.3 and later)
INV_OPERATION_VV_IS_PCOPY	409 Conflict	Invalid operation: The volume is a physical copy. (WSAPI 1.3 and later)
INV_OPERATION_VV_NOT_IN_NORMAL_STATE	403 Forbidden	The volume state is not normal. (WSAPI 1.3 and later)
INV_OPERATION_VV_PROMOTE_VV_PROMOTE_IN_PROGRESSIN_PROGRESS	409 Conflict	Invalid operation: Volume promotion is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_PCOPY_IN_PROGRESSS	409 Conflict	The volume has a copy in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_PARENT_OF_PCOPY	409 Conflict	Invalid operation. The volume is the parent of a physical copy. (WSAPI 1.3 and later)
NO_SPACE	400 Bad Request	Insufficient space for requested operation. (WSAPI 1.3 and later)

Tuning virtual volumes

Use the HTTP PUT method with the following URI and a request message body as described in the following table.

`https://<storage_system>:8080/api/v1/volumes/<volume_name>`

The <volume_name> is the name of the volume to be tuned.

Table 59: Request message body JSON object members for a volume tune operation

Member	JSON type	API type	Ignored Values	Description
action	number	See, Volume custom action enumeration	Required field.	Specifies the action to be performed on the volume. (WSAPI 1.3 and later)
tuneOperation	number	See, tuneOperationEnum	Required field.	Tune operation enumeration. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
userCPG	string	name31	Required if the tuneOperation value is 1.	Specifies the new user CPG to which the volume will be tuned. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
snapCPG	string	name31	Required if the tuneOperation value is 2.	Specifies the snap CPG to which the volume will be tuned. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
conversionOperation	number	See, conversionOperationEnum	Ignored if 0 or null. Values of 1, 2, or 3, require a userCPG specification.	(WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1) (WSAPI 1.4 and later)
keepVV	string	name31	Requires conversionOperation specification of 1, 2, or 3.	Name of the new volume where the original logical disks are saved. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
compression	boolean	boolean	Ignored if set to false.	Enables (true) or disables (false) compression. You cannot compress a fully provisioned volume.

Table 60: tuneOperationEnum

Symbol	Value	Description
USR_CPG	1	Change the user CPG of the volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
SNP_CPG	2	Change the snap CPG of the volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)

Table 61: conversionOperationEnum

Symbol	Value	Description
TPVV	1	Convert the volume to a TPVV. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
FPVV	2	Convert the volume to an FPVV. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
TDVV	3	Convert the volume to a TDVV. (WSAPI 1.4.1 and later)

Success

A successful request to tune or keep a volume returns the HTTP status code 200 OK. The response message body shows the task ID of the `tunevv` task.

Example response: Successful tunevv

```
{
  taskid: 1234
  links: [ 1 ]
    - 0: {
      href: "https://<server_name>:8080/api/v1/volumes/<vvcopy_name>"
      rel: "self",
    }
}
```

Example response: Successful tunevv with keepvv specified

```
{
  taskid: 1234
  links: [ 2 ]
    - 0: {
      href: "https://<server_name>:8080/api/v1/volumes/<vv_tuned>"
      rel: "self"
    }
    - 1: {
      href: "https://<server_name>:8080/api/v1/volumes/keepvv"
      rel: "OriginalLDsVV"
    }
}
```



```
}
```

Errors

Table 62: Virtual volume tuning error codes

API Error	HTTP Code	Description
CPG_NOT_IN_SAME_DOMAIN	403 Forbidden	The CPG is not in the current domain. (WSAPI 1.3 and later)
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Invalid volume name or CPG name. (WSAPI 1.3 and later)
INV_INPUT_VV_IS_FPVV	403 Forbidden	The volume is already fully provisioned. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_INPUT_VV_IS_TDVV	403 Forbidden	The volume is already deduplicated. (WSAPI 1.4.1 and later)
INV_INPUT_VV_IS_TPVV	403 Forbidden	The volume is already thinly provisioned. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_UNSUPPORTED_VV_TYPE	403 Forbidden	Invalid operation: Cannot grow this type of volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_MODIFY_USR_CPG_TDVV	403 Forbidden	Cannot change USR CPG of a TDVV to a different CPG. (WSAPI 1.4.1 and later)
INV_OPERATION_VV_NON_BASE_VOLUME	403 Forbidden	The destination volume is not a base volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_SYS_VOLUME	403 Forbidden	The volume is a system volume. This operation is not allowed on a system volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_CLEANUP_IN_PROGR	403 Forbidden	Cleanup of internal volume for the volume is in progress. (WSAPI 1.3 and later)

Table Continued

API Error	HTTP Code	Description
INV_OPERATION_VV_INTERNAL_VOLUME	403 Forbidden	The operation is not allowed on an internal volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_VOLUME_CONV_IN_PROGRESS	409 Conflict	The volume is in a conversion operation. (WSAPI 1.3 and later)
INV_OPERATION_VV_NOT_IN_NORMAL_STATE	403 Forbidden	The volume is not in the normal state. (WSAPI 1.3 and later)
INV_OPERATION_VV_PEER_VOLUME	403 Forbidden	The operation is not allowed on a peer volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_TASK_CANCEL_IN_PROGRESS	409 Conflict	Invalid operation: A task involving the volume is being canceled. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_PROMOTE_IN_PROGRESS	409 Conflict	Invalid operation: Volume promotion is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_TUNE_IN_PROGRESS	409 Conflict	Invalid operation: Volume tuning is in progress.
NO_SPACE	400 Bad Request	Insufficient space for requested operation.
NODE_DOWN	403 Forbidden	The node is down. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
NON_EXISTENT_CPG	404 Not Found	The CPG does not exist. (WSAPI 1.3 and later)
NON_EXISTENT_VOL	404 Not Found	The volume does not exist. (WSAPI 1.3 and later)
VV_IN_INCONSISTENT_STATE	403 Forbidden	The volume has an internal consistency error. (WSAPI 1.3 and later)

Table Continued

API Error	HTTP Code	Description
VV_IS_BEING_REMOVED	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
VV_NEEDS_TO_BE_CHECKED	403 Forbidden	The volume needs to be checked. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
VV_NOT_STARTED	403 Forbidden	Volume is not started. (WSAPI 1.3 and later)
INV_INPUT_VV_IS_FPVV	403 Forbidden	A fully provisioned volume cannot be compressed.

More information

[WSAPI error codes and descriptions on page 34](#)

Removing a storage volume

Use the HTTP DELETE method with the following URI and no request message body:

`https://<storage_system>:8080/api/v1/volumes/<volume_name>`

Success

A successful storage-volume removal returns the HTTP status code 200 OK.

Errors

Table 63: Storage volume removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_VOL	404 Not Found	The volume does not exist.
RETAINED	409 Conflict	The volume retention time has not expired.
HAS_RO_CHILD	409 Conflict	The volume has read-only child.
HAS_CHILD	409 Conflict	The volume has a child volume. (WSAPI 1.2 and later)
IN_USE	409 Conflict	The volume is in use by VV set, VLUN, etc. (WSAPI 1.2 and later)

More information

[WSAPI error codes and descriptions on page 34](#)

Querying storage volumes

Storage volume queries include:

- [Querying all volumes](#)
- [Querying a single volume](#)
- [Querying volumes with multiple WWNs](#)
- [Querying volume copies](#)

More information

[Managing storage volumes](#) on page 103

[Creating a physical copy of a volume](#) on page 285

[Creating a volume snapshot](#) on page 280

Querying all volumes

Use the HTTP GET method with the following URI and no request message body:

`https://<storage_system>:8080/api/v1/volumes`

Success

A successful query returns the HTTP code 200 OK. Unless an error occurs, the response includes a message body with the JSON objects shown in the following tables. For information about chunked transfer encoding in volume query responses, see [HTTP chunked transfer encoding in WSAPI](#).

Table 64: Response message body JSON object members for querying volumes

Member	JSON type	API type	Description
total	number	int32	Number of volume objects returned.
members	array of objects	Volume property objects	Storage volume properties.
links	Array of URL links	Array of URL links	Links include the URL for self and space distribution for all volumes.

Table 65: Volume property objects

Member	JSON type	API type	Description
additionalStates	array of numbers	DetailedState enumeration	Detailed state of the VV.
adminSpace	object	space objects	Administrative space in MiB.

Table Continued

Member	JSON type	API type	Description
baseId	number	uint32	The ID of the volume that is the base volume (at the root of the snapshot tree) for the volume.
comment	string	print511	Comment associated with the volume.
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes. (WSAPI 1.4.1 with 3PAR OS 3.2.1 MU1)
copyOf	string	name31	If the volume is a physical copy or virtual copy of another volume, this field indicates the volume that this volume is a copy of.
copyType	number	<u>CopyType enumeration</u>	Indicates the copy type of the volume.
creationTime8601	string	8601	Time of volume creation.
creationTimeSec	number	epoch	Time of volume creation, measured in seconds since 12 AM on 01/01/1970.
degradedStates	array of numbers	<u>DetailedState enumeration</u>	Volume detailed state.
domain	string	name31	Volume domain.
expirationTime8601	string	8601	Time of volume expiration.
expirationTimeSec	number	epoch	Time of volume expiration.
failedStates	array of numbers	<u>DetailedState enumeration</u>	Volume detailed state.
compressionState	number	<u>compressionState enumeration</u>	Volume compression state
deduplicationState	number	<u>deduplicationState enumeration</u>	Volume deduplication state.
id	number	int32	Volume identifier.
links	Array of URL links	Array of URL links	Links include the URL for space distribution for a particular volume, and the self URL when querying for the single instance.
name	string	name31	Volume name.

Table Continued

Member	JSON type	API type	Description
parentId	number	int32	ID of the parent in the snapshot tree (not necessarily the same as the CopyOf VV).
physParentId	number	int32	ID of the physical parent. Valid for a physical copy only.
policies	object	<u>volume policies configuration objects</u>	Policies used for the volume.
provisioningType	number	<u>provisioningType enumeration</u>	Volume provisioning.
readOnly	boolean	boolean	Enables (<code>true</code>) or disables (<code>false</code>) read/write.
retentionTime8601	string	8601	Time of volume retention time expiration.
retentionTimeSec	number	epoch	Time of volume retention expiration.
roChildId	number	int32	ID of the read-only child volume in the snapshot tree.
rwChildId	number	int32	ID of the read/write child volume in the snapshot tree.
hostWriteMiB	number	uint64	Total written to volume. For TDVVs this includes shared data that this volume references.
totalUsedMiB	number	uint32	Total used space. Sum of used UserSpace and used Snapshot space.
totalReservedMiB	number	uint32	Total Reserved space.
sizeMiB	number	uint32	Virtual size of volume in MiB (1024 ² bytes).
snapCPG	string	name31	CPG name from which the snapshot (snap and admin) space is allocated.
snapshotSpace	object	<u>space objects</u>	Snapshot space in MiB.
ssSpcAllocLimitPct	number	igint32	Sets a snapshot space allocation limit. Prevents the snapshot space of the volume from growing beyond the indicated percentage of the volume size.

Table Continued

Member	JSON type	API type	Description
ssSpcAllocWarningPct	number	igint32	Enables a snapshot space allocation warning. Generates a warning alert when the reserved snapshot space of the virtual volume exceeds the indicated percentage of the virtual volume size.
state	number	<u>State enumeration</u>	State of the volume.
userCPG	string	name31	CPG name from which the user space is allocated.
userSpace	object	<u>space objects</u>	User space in MiB.
usrSpcAllocLimitPct	number	igint32	This field sets the user space allocation limit. The user space of the TPVV is prevented from growing beyond the specified percentage of the volume size. After the size is reached, any new writes to the volume will fail.
usrSpcAllocWarningPct	number	igint32	This field enables a user space allocation warning. It specifies that a warning alert is generated when the reserved user space of the TPVV exceeds the specified percentage of the volume size.
uuid	string	uuid string	The UUID that was automatically assigned to the volume at creation.
sharedParentID	number	uint32	The ID of the shared volume that this volume is associated with.
udid	number	uint32	User-Defined identifier per VV for OpenVMS hosts.
wwn	string	WWN	Volume WWN.
rcopyStatus	number	<u>rcopyStatus enum</u>	Remote Copy status of the volume.
rcopyGroup	string	string	Name of the Remote Copy group to which the volume belongs (if any).

Table 66: rcopyStatus enum

Symbol	Value	Description
NONE	1	Volume is not associated with Remote Copy.
PRIMARY	2	Volume is the primary copy.
SECONDARY	3	Volume is the secondary copy.
SNAP	4	Volume is the Remote Copy snapshot.
SYNC	5	Volume is a Remote Copy snapshot being used for synchronization.
DELETE	6	Volume is a Remote Copy snapshot that is marked for deletion.
UNKNOWN	99	Remote Copy status is unknown for this volume.

Errors

Table 67: Query error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error.

More information

[WSAPI error codes and descriptions](#) on page 34

Querying a single volume

To query a single volume, use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/volumes/<volume_name>`

Success

A successful query returns HTTP code 200 OK. Unless an error occurs, the response includes a message body as specified in **[JSON members of volume property objects](#)**. The WSAPI server does not use chunked transfer encoding on requests for a single volume or VLUN.

Errors

Table 68: Single volume query error codes

API Error	HTTP Code	Description
INV_INPUT_ILLEGAL_CHAR	400 Bad request	Invalid character for volume name. (WSAPI 1.2 and later)
NON_EXISTENT_VOL	404 Not Found	The volume does not exist. (WSAPI 1.2 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying volumes using WWN filters

Use the HTTP GET method with the following URI and no message body:

```
https://<storage_system>:8080/api/v1/volumes?query="wwn EQ value1 OR wwn EQ value2 ... OR wwn EQ valueN"
```

The filtering request supports the OR operator only, and is limited to approximately 150 WWNs, depending on how many spaces between blocks occur in the query. You can use == in place of EQ in the message body.

Success

A successful query returns the HTTP code 200 OK and a message body containing JSON object members as described in the following table.

Table 69: Message body JSON objects for volume query with WWN filtering

Member	JSON type	API type	Description
members	array of objects	Array of volume objects	An array of volume objects matching the WWNs. With no matching volume found, returns an empty array. (WSAPI 1.3 and later)
total	number	int32	Number of volume objects returned, or zero if no WWNs matched volume records. (WSAPI 1.3 and later)

Errors

Table 70: queries using filters error codes

API Error	HTTP Code	Description
INV_QUERY_STRING	400 Bad request	Invalid query string.
INV_COMP_OP	400 Bad request	Invalid COMPARISON_OPERATOR used.
INV_LOGICAL_OP	400 Bad request	Invalid LOGICAL_OPERATOR used.

Querying volumes with multiple filters

With WSAPI 1.3.1 and later, you can use the volume filter to query by UUIDs, userCPGs, and snapCPGs. Duplicate volume entries are not listed in a filtered query for volume information. With WSAPI 1.6.3 and later, you can also filter a query by provisioningType.

For example:

- To filter multiple volumes in a query for a storage volume, use the HTTP GET method with the following URI and no message body:

```
https://<storage_system>:8080/api/v1/volumes?query="wnn EQ value1 OR wnn EQ value2 OR userCPG EQ value3 OR snapCPG EQ value4... OR wnn EQ valueN"
```

The filtering request supports the OR operator only, and is limited to approximately 150 WWNs, depending on how many spaces between blocks occur in the query. You can use == in place of EQ in the message body.

- To query for volumes that do not have a userCPG assigned, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/volumes?query="userCPG EQ null"
```

- To query for volumes that do not have a snapCPG assigned, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/volumes?query="snapCPG EQ null"
```

- To query for volumes that are snapshots, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/volumes?query="provisioningType EQ 3"
```

- To query for a copy of a volume, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/volumes?query="copyOf EQ myvolume"
```

Success

A successful query returns HTTP code 200 OK and a message body containing JSON object members as described in the following table.

Table 71: Message body JSON objects for volume query with multiple volume filters

Member	JSON type	API type	Description
<code>members</code>	array of objects	See, Volume property objects	An array of volume objects matching any of the query conditions. With no matching volume found, returns an empty array. (WSAPI 1.3.1 and later MU1)
<code>total</code>	number	int32	Number of volume objects returned or zero if there are no matching volume records. (WSAPI 1.3.1 and later MU1)

Errors

Table 72: Volume query with multiple-volume filters error codes

API Error	HTTP Code	Description
<code>INPUT_TOO_LONG</code>	400 Bad Request	The client request is too long. (WSAPI 1.3.1 and later MU1)

In addition see, [Queries using filters error codes](#).

Querying volume copies

You can query for volume copies using the following filter:

`copyOf (vv_name)` – Name of vv to copy

To query for information about 1st level snapshots for a volume, use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/volumes?query="copyOf EQ <vvname>"`

Success

A successful query returns the HTTP code 200 OK and a response message containing a JSON object with `total`, `members`, and `links` as described in [Message body JSON object members for querying volumes](#).

Errors

See, [Queries using filters error codes](#).

Querying volumes by type

Use the HTTP GET method with the following URI and no message body

`https://<storage_system>:8080/api/v1/volumes?query=" provisioningType EQ 3"`

For additional details, see [Response message body JSON object members for querying volumes](#).

File Persona

The File Persona functionality includes the following:

- [File Services](#)
- [File Provisioning Groups](#)
- [Virtual File Servers](#)
- [File Stores](#)
- [File Shares](#)
- [File Store snapshots](#)
- [File Persona quotas](#)

File Services

Querying File Services information

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/fileservices`

Success

A successful query returns HTTP code 200 OK. The body of the response is a JSON object as described in the following tables.

Table 73: Response message body JSON objects for File Services query

Member	JSON type	API type	Description
nodeInfo	array of objects	See, <u>FSNodeInfo objects</u>	File Persona node information.
IPInfo	array of objects	See, <u>FSIPInfo objects</u>	Node network configuration information.
httpInfo	array of objects	See, <u>FSHttpObj objects</u>	HTTP default settings.
activeDirectory	array of objects	See, <u>FSADObj objects</u>	Active Directory domain information.
ldap	array of objects	See, <u>FSLdapObj objects</u>	LDAP configuration information.
authentication	array of objects	See, <u>fsAuthEnum</u>	Auth provider stacking order.

Table Continued

Member	JSON type	API type	Description
idmap	array of objects	See, FSIdMapObj objects	Displays NFSv4 domain name info.
rfc2307	boolean	boolean	RFC2307 configuration.
smb	array of objects	See, smbParamObj objects	SMB tunable parameters.
links	array of URI links	array of URI links	Links include the self URI

Table 74: FSNodeInfo objects

Member	JSON type	API type	Description
nodeId	number	int32	Id of the node
nodeName	string	name31	Name of the node
fsNode	boolean	boolean	Node configured for File Persona
fsState	number	See, fsStateEnum	File Persona state
active	boolean	boolean	File Persona active on this node
inCluster	boolean	boolean	File Persona cluster contains node
version	string	string	File persona version info
nsp	array of objects	See, portPos objects	List of the File Persona ports
bondMode	number	int32	Bond mode for File Persona
mtu	number	int32	MTU for File Persona

Table 75: FSIPInfo objects

Member	JSON type	API type	Description
nodeIPInfo	array of objects	See, FsNodeIPInfo objects	Network information related to the node.
DNSInfo	array of objects	See, FSDNSInfo objects	DNS server information related to the node.
gateway	string	name255	Default gateway

Table 76: FsNodePInfo objects

Member	JSON type	API type	Description
nodeId	number	int32	Id of the node
IPAddress	string	name255	Node IP address
netmask	string	name255	Node subnet mask
vlanId	number	int32	File Persona VLAN ID

Table 77: FSDNSInfo objects

Member	JSON type	API type	Description
server	string	name255	DNS server name
suffix	string	name255	DNS suffix

Table 78: FSHttpObj objects

Member	JSON type	API type	Description
nonSSLPort	number	int32	http non secure port
SSLPort	number	int32	http secure port
allowPersistentConnections	boolean	boolean	Keeps the http connection persistent
persistentConnectionTimeoutSec	number	int32	Specifies the time (in seconds) to keep the http connection persistent
maxClients	number	int32	Max number of clients allowed
rBlockSizeKB	number	float	Read block size in Kbytes
wBlockSizeKB	number	float	Write block size in Kbytes

Table 79: FSADObj objects

Member	JSON type	API type	Description
domain	string	name31	Active directory domain name
netbios	string	name255	Active directory Netbios name
forest	string	name255	Active directory Forest name
status	number	See, <u>fsADStatus enumeration</u>	Active directory status

Table 80: FSLDapObj objects

Member	JSON type	API type	Description
server	string	name255	LDAP server name
administratorDN	string	name255	Administrator DN
searchBase	string	name255	Search base
netbios	string	name255	Netbios name
schema	string	name255	Schema for users/groups
SSLEnabled	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) SSL
certCommonName	string	name255	Certificate common name
certificate	string	printt1782	Certificate content

Table 81: FSldMapObj objects

Member	JSON type	API type	Description
Nfsv4domain	string	name255	NFSV4 domain name

Table 82: smbParamObj objects

Member	JSON type	API type	Description
enableOplocks	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) opportunistic locks.
signingEnabled	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) SMB signing.
signingRequired	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) required SMB signing.
ignoreWriteThroughRequests	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) ignoring write through requests.
supportPersistentHandles	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) support for persistent handles.
smb3DialectEnable	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) SMB3 connections.
enableSMB2AD	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) SMB2 active directory connections.
enableSMBLeases	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) SMB leases.
enableDirLeases	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) directory leases.
enableSMB2	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) SMB2 connections.

Table 83: fsAuthEnum enumeration

Symbol	Value	Description
AD	1	Active directory
LDAP	2	LDAP
LOCAL	3	Local
UNKNOWN	99	Unknown

Table 84: fsStateEnum enumeration

Symbol	Value	Description
starting	1	Starting the File Service.
running	2	File service is running.
shutoff	3	File service is shutoff.
unknown	99	File service is in unknown state.

Table 85: fsADStatus enumeration

Symbol	Value	Description
online	1	Status is online
initializing	2	Status is initializing
joining	3	Status is joining
partial	4	Status is partial
degraded	5	Status is degraded
offline	6	Status is offline
unknown	99	Status is unknown

Errors

Table 86: File services query error codes

API Error	HTTP Code	Description
FS_NOT_CONFIGURED	404 Not Found	File Services is not configured, or there is no File Service license available.

File Provisioning Groups

- [Creating an FPG](#)
- [Removing FPGs](#)
- [Querying all FPG reclamation tasks](#)
- [Querying FPGs](#)

Creating an FPG

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/fpgs`

The message body of the request is a JSON object as described in the following table.

Table 87: Request message body JSON objects for creating FPGs

Member	JSON type	API type	Ignored Values	Description
name	string	name22	Required field.	Name of the FPG, maximum 22 chars
cpg	string	name31	Required field.	Name of the CPG on which to create the FPG.
sizeTiB	number	uint32	Required field.	Size of the FPG in terabytes.
fpvv	boolean	boolean	Optional field.	Enables (<code>true</code>) or disables (<code>false</code>) FPG volume creation with the FPVV volume. Defaults to <code>false</code> , creating the FPG with the TPVV volume.
tdvv	boolean	boolean	Optional field.	Enables (<code>true</code>) or disables (<code>false</code>) FPG volume creation with the TDVV volume. Defaults to <code>false</code> , creating the FPG with the TPVV volume. You cannot set both FPVV and TDVV to <code>true</code> at the same time.

Table Continued

Member	JSON type	API type	Ignored Values	Description
nodeId	number	int32	Optional field.	Bind the created FPG to the specified node.
comment	string	print511	Optional field.	Specifies any additional information up to 511 characters for the FPG.

Success

A successful creation returns the HTTP code `202 Accepted`. The response body contains the `task_id`, a link to the newly created FPG, and a link to the task. Check the `taskId` status to determine the success or failure of the FPG creation request.

The response also includes a location header, which contains a link to the URL for the newly generated task, formatted as follows:

```
/api/v1/tasks/<task_id>
```

Table 88: Response body for creating FPGs

Member	JSON Type	API Type	Description
links	Array of links	Array of URL links	Links include: <ul style="list-style-type: none"> inProgress URL type: /v1/fpgs? query="name EQ <fpg_name> Tasks URL: /v1/tasks/ <task_id>
taskId	Integer	int32	ID of the task generated for the FPG creation

Errors

Table 89: FPG creation error codes

API Error	HTTP Code	Description
NON_EXISTENT_CPG	404 Not Found	CPG does not exist.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.

Table Continued

API Error	HTTP Code	Description
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Only alphanumeric characters and underscore allowed in FPG name.
INV_INPUT_BELOW_RANGE	400 Bad Request	Number is below expected range
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	invalid input: number exceeds expected range
INV_INPUT_MISSING_REQUIRE D	400 Bad Request	invalid input: some or all required parameters are missing
INV_INPUT_PARAM_CONFLICT	400 Bad Request	Invalid input (parameters cannot be present at the same time).
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	createfpg: Invalid node: 8. Node should be an integer from 0 to 7
FS_NOT_CONFIGURED	400 Bad Request	File Services is not configured on the system.
OTHER	400 Bad Request	Unlisted errors map to OTHER.

Removing FPGs

Use the HTTP DELETE method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/fpgs/<fpg uuid>`

Success

A successful removal returns the HTTP status code 202 *Accepted*. The response body contains the `task id` and a link to the task, as described in the following table.

Table 90: Message body JSON objects for removing an FPG

Member	JSON Type	API Type	Description
<code>links</code>	Array of links.	Array of URL links	Links include a URI to the tasks: <code>/v1/tasks/<task_id></code>
<code>taskId</code>	Integer	int32	The ID of the task generated for the FPG removal.

Check the `taskId` status to determine the success or failure of the remove FPG request.

The location header in the response contains a link to the URL for the newly generated task in the following format:

`/api/v1/tasks/<task_id>`

Errors

Table 91: FPG removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_FPG	404 Not Found	The FPG does not exist.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
IN_USE	409 Conflict	resource in use
OTHER	400 Bad Request	Unlisted errors map to OTHER.

Querying FPGs

Query FPGs using the following methods:

- [Querying all FPGs](#)
- [Querying a single FPG](#)
- [Querying FPGs using filters](#)

Querying all FPGs

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/fpgs`

Success

Unless an internal server error occurs, the response body includes a JSON object as described in the following table.

Table 92: Response message body for querying an FPG collection

Member	JSON type	API type	Description
total	number	int32	Number of FPGs returned; total number of objects in the collection.
members	array	See, FPG property objects	FPG property objects.
links	Array of URL links	Array of URL Links	Links include the self URL.

Table 93: FPG property objects

Member	JSON type	API type	Description
name	string	name31	Name of the FPG
id	string	name31	FPG identifier
uuid	string	uuid string	Globally unique FPG ID.
generation	number	uint32	At FPG creation = 1. Increases incrementally with each configuration change.
fileSystemNumber	number	uint32	The file system number.
activePath	string	name31	Mountpoint path for the filesystem.
creationTime8601	string	8601	Time of FPG creation.
creationTimeSec	number	epoch	Time of FPG creation, measured in seconds since 12 AM on 01/01/1970.
availableCapacityGiB	number	float	Available capacity in the FPG.
usedCapacityGiB	number	float	Used capacity in the FPG.
freeCapacityGiB	number	float	Free capacity in the FPG.
totalCapacityGiB	number	float	Total capacity in the FPG.
freeFiles	number	uint64	Number of unused file inodes available in this FPG.
usedFiles	number	uint64	Number of used file inodes available in this FPG.
volumes	array of objects	See, <u>FPG volume property objects</u>	FPG volume properties.
cpg	string	name31	Name of the CPG used by the FPG.
primaryNode	number	uint32	Primary node ID for the FPG.
alternateNode	number	uint32	Alternate node ID for the FPG.
currentNode	number	uint32	Current node ID, which owns the FPG.
comment	string	print511	Comment on the FPG.

Table Continued

Member	JSON type	API type	Description
activeState	number	See, <u>FPG activeState enumeration</u>	Active state of the FPG.
overAllState	number	See, <u>State enumeration</u>	Over all state of the FPG.
freezeState	number	See, <u>fpgFreezeState enumeration</u>	State of the FPG.
isolationState	number	See, <u>fpgIsolationState enumeration</u>	State of the FPG.
domains	array of objects	See, <u>FPG domain property objects</u>	FPG domain properties.
version	string	string	FPG version. Appends an asterisk (*) to the version when FPG upgradeState is UPGRADABLE
segments	array of objects	See, <u>segmentProperty objects</u>	FPG domain properties.
healthDescription	string	print255	FPG health description.
correctiveAction	string	print255	FPG corrective actions.
links	Array of URL links	Array of URL links	Links include : <ul style="list-style-type: none"> • Self URL, v1/fpgs/<fpg uuid> • URL for CPG, v1/cpgs/<cpg_name> • URL for the Volume set, v1/volumeSets/<volume_setName> • URL for the VFS, v1/virtualfileservers?query="fpg EQ <fpg_name>" • Array of URL for the volume, v1/volumes/<volume_name>

Table 94: FPG volume property objects

Member	JSON type	API type	Description
volumeName	string	name31	Name of the volume supporting the FPG
volumeId	number	uint32	Volume Id.
capacityGiB	number	float	Capacity of the Volume.
nodes	array of number	array of uint32	Node ids.

Table 95: FPG domain property objects

Member	JSON type	API type	Description
uuid	string	uuid string	Domain uuid.
owner	number	int32	The node that owns the FPG.
filesetName	string	name31	Name of the fileset.
ipfsType	number	See, ipfsType enumeration	Ipfs type for the FPG.

Table 96: FPG activeState enumeration

Symbol	Value	Description
ACTIVATED	1	Activated state.
DEACTIVATED	2	Deactivated state.
MOUNTING	3	Mounting state.
DISMOUNTING	4	Dismounting state.
UNKNOWN	99	Unknown state.

Table 97: fpgFreezeState enumeration

Symbol	Value	Description
FROZEN	1	Frozen state.
NOT_FROZEN	2	Not frozen state.
UNKNOWN	99	Unknown state.

Table 98: fpgIsolationState enumeration

Symbol	Value	Description
ACCESSIBLE	1	Accessible state.
ISOLATED	2	Isolated state.
UNKNOWN	99	Unknown state.

Table 99: ipfsType enumeration

Symbol	Value	Description
ADE	1	ADE
UNKNOWN	99	Unknown state

Table 100: segmentProperty objects

Member	JSON type	API type	Description
segmentNumber	number	uint32	Segment number.
FSCKState	number	See, fpgFSCKState enumeration	Segment FSCK state.
FSCKPhaseRequired	number	See, fpgFSCKPhaseReq enumeration	Details of FSCK phase required.

Table 101: fpgFSCKState enumeration

Symbol	Value	Description
NOT_REQUIRED	1	Segment healthy. FSCK is not needed
FSCK_REQUIRED	2	Segment not healthy. FSCK is needed
ONFSCK_RUNNING	3	FSCK is Running
ONFSCK_STOPPED	4	FSCK stopped.
OFFLINE_FSCK_REQUIRED	5	Run FSCK offline to make segment available.
OFFLINE_FSCK_RUNNING	6	Offline FSCK running.
UNKNOWN 99	99	Unknown state.

Table 102: fpgFSCKPhaseReq enumeration

Symbol	Value	Description
NONE	1	Segment available. No Offline FSCK phase required
PHASE0_AND_PHASE1	2	Segment unavailable. Needs offline FSCK phase 1 and 0.
PHASE1	3	Segment unavailable. Needs offline FSCK phase 1.
UNKNOWN	99	Unknown state.

Errors

See, [File services query error codes](#).

Querying a single FPG

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/fpgs/<fpg>`

Success

A successful query returns the HTTP status code 200 OK. Unless an internal server error occurs, the response includes a message body as described in [Message body JSON object members for FPG properties](#).

Errors

Table 103: Single FPG query error codes

API Error	HTTP Code	Description
NON_EXISTENT_FPG	404 Not Found	The FPG does not exist.

In addition see, [File services query error codes](#).

Querying FPGs using filters

Use the HTTP GET method with the following URI and no request message body.

`https://<storage_system>:8080/api/v1/fpgs?query="name EQ <fpg_name>"`

Success

A successful query returns the HTTP code 200 OK, and a response message body with members as described in the following table.

Table 104: Response message body for Querying FPG Using Filters

Member	JSON type	API type	Description
total	number	int32	Total number of FPG objects returned
members	Array of objects	See, FPG property objects	File Provisioning Group properties

Errors

See, [queries using filters error codes](#).

Querying all FPG reclamation tasks

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/fpgs/reclaimtasks`

Success

A successful query returns HTTP code 200 OK. Unless an error occurs, the response message body includes a JSON object as described in the following table.

Table 105: Response message body JSON objects for FPG reclamation query

Member	JSON type	API type	Description
total	number	int32	Total number of reclamation tasks for the FPG.
members	string	See, FPG reclamation tasks	Reclamation tasks for the FPG.
links	array of URI links	array of URI links	Links include the self URL.

Table 106: FPG reclamation tasks

Member	JSON type	API type	Description
id	string	name31	Unique ID of the reclamation task.
state	number	See, reclaimState enumeration	State of the reclamation task.
startTimeInSec	number	epoch	Reclamation task start time, measured in seconds since 12 AM on 01/01/1970.

Table Continued

Member	JSON type	API type	Description
startTime8601	string	8601	Reclamation task start time.
endTimeInSec	number	epoch	Reclamation task end time, measured in seconds since 12 AM on 01/01/1970.
endTime8601	string	8601	Reclamation task end time.
spaceRecoveredMiB	number	uint64	Amount of space reclaimed.
strategy	number	See, <u>reclaimStrategy enumeration</u>	Reclaim task strategy used.
entriesScanned	number	uint32	Number of entries scanned.
entriesReclaimed	number	uint32	Number of entries reclaimed.
inodesReclaimed	number	uint32	Number of files reclaimed.
inodesSkipped	number	uint32	Number of files skipped.
avgFileSizeKiB	number	uint64	Average file size in KiB.
taskErrors	string	uint32	Number of errors while performing the task.
exitStatus	string	uint32	Task exit status.
fpg	string	name31	FPG name.
links	array of URL links	name21	Links include: <ul style="list-style-type: none"> • Self URI: <pre>/api/v1/fpgs/ <fpg_id>/ reclaimtasks/ <task_id></pre> • URI to FPG: <pre>/v1/ fpg? query="name EQ <fpg_name>"</pre>

Table 107: reclaimState enumeration

Symbol	Value	Description
COMPLETED	1	Reclamation task completed.
PAUSED	2	Reclamation task paused.
STOPPED	3	Reclamation task stopped.
RUNNING	4	Reclamation task running.
SCHEDULED	5	Reclamation task scheduled.
UNKNOWN	99	Unknown state.

Table 108: reclaimStrategy enumeration

Symbol	Value	Description
MAX_SPEED	1	Optimize for speedy reclamation.
MAX_SPACE	2	Optimize to reclaim maximum space.

Errors

Table 109: Query error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error.

Virtual File Servers

Creating a VFS

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/virtualfileservers/`

The request body is a JSON object with members as described in the following table.

Table 110: Request message body JSON objects for creating a VFS

Member	JSON Type	API Type	Ignored Values	Description
name	string	name255	None. Required field.	Name of the VFS to be created.
IPInfo	object	See, IPInfo objects	None.	Specify IPAddr and netmask (both required), and vlanId as part of IPInfo object.
cpg	string	name31	None.	CPG in which to create the FPG.
fpg	string	name31	None.	Name of an existing FPG in which to create the VFS.
sizeTiB	number	uint32	Negative values.	Specifies the size of the FPG you want to create. Required when using the cpg option.
tdvv	boolean	boolean	None.	Enables (true) or disables false creation of the FPG with tdvv volumes. Defaults to false which creates the FPG with the default volume type (tpvv).
fpvv	boolean	boolean	None.	Enables (true) or disables false creation of the FPG with fpvv volumes. Defaults to false which creates the FPG with the default volume type (tpvv).
nodeId	number	int32	Negative values.	Node ID to which to assign the FPG. Always use with cpg member.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
comment	string	print511	None.	Specifies any additional comments while creating the VFS.
blockGraceTimeSec	number	UInt64	Negative values.	Block grace time in seconds for quotas within the VFS.
inodeGraceTimeSec	number	UInt64	Negative values.	The inode grace time in seconds for quotas within the VFS.
noCertificate	boolean	boolean	None.	<p><code>true</code> – Does not create a self-signed certificate associated with the VFS.</p> <p><code>false</code> – (default) Creates a self-signed certificate associated with the VFS.</p>
snapshotQuotaEnabled	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) the quota accounting flag for snapshots at VFS level.

Success

A successful VFS creation returns the HTTP code `202 Accepted`. Unless an error occurs, the response includes a JSON message body as described in the following table.

Table 111: Response body for creating a VFS

Member	JSON Type	API Type	Description
links	Array of links.	Array of URL links	<p>Links include the URI to the new resource as shown below:</p> <pre>v1/virtualfileservers? query="name EQ <vfs_name> AND fpg EQ <fpg_name>"</pre>
taskId	Integer	int32	The ID of the task generated for the VFS creation.

The response location header contains a link to the URL for the newly generated task using the following format:

`/api/v1/tasks/<task_id>`

Errors

Table 112: VFS creation error codes

API Error	HTTP Code	Description
NON_EXISTENT_CPG	404 Not Found	Invalid CPG name.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	FPG/CPG name can only contain alphanumeric characters and underscore.
INV_INPUT_BELOW_RANGE	400 Bad Request	Number is below expected range
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	invalid input: number exceeds expected range. "bgrace value should be between 1 and 2147483647"
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Missing some or all required parameters.
INV_INPUT_PARAM_CONFLICT	400 Bad Request	Invalid input (parameters cannot be present at the same time).
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	FPG <code>tdvvfs</code> could not be created. Error: Invalid node id.
FS_NOT_CONFIGURED	400 Bad Request	File Services is not configured on the system.
NON_EXISTENT_FPG	404 Not Found	FPG does not exist.

Removing a VFS

Use the HTTP DELETE method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/virtualfileservers/<vfs_id>`

Success

A successful VFS removal returns the HTTP status code 200 OK and no response body.

Errors

Table 113: VFS removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_FPG	404 Not Found	The FPG does not exist.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
IN_USE	409 Conflict	Resource in use.
OTHER	400 Bad Request	Unlisted errors map to OTHER.
NON_EXISTENT_VFS	404 Not Found	The VFS does not exist.

Querying a VFS

Use any of the following methods to query VFS:

- [Querying all VFS](#)
- [Querying a single VFS](#)
- [Querying VFS using filters](#)

Querying all VFS

Use the HTTP GET method with the following URI with no message body:

`https://<storage_system>:8080/api/v1/virtualfileservers`

Success

A successful query returns the HTTP status code 200 OK. The body of the response is a JSON object as described in the following table.

Table 114: Response message body for querying VFS

Member	JSON type	API type	Description
total	number	int32	Total number of VFS objects returned; total number of objects in the collection.
members	Array of objects	See, VFS property objects	VFS properties, returned as an array of zero or more JSON objects.
links	Array of URI links	Array of URI links	Links include a self URI.

Table 115: VFS property objects

Member	JSON type	API type	Description
name	string	print255	VFS name.
id	string	print255	VFS ID
uuid	string	uuid string	VFS globally unique ID.
fpg	string	name22	Name of the FPG to which the VFS belongs.
overallState	number	See, <u>State enumeration</u>	Over all state of the VFS.
blockGraceTimeSec	number	uint64	Block grace time in seconds for quotas within the VFS.
inodeGraceTimeSec	number	uint64	The inode grace time in seconds for quotas within the VFS.
comment	string	print511	Specifies any additional information for VFS.
IPInfo	Array of objects	See, <u>IPInfo objects</u>	Network configuration information of a VFS.
certificationInfo	Array of objects	See, <u>certificationInfo objects</u>	Certification information associated with a VFS.
snapshotQuotaEnabled	boolean	boolean	Enables (<code>true</code>) or disables (<code>false</code>) the quota accounting flag for snapshots at VFS level.
links	Array of URI links	Array of URI links	Links include: <ul style="list-style-type: none"> • Self URI: <pre>v1/ virtualfileserve rs/<vfs id></pre> • URI for FPG: <pre>v1/fpgs? query="name EQ <fpg name>"</pre> • URI for File Store: <pre>v1/filestore? query="fpg EQ <fpg name> AND vfs EQ <vfs name>"</pre>

Table 116: IPInfo objects

Member	JSON type	API type	Description
policyId	string	name255	Policy ID associated with the network configuration.
fpg	string	name22	FPG to which VFS belongs.
vfs	string	name255	VFS where the network is configured.
IPAddr	string	name255	IP address.
netmask	string	name255	Subnet mask.
networkName	string	name255	Network configuration name.
vlanTag	number	int32	VFS network configuration VLAN ID.

Table 117: certificationInfo objects

Member	JSON type	API type	Description
name	string	name255	Certificate name.
validFrom8601	string	8601	Start time of a valid certificate.
validFromSec	number	int32	Start time of a valid certificate in seconds.
validUntil8601	string	8601	End time of valid certificate.
validUntilSec	number	int32	End time of valid certificate in seconds.
issuer	string	name255	Name of the issuer who generated the certificate
subIssuer	string	name255	Name of the sub issuer who generated the certificate.
serialNumber	string	name255	Certificate serial number.

Table Continued

Member	JSON type	API type	Description
version	number	int32	Certificate version.
contents	string	printt1782	Content of the certificate (1303 characters).

Errors

See, [File services query error codes](#).

Querying a single VFS

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/virtualfileservers/<vfs_id>`

The <vfs id> parameter uniquely identifies the VFS to query.

Success

A successful query returns the HTTP code 200 OK. Unless an error occurs, the response includes JSON objects as described in [VFS property objects](#).

Errors

Table 118: Single VFS query error codes

API Error	HTTP Code	Description
NON_EXISTENT_VFS	404 Not Found	The VFS does not exist.

In addition see, [File services query error codes](#).

Querying VFS using filters

Use the following filters to query VFS:

- name (VFS name)
- fpg (FPG name)

To query VFSs using multiple filters, use the HTTP GET method with the AND operator in the query string.

For example:

- To query using both the VFS name and the FPG name, use the following URI:

`https://<storage_system>:8080/api/v1/virtualfileservers?query="name EQ <vfs_name> AND fpg EQ <fpg_name>"`

- To query using only the VFS name, use the following URI:

`https://<storage_system>:8080/api/v1/virtualfileservers?query="name EQ <vfs_name>"`

- To query using only the FPG name, use the following URI:

`https://<storage_system>:8080/api/v1/virtualfileservers?query="fpg EQ <fpg_name>"`

Success

A successful VFS query returns the HTTP code 200 OK, with the response body including members as described below.

Table 119: Response body for querying VFS using filters

Member	JSON type	API type	Description
total	number	int32	Total number of VFS objects returned
members	Array of objects	Array of VFS property object	VFS properties

Errors

See, [Queries using filters error codes](#).

File Stores

Creating File Stores

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/filestores/`

The request message body is a JSON object with members as described in the following table:

Table 120: Request message body JSON objects for creating File Stores

Member	JSON Type	API Type	Ignored Values	Description
name	string	name255	None. Required field.	Name of the File Store you want to create (max 255 characters).
vfs	string	name255	None. Required field.	Name of the VFS under which to create the File Store. If it does not exist, the system creates it.
fpg	string	name22	None. Required field.	Name of the FPG in which to create the File Store.
securityMode	number	See, securityMode enumeration	None. Required field.	Security mode of the File Store being created.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
<code>supressSecOpErr</code>	boolean	boolean	None.	Enables or disables the security operations error suppression for File Stores in <code>NTFS</code> security mode. Defaults to false. Cannot be used in <code>LEGACY</code> security mode.
<code>comment</code>	string	print511	None.	Specifies any additional information about the File Store.

Table 121: securityMode enumeration

Symbol	Value	Description
<code>NTFS</code>	1	File Store security mode is <code>NTFS</code> .
<code>LEGACY</code>	2	File Store security mode is legacy.

Success

A successful request returns the HTTP code `201 CREATED`. The response body contains the link to the created File Store as described in the following table.

Table 122: Response message body for creating a File Store

Member	JSON Type	API Type	Description
<code>links</code>	Array of links	Array of URL links	Links include a self-URL (<code>v1/filestores/<fstore_id></code>).

The response location header contains a link to the URL for the newly created File Store using the following format:

```
/api/v1/filestores/<fstore_id>
```

Errors

Table 123: File Store modification error codes

API Error	HTTP Code	Description
NON_EXISTENT_VFS	404 Not Found	Specified VFS does not exist.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
FS_NOT_CONFIGURED	400 Bad Request	File Services is not configured on the system.
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	String length exceeds limit.
OTHER	400 Bad Request	Unlisted errors map to OTHER.

Modifying File Stores

Use the HTTP PUT method with the following URI:

https://<storage_system>:8080/api/v1/filestores/<fstore_id>

The message body of the request is a JSON object as described in the following table.

Table 124: Request message body JSON objects for modifying a File Store

Member	JSON type	API type	Ignored Values	Description
comment	string	print511	None.	Specifies any additional information, up to 511 characters, for the File Store.
securityMode	number	See, <u>securityMode enumeration</u>	None.	Security mode for the File Store. Only NTFS mode is valid.
suppressSecOpEr r	boolean	boolean	None.	Enables (True) or disables (False) the security operations error suppression for File Stores in NTFS security mode. Defaults to False. Not supported in legacy security mode.

Success

A successful request returns the HTTP code 200 OK. The response message body contains the link to the updated File Store as described in the following table.

Table 125: Response message body for modifying a File Store

Member	JSON Type	API Type	Description
links	Array of links	Array of URL links	Links include a self-URL (v1/filestores/<fstore_id>).

Errors

Table 126: File Store modification error codes

API Error	HTTP Code	Description
NON_EXISTENT_VFS	404 Not Found	Specified VFS does not exist.
NON_EXISTENT_FSTORE	404 Not Found	Specified File Store does not exist.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	File Store name can only contain alphanumeric characters and underscore.
INV_INPUT_MISSING_REQUIRE D	400 Bad Request	Missing some or all required parameters.
FS_NOT_CONFIGURED	400 Bad Request	File Services is not configured on the system.
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	String length exceeds limit.
OTHER	400 Bad Request	Unlisted errors map to OTHER.
INV_INPUT_SECMODE_CONFLIC TS_ERRSUPPRESS	400 Bad Request	Use suppressSecOpErr with NTFS securityMode only.

Removing a File Store

Use the HTTP DELETE method with the following URI and no message body:

https://<storage_system>:8080/api/v1/filestores/<fstore_id>

Success

A successful File Store removal returns the HTTP status code 200 OK and no response body.

Errors

Table 127: File Store removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_FSTORE	404 Not Found	The File Store does not exist.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
IN_USE	409 Conflict	Resource in use.
OTHER	400 Bad Request	Unlisted errors map to OTHER.

Querying File Stores

Choose any of the following query methods:

- Querying all File Stores
- Querying a single File Store
- Querying File Stores using filters

Querying all File Stores

Use the HTTP GET method with the following URI and no request message body:

`https://<storage_system>:8080/api/v1/filestores`

Success

The body of the response is a JSON object with total, members, and links as described in the following table:

Table 128: Response message body for querying all File Stores

Member	JSON type	API type	Description
total	number	int32	Total number of File Store objects returned.
members	Array of objects	See, <u>File Store property objects</u>	An array of zero or more JSON objects.
links	Array of URI links	Array of URI links	Links include a self URL.

Table 129: JSON File Store property objects

Member	JSON type	API type	Description
name	string	print255	File Store name.
id	string	print255	File Store ID.

Table Continued

Member	JSON type	API type	Description
uuid	string	uuid string	File Store globally unique ID.
fpg	string	name22	Name of the FPG to which the File Store belongs.
vfs	string	Print255	Name of the VFS to which the File Store belongs.
comment	string	print511	Specifies any additional information for the File Store.
state	number	See, <u>State enumeration</u>	State of the File Store.
securityMode	number	See, <u>securityMode enumeration</u>	File Store security mode.

Table Continued

Member	JSON type	API type	Description
suppressSecOpErr	boolean	boolean	Security operations error suppression for File Stores in NTFS security mode.
links	Array of URI links	Array of URI links	<p>Links include:</p> <ul style="list-style-type: none"> • Self URL • Link to the FPG <pre> /v1/fpgs? query="name EQ <fpgname>" </pre> • Link to the VFS <pre> /v1/ virtualfileserve rs?query="name EQ <vfsname> AND fpg EQ <fpgname>" </pre> • File share within the File Store <pre> /v1/fileshares? query="fpg EQ <fpg name> AND vfs EQ <vfs name> AND fstore EQ <fstore name>" </pre> • Snapshots within the File Store <pre> /v1/ filestoresnapsho ts?query="fpg EQ <fpg name> AND vfs EQ <vfs name> AND fstore EQ <fstore name>" </pre>

Errors

See, [File services query error codes](#).

Querying a single File Store

Use the HTTP GET method with the following URI and no message body:

https://<storage_system>:8080/api/v1/filestores/<fstore_id>

The <fstore_id> parameter contains the unique identifier of the File Store you want to query.

Success

A successful single File Store query returns the HTTP code 200 OK. Unless an error occurs, the response includes JSON objects as described in [Response message body for querying all File Stores](#).

Errors

Table 130: Single File Store query error codes

API Error	HTTP Code	Description
NON_EXISTENT_FILE_STORE	404 Not Found	Specified File Store does not exist

In addition see, [File services query error codes](#).

Querying File Stores using filters

Use the following filters to query File Stores:

- Name (File Store name)
- vfs (VFS name)
- fpg (FPG name)

To query File Stores using multiple filters, use the HTTP GET method with the AND operator in the query string.

For example:

- To query File Stores with File Store name and FPG name, use the following URI:
`https://<storage_system>:8080/api/v1/filestores?query="name EQ <fstore_name> AND fpg EQ <fpg_name>"`
- To query File Stores with File Store name, use the following URI:
`https://<storage_system>:8080/api/v1/filestores/filestores?query="name EQ <fstore_name>"`
- To query File Stores with FPG name, use the following URI:
`https://<storage_system>:8080/api/v1/filestores?query="name EQ <fpg_name>"`
- To query File Stores with File Store name, FPG name and VFS name use the following URI:
`https://<storage_system>:8080/api/v1/filestores?query="name EQ <fstore_name> AND vfs EQ <vfs_name> AND fpg EQ <fpg_name>"`

Success

A successful File Store query returns the HTTP code 200 OK, with a response body JSON object as described in the following table.

Table 131: Response body for querying File Stores using filters

Member	JSON type	API type	Description
<code>total</code>	number	int32	Total number of File Store objects returned
<code>members</code>	Array of objects	Array of File Store property objects	File Store properties

Errors

See, [Queries using filters error codes](#).

File Store snapshots

Creating a File Store snapshot

Use the HTTP POST method on the following URI:

`https://<storage_system>:8080/api/v1/filestoresnapshots`

The message body is a JSON object with the members described in the following table.

Table 132: Message body JSON objects for creating a File Store snapshot

Member	JSON type	API type	Ignored Values	Description
<code>tag</code>	string	name255	Required Field	The suffix appended to the timestamp of a snapshot creation to form the snapshot name (<timestamp>_<tag>), using ISO8601 date and time format. Truncates tags in excess of 255 characters.
<code>fstore</code>	string	name255	Required Field	The name of the File Store for which you are creating a snapshot.
<code>vfs</code>	string	name255	Required Field	The name of the VFS to which the File Store belongs.

Table Continued

Member	JSON type	API type	Ignored Values	Description
retainCount	number	int32		<p>In the range of 1 to 1024, specifies the number of snapshots to retain for the File Store. Snapshots in excess of the count are deleted beginning with the oldest snapshot.</p> <p>If the tag for the specified <code>retainCount</code> exceeds the count value, the oldest snapshot is deleted before the new snapshot is created. If the creation of the new snapshot fails, the deleted snapshot will not be restored.</p>
fpg	string	Name22	Required Field	The name of the FPG to which the VFS belongs.

Success

A successful operation returns the HTTP status code `201 Created`. The response body is a JSON object with the members described in the following table.

Table 133: Response body for creating File Store snapshot

Member	JSON type	API type	Description
links	array of URI links	array of URI links	<p>Links includes the URL to the new resource:</p> <pre>.../v1/ filestoresnapshots/ <id></pre>

Errors

Table 134: File Store snapshot creation error codes

API error	HTTP code	Description
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
FS_NOT_CONFIGURED	400 Bad Request	File Services is not configured on the system.
NON_EXISTENT_FSTORE	404 Not Found	The File Store does not exist.
NON_EXISTENT_VFS	404 Not Found	The VFS does not exist.
NON_EXISTENT_FPG	404 Not Found	The FPG does not exist.
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	
INV_INPUT_OUTSIDE_RANGE	400 Bad Request	<code>retainCount</code> value is outside of the expected range.
OTHER	400 Bad Request	Unknown Error.

Removing a File Store snapshot

Use the HTTP DELETE method with the following URI:

https://<storage_system>:8080/v1/filestoresnapshots/<id>

To find the URI of a particular snapshot, check the `links` field of the response message body returned when creating a File Store snapshot.

Success

A successful operation returns the HTTP status code 200 OK.

Errors

API error	HTTP code	Description
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
NON_EXISTENT_FSNAP	404 Not Found	The File Store Snapshot does not exist.
OTHER	400 Bad Request	Unknown Error.

Querying File Store snapshots

Use any of the following methods to query File Store snapshots:

- Querying all File Store snapshots
- Querying a single File Store snapshot
- Querying File Store snapshots using filters

Querying all File Store snapshots

Use the HTTP GET method with the following URI and no message body:

https://<storage_system>:8080/v1/filestoresnapshots

Success

A successful query returns the HTTP code 200 OK and a response body that includes a JSON object as described in the following table.

Table 135: Response body for querying all File Store snapshots

Member	JSON type	API type	Description
total	number	int32	Total number of File Store snapshot objects returned; total number of objects in the collection.
members	Array of objects	Array of File Store Snapshot property object (see, JSON objects for a File Store snapshot)	File Store Snapshot properties as an array of zero or more JSON objects.
links	Array of URI links	Array of URI links	Links include the self URI.

Table 136: JSON objects for a File Store snapshot

Member	JSON type	API type	Description
name	string	name255	File Store snapshot name.
id	string	name22	File Store snapshot ID.
fpg	string	name22	FPG name.
vfs	string	name255	VFS name.
fstore	string	name255	File Store name.
creationTimeSec	number	uint64	Snapshot creation time in seconds.

Table Continued

Member	JSON type	API type	Description
creationTime8601	string	8601	Snapshot creation time in 8601 format
links	Array of URI links	Array of URI links	Links include: <ul style="list-style-type: none"> Self URI , v1/ filestoresnapshots/<id> URI for FPG, v1/fpgs? query="name EQ <fpg name>" URI for VFS, v1/ virtualfileserve rs?query="name EQ <vfs name> AND fpg EQ <fpg name>" URI for File Store, v1/filestore? query="name EQ <fstore name> AND fpg EQ <fpg name> AND vfs EQ <vfs name>"

Errors

See, [File services query error codes](#).

Querying a single File Store snapshot

Use the HTTP GET method with the following URI and no message body:

https://<storage_system>:8080/v1/filestoresnapshots/<id>

Success

A successful single File Store snapshot query returns the HTTP code 200 OK. Unless an error occurs, the response includes JSON objects as described in [JSON objects for a File Store snapshot](#).

Errors

Table 137: Single File Store snapshot query error codes

API Error	HTTP Code	Description
NON_EXISTENT_FSNAP	404 Not Found	Specified File Store snapshot does not exist.

In addition see, [File services query error codes](#).

Querying File Store snapshots using filters

- `name` (File Store snapshot name — exact match and pattern match)
- `fpg` (FPG name)
- `vfs` (VFS name)
- `fstore` (File Store name)

To query File Store Snapshots using multiple filters, use the HTTP GET method with the AND operator in the query string.

For example:

- To query File Store Snapshots with all the filters, use the following URI:

```
https://<storage_system>:8080/api/v1/filestoresnapshots?query="name EQ  
<fsnap_name> AND vfs EQ <vfs_name> AND fpg EQ <fpg_name> AND fstore EQ  
<fstore_name>"
```

- To query File Store Snapshots with File Store Snapsho name, use the following URI:

```
https://<storage_system>:8080/api/v1/filestoresnapshots?query="name EQ  
<fsnap_name>"
```

- To query File Store Snapshots with VFS name, use the following URI:

```
https://<storage_system>:8080/api/v1/filestoresnapshots?query="vfs EQ  
<vfs_name>"
```

- To query File Store Snapshots with FPG name, use the following URI: `https://<storage_system>:8080/api/v1/filestoresnapshots?query="fpg EQ<fpg_name>`

- To query File Store Snapshots with File Store name, use the following URI:

```
https://<storage_system>:8080/api/v1/filestoresnapshots?query="fstore EQ  
<fstore_name>
```

- To query File Store Snapshots with File Store name pattern, use the following URI:

```
https://<storage_system>:8080/api/v1/filestoresnapshots?query="name LIKE  
<fsnap_name_pattern>
```

For example, to find all `fsnaps` beginning with `myfsnap`, use `myfsnap*` `https://`

```
<storage_system>:8080/api/v1/filestoresnapshots?query="name LIKE myfsnap*"
```

Success

A successful File Store snapshot query returns the HTTP code 200 OK, with a response body including JSON objects as described in the following table.

Table 138: Response body for querying File Store snapshot using filters

Member	JSON type	API type	Description
total	number	int32	Total number of File Store Snapshot objects returned
members	Array of objects	Array of File Store Snapshot property objects	File Store Snapshot properties

Errors

See, [Queries using filters error codes](#).

File Shares

Creating File Shares

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/fileshares/`

The request message body is a JSON object with members as described in the following table.

Table 139: Request message body JSON objects for creating File Shares

Member	JSON Type	API Type	Ignored Values	Description
name	string	name255	None. Required field.	Name of the File Share you want to create.
type	number	See, fileShareType enumeration	None. Required field.	Type of File Share you want to create.
vfs	string	name255	None. Required field.	Name of the VFS under which to create the File Share. If it does not exist, the system creates it.
shareDirectory	string	name255	None.	Directory path to the File Share. Requires <code>fstore</code> .
fstore	string	name255	None.	Name of the File Store in which to create the File Share.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
fpg	string	name22	None. Required field.	Name of FPG in which to create the File Share.
comment	string	print511	None.	Specifies any additional information about the File Share.
ssl	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) SSL. Valid for <code>OBJ</code> and <code>FTP</code> File Share types only.
objurlPath	string	name255	None.	URL that clients will use to access the share. Valid for <code>OBJ</code> File Share type only.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
nfsOptions	string	string	None.	<p>Valid for NFS File Share type only.</p> <p>Specifies options to use when creating the share. Supports standard NFS export options except <code>no_subtree_check</code>.</p> <p>With no options specified, automatically sets the default options.</p> <ul style="list-style-type: none"> • <code>auth_nlm</code> • <code>wdelay</code> • <code>sec_sys</code> • <code>no_all_squash</code> • <code>crossmnt</code> • <code>secure</code> • <code>subtree_check</code> • <code>hide</code> • <code>root_squash</code> • <code>ro</code> <p>See <code>linux exports(5)</code> man page for detailed information.</p>

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
nfsClientlist	array of strings	array of strings	None.	<p>Valid for NFS File Share type only.</p> <p>Specifies the clients that can access the share. Specify the NFS client using any of the following:</p> <ul style="list-style-type: none"> Full name (sys1.hp.com) Name with a wildcard (*hp.com) IP address (use a comma to separate IP addresses) <p>With no list specified, defaults to match everything.</p>
smbABE	boolean	boolean	None.	<p>Valid for SMB File Share only.</p> <p>Enables (<code>true</code>) or disables (<code>false</code>) Access Based Enumeration (ABE).</p> <p>ABE specifies that users can see only the files and directories to which they have been allowed access on the shares.</p> <p>Defaults to <code>false</code></p>
smbAllowedIPs	array of strings	array of name255	None.	<p>List of client IP addresses that are allowed access to the share.</p> <p>Valid for SMB File Share type only.</p>

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
smbDeniedIPs	array of strings	array of name255	None.	List of client IP addresses that are not allowed access to the share. Valid for SMB File Share type only.
smbAllowedUserPerm	array of objects	See, <u>userPerm objects</u>	None.	Permits access to a share for user or group. Valid for SMB File Share type only.
smbDeniedUserPerm	array of objects	See, <u>userPerm objects</u>	None.	Denies permission to access a share by user or group. Valid for SMB File Share type only.
smbContinuousAvailability	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) SMB3 continuous availability features for the share. Defaults to <code>true</code> . Valid for SMB File Share type only.
smbCache	number	See, <u>clientCacheEnum enumeration</u>	Negative values.	Specifies client-side caching for offline files. Valid for SMB File Share type only.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
ftpShareIPs	array of strings	array of name255	None.	Lists the IP addresses assigned to the FTP share. Valid only for FTP File Share type.
ftpOptions	string	string	None.	Specifies the configuration options for the FTP share. Use the format: <option1=value 1[,option2=valu e2]...>. Unspecified values use the default values (see, <u>ftpOptions default values</u>) .

Table 140: ftpOptions default values

ftpOption	Default
accept_timeout	60
force_local_data_ssl	NO
allow_anon_ssl	YES
force_local_logins_ssl	YES
anon_max_rate	0
hide_ids	NO
anon_mkdir_write_enable	YES
home_dir_prefix	/
anon_other_write_enable	NO
home_dir_support	NO
anon_umask	0077
idle_session_timeout	300
anon_upload_enable	YES

Table Continued

ftpOption	Default
implicit_ssl	YES
anon_world_readable_only	NO
local_max_rate	0
ascii_mode	both
local_umask	0022
login_access_mode	local
lock_upload_files	YES
chown_upload_mode	0600
max_clients	250
connect_timeout	60
mdtm_write	YES
connection_mode	passive
no_anon_password	YES
data_connection_timeout	300
pasv_max_port	49500
dirlist_enable	YES
pasv_min_port	49251
file_access_mode	both
require_ssl_reuse	NO

Table 141: fileShareType enumeration

Symbol	Value	Description
NFS	1	File Share of type NFS.
SMB	2	File Share of type SMB.
OBJ	3	File Share of type OBJ.
FTP	4	File Share of type FTP.

Table 142: userPerm objects

Member	JSON type	API type	Description
user	string	name255	The <code>userName</code> or <code>groupName</code> of a local, AD, or LDAP user. Use <code>everyone</code> to include all groups and users.
permission	number	See, <u>permEnum enumeration</u>	Establishes the level of permission required.

Table 143: clientCacheEnum enumeration

Symbol	Value	Description
OFF	1	Indicates that share configuration disallows caching from the share.
MANUAL	2	Allows only manual caching for the files open from this share.
OPTIMIZED	3	Indicates that share configuration allows automatic caching of programs and documents. Client may cache every file that it opens from this share. Also, the client may satisfy the file requests from its local cache.
AUTO	4	Indicates that share configuration allows automatic caching of programs and documents. The client may cache every file that it opens from this share.

Table 144: permEnum enumeration

Symbol	Value	Description
FULLCONTROL	1	Permission is full control.
READ	2	Permission is read-only.
CHANGE	3	Permission is read and write.
UNKNOWN	99	Unknown permission

Success

A successful creation returns an HTTP code 201 `Created`. Unless an error occurs, the response message body is a JSON object as defined in the following table.

Table 145: Response message body for creating File Shares

Member	JSON Type	API Type	Description
links	Array of links	Array of URL links	Links include the self-URI (/api/v1/fileshares/<fileshare_id>)

Errors

Table 146: File share creation error codes

API Error	HTTP Code	Description/Error message
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	FPG name can only contain alphanumeric characters and underscore.
INV_INPUT_MISSING_REQUIRE D	400 Bad Request	Some or all required parameters are missing.
INV_INPUT_PARAM_CONFLICT	400 Bad Request	Invalid input (parameters cannot be present at the same time).
FS_NOT_CONFIGURED	400 Bad Request	File services is not configured on the system.
NON_EXISTENT_FPG	400 Bad Request	FPG does not exist.

Updating a File Share

Use the HTTP PUT method with the following URI:

https://<storage_system>:8080/api/v1/fileshares/<fshare_id>

The <fshare_id> contains the unique identifier of the File Share you want to update.

The request body is a JSON object with members as described in the following table:

Table 147: Request message body JSON object members for updating a File Share

Member	JSON Type	API Type	Ignored Values	Description
<code>comment</code>	string	print511	None	Specifies any additional information about the File Share.
<code>ssl</code>	boolean	boolean	None	Enables (<code>true</code>) or disables (<code>false</code>) SSL Valid for <code>OBJ</code> File Share type only.
<code>nfsOptions</code>	string	string		Specifies options to use for the share, and overwrites the existing options. Valid only for NFS fileshare type.
<code>nfsClientlistOperation</code>	number	See, <u>operationEnum enumeration</u>		Specifies whether to add a new or remove an existing client list as defined in <code>nfsClientlist</code> . With nothing specified, replaces the existing list.
<code>nfsClientlist</code>	array of strings	array of strings		Specifies clients to be added or removed. Valid for <code>NFS</code> file share type only.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
smbABE	boolean	boolean	None	<p>Access Based Enumeration.</p> <p><code>true</code> – Allows users to see all files and directories on the shares.</p> <p><code>false</code> – (default) Allows users to see only those files and directories to which they are allowed access on the shares.</p> <p>Valid for SMB file share type only.</p>
smbAllowedIPsOperation	number	See, <u>operationEnumeration</u>		<p>Specifies whether to add a new or remove an existing permitted client IP address.</p> <p>Valid for SMB file share type only.</p>
smbAllowedIPs	Array of strings	Array of name255		<p>Allows you to replace an existing list of permitted client IP addresses with a different list.</p> <p>Valid for SMB file share type only.</p>
smbDeniedIPsOperation	number	See, <u>operationEnumeration</u>		<p>Allows you to replace an existing denied client IP addresses with a different list.</p> <p>Valid for SMB file share type only.</p>
smbDeniedIPs	Array of strings	Array of name255		<p>Allows you to replace an existing list of denied client IP addresses with a different list.</p> <p>Valid for SMB file share type only.</p>

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
<code>smbAllowedUserPermissionsOperation</code>	number	See, <u>operationEnum enumeration</u>		Specifies whether to add, remove, or modify the users or groups with permission to access the share. If not specified, replaces existing list. Valid for SMB file share type only.
<code>smbAllowedUserPermissions</code>	Array of objects	See, <u>userPerm objects</u>		Specifies whether to add, remove, or modify the users or groups with permission to access the share. Valid for SMB file share type only.
<code>smbDeniedUserPermissionsOperation</code>	number	See, <u>operationEnum enumeration</u>		Specifies whether to add, remove, or modify the users or groups with permission to access the share. Valid for SMB file share type only.
<code>smbDeniedUserPermissions</code>	Array of objects	See, <u>userPerm objects</u>		Specifies whether to add, remove, or modify the users or groups with permission to access the share. Valid for SMB file share type only.
<code>smbContinuousAvailability</code>	boolean	boolean		<code>true</code> – enables SMB3 continuous availability features <code>false</code> – disables SMB3 continuous availability features. Valid only for SMB File Share type only.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
smbCache	number	See, <u>clientCacheEnum enumeration</u>		<p>Specifies client-side caching for offline files. Valid values are:</p> <ul style="list-style-type: none"> • off • manual • optimized • auto <p>Valid for SMB file share type only.</p>
ftpOptions	string	string		<p>Specifies the configuration options to be modified for the FTP share. Setting to "" sets all the values to default.</p>
ftpOptionOperation	number	See, <u>clientCacheEnum enumeration</u>		<p>Allows you to add new FTP options as defined in <code>ftpOptions</code>. With nothing specified, replaces the existing list. Supports adding only.</p>
ftpShareIPs	array of strings	array of strings		<p>Used to add, remove, or overwrite IP addresses in the FTP share. To add or overwrite, the IPs must be assigned to the specified VFS.</p>
ftpShareIPOperation	number	See, <u>clientCacheEnum enumeration</u>		<p>Specify + to add to the existing list, or add the list if it does not already exist.</p> <p>Specify - to remove an existing list.</p> <p>Supports only + and -.</p>

Table 148: operationEnum enumeration

Symbol	Value	Description
+	1	Add the corresponding list to the existing list.
–	2	Remove the corresponding list from the existing list.
=	3	Modify the corresponding list. Requires an existing list to modify. Valid for user permission only.
Unknown	99	

Success

A successful update returns the HTTP status code 200 OK. The response message body contains a link to the updated File Share as described in the following table.

Table 149: Response message body for updating a File Share

Member	JSON Type	API Type	Description
links	Array of links	Array of URL links	Links include a self-URL (v1/fileshares/<fsshare_id>).

Errors

For error codes, see [File Share update or removal error codes](#).

Updating File Share directory permissions

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/fileshares/<fshare_id>/dirperms`

The <fshare_id> contains the unique identifier of the File Share you want to update.

The request message body is a JSON object with members as described in the following table.

Table 150: Request message body JSON members for updating File Share directory permissions

Member	JSON type	API type	Description
owner	string	name255	The owner of the share directory.
group	string	name255	The group to which the share directory belongs.

Table Continued

Member	JSON type	API type	Description
mode	number	number	Permissions that are allowed on a share directory. This can NOT be used with <code>aclList</code> field.
aclListOperation	number	See, <u>operationEnum enumeration</u>	Specifies whether to add to or remove from the ACL permission list defined in <code>aclList</code> . If not specified, adds an <code>aclList</code> .
aclList	array of objects	See, <u>ACL objects</u>	Specifies the ACL permissions to add, remove, or replace on a share directory. This can NOT be used with <code>mode</code> field.

Success

A successful update returns the HTTP status code 200 OK. The response message body contains a link to the updated File Share as described in the following table.

Table 151: Response message body for updating a File Share

Member	JSON Type	API Type	Description
links	Array of links	Array of URL links	Links include a self-URL (<code>v1/filesshares/<fsshare_id></code>).

Errors

For error codes, see [File Share update or removal error codes](#).

Removing a File Share

Use the HTTP DELETE method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/filesshares/<fshare_id>`

The `<fshare_id>` contains the unique identifier of the File Share you want to remove.

Success

A successful File Share removal returns the HTTP status code 200 OK and no response body.

Errors

Table 152: File Share update or removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_FSHARE	404 Not Found	File Share does not exist.
UNLICENSED_FEATURE	403 Forbidden	System is not licensed for File Services.
OTHER	400 Bad Request	Unlisted errors map to OTHER.

Querying File Shares

You can query File Shares using the following methods:

- **Querying all File Shares**
- Querying a single File Share
- Query File Shares using filters

Querying all File Shares

Use the HTTP GET method with the following URI and no message body.

`https://<storage_system>:8080/api/v1/fileshares`

Success

A successful query returns HTTP code 200 OK, and a response message body with JSON objects as described in the following table:

Table 153: Response message body for File Share query

Member	JSON type	API type	Description
total	number	int32	Number of File shares returned; total number of objects in the collection.
members	string	<u>File Share properties</u>	File share property objects returned as an array of zero or more JSON objects.
links	Array of URI links	Array of URI Links	Links include the self URL.

Table 154: File Share properties

Member	JSON type	API type	Description
name	string	name255	File Share name.
type	number	<u>fileShareType enumeration</u>	Type of the File Share.
uuid	string	uuid string	Globally unique File Share ID.
id	string	name255	File Share ID.
comment	string	print511	Specifies any additional information about the File Share.
fpg	string	name22	Name of FPG to which the File Share belongs.
vfs	string	name255	Name of the VFS to which the File share belongs.
fstore	string	name255	Name of the File Store to which the File Share belongs.
shareDirectory	string	name255	Directory path to the File Share.
overallState	number	<u>State enumeration</u>	State of the File Share.
nfsSharePath	string	name255	Complete path to the File Share. Valid for NFS File Share type only.
nfsClientlist	Array of strings	Array of name255	List of client IP address or system name. Returns "*" when no client list was specified when creating the File Share. Valid for NFS File Share type only.

Table Continued

Member	JSON type	API type	Description
nfsOptions	string.	string	<p>NFS options used to create the File Share. List options as comma separated string.</p> <p>See <code>linux exports(5)</code> man page for detailed information.</p> <p>Valid for NFS File Share type only.</p>
smbABE	boolean	boolean	<p>Enables (<code>true</code>) or disables (<code>false</code>) Access Based Enumeration (ABE).</p> <p>Valid for SMB File Share type only.</p>
smbContinuousAvailability	boolean	boolean	<p>Enables (<code>true</code>) or disables (<code>false</code>) SMB3 continuous availability features this share.</p> <p>Valid for SMB File Share type only.</p>
smbAllowedUserPerm	Array of objects	See, <u>userPerm objects</u>	<p>Specifies the permission that a user/group is allowed to access the share.</p> <p>Valid for SMB File Share type only.</p>
smbDeniedUserPerm	Array of objects	See, <u>userPerm objects</u>	<p>Specifies the permission that a user/group is denied to access the share.</p> <p>Valid for SMB File Share type only.</p>
smbAllowedIPs	Array of strings	Array of name255	<p>List of client IP addresses that are allowed access to the share.</p> <p>Valid for SMB File Share type only</p>

Table Continued

Member	JSON type	API type	Description
smbDeniedIPs	Array of strings	Array of name255	List of client IP addresses that are not allowed access to the share. Valid for SMB File Share type only.
smbCache	number	<u>clientCacheEnum enumeration</u>	Specifies client-side caching for offline files. Valid for SMB File Share type only.
objurlPath	string	name255	URL that clients will use to access the share. Valid for OBJ File Share type only
ssl	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) <code>ssl</code> . Valid for OBJ File Share type only.
ftpOptions	string	string	FTP share configuration options used to create the File Share. Use a comma to separate options. For more information, see the FTP user guide.

Table Continued

Member	JSON type	API type	Description
ftpShareIPs	array of strings	array of name255	List of IP addresses assigned to the FTP share.
links	Array of URI links	Array of URI links	<p>Links include:</p> <ul style="list-style-type: none"> • Self URI: v1/fileshares / <fshare_id> • FPG URI: v1/fpgs?query="name EQ <fpg_name>" • VFS URI: /v1/virtualfileserve rs?query="name EQ <vfsname> AND fpg EQ <fpgname>" • File Store URI: v1/filestores?query="name EQ <fstore_name> AND fpg EQ <fpg name> AND vfs EQ <vfs name>"

Errors

See, [File services query error codes](#).

Querying a single File Share

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/fileshares/<fshare_id>`

The <fshare_id> contains the unique identifier of the File Share you want to query.

Success

A successful query returns the HTTP code 200 OK. Unless an error occurs, the response includes JSON objects as described in [Response message body for File Share query](#).

Errors

Table 155: File Share query error codes

API Error	HTTP Code	Description
NON_EXISTENT_FSHARE	404 Not Found	Specified File Share does not exist

In addition see, [File services query error codes](#).

Querying File Shares using filters

Use the following filters to query File Shares:

- `name` (File Share name)
- `type` (File Share type, ie, smb/nfs/obj)
- `vfs` (VFS name)
- `fpg` (FPG name)
- `fstore` (fstore name)

To query File Shares using multiple filters, use the HTTP GET method with the AND operator in the query string.

- To query File Shares using the File Share name and the FPG name, use the following URI:
`https://<storage_system>:8080/api/v1/fileshares?query="name EQ <fshare_name> AND fpg EQ <fpg_name>"`
- To query all SMB File Shares, use the following URI:
`https://<storage_system>:8080/api/v1/fileshares?query="type EQ 2"`
- To query File Shares with VFS name, use the following URI:
`https://<storage_system>:8080/api/v1/fileshares?query="vfs EQ <vfs_name>"`
- To query File Shares with File Store name and VFS name, use the following URI:
`https://<storage_system>:8080/api/v1/fileshares?query="fstore EQ <file store_name> AND vfs EQ <vfs name>"`

Success

A successful File Share query returns the HTTP code 200 OK, with the response body including members as described in the following table:

Table 156: Response body for querying File Shares using filters

Member	JSON type	API type	Description
total	number	int32	Total number of File Share objects returned
members	Array of objects	Array of File Share property objects (see, File Share properties).	File share properties.

Errors

See, [Queries using filters error codes](#).

Querying for directory permission properties

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/fileshares/<fshare_id>/dirperms`

The `<fshare_id>` contains the unique identifier of the File Share you want to query.

Success

A successful query returns the HTTP code 200 OK. Unless an error occurs, the response includes JSON objects as described in the following tables.

Table 157: Message body JSON objects for a single File Share query

Member	JSON type	API type	Description
owner	string	name255	Owner name of the File Share
group	string	name255	Group name of the File Share
mode	number	number	Mode bits of the File Share
ACLList	Array of objects	Array of ACL objects (see, ACL objects)	Access list of the File Share

Table 158: ACL objects

Member	JSON type	API type	Description
aclType	number	permType enumeration (see, permType enumeration).	ACL permission type.
aclFlags	string	string	ACL flags.

Table Continued

Member	JSON type	API type	Description
aclPrincipal	string	string	Any user or group name or OWNER@, GROUP@, EVERYONE@
aclPermissions	string	string	ACL permissions

Table 159: permType enumeration

Symbol	Value	Description
A	1	Allow
D	2	Deny
U	3	Audit
L	4	Alarm
Unknown	99	—

Errors

See, [File Share query error codes](#).

File Persona quotas

Creating a File Persona quota

Use the HTTP POST method and the following URI:

`https://<storage_system>:8080/api/v1/filepersonaquotas/`

The location header in the response contains a link to the URL for the newly created File Persona quota, using the following format:

`/api/v1/filepersonaquotas/<id>`

The request message body is a JSON object with members as described in the following table.

Table 160: Request message body JSON objects for File persona quota creation

Member	JSON Type	API Type	Ignored Values	Description
name	string	name255	None. Required field.	The name of the object that the File Persona quotas to be created for.
type	number	See, <u>QuotaType enumeration</u>	None. Required field.	The type of File Persona quota to be created.
vfs	string	name255	None. Required field.	VFS name associated with the File Persona quota.
fpg	string	name21	None. Required field.	Name of the FPG hosting the VFS.
softBlockMiB	number	number	0 or negative value ignored. At least one of softBlockMiB, hardBlockMiB, softFileLimit and hardFileLimit should have positive value.	Soft capacity storage quota.
hardBlockMiB	number	number	0 or negative value ignored. At least one of softBlockMiB, hardBlockMiB, softFileLimit and hardFileLimit should have positive value.	Hard capacity storage quota.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
<code>softFileLimit</code>	number	number	0 or negative value ignored. At least one of <code>softBlockMiB</code> , <code>hardBlockMiB</code> , <code>softFileLimit</code> and <code>hardFileLimit</code> should have positive value.	Specifies the soft limit for the number of stored files.
<code>hardFileLimit</code>	number	number	0 or negative value ignored. At least one of <code>softBlockMiB</code> , <code>hardBlockMiB</code> , <code>softFileLimit</code> , or <code>hardFileLimit</code> should have a positive value.	Specifies the hard limit for the number of stored files.

Success

A successful File Persona quota creation returns an HTTP code `201 created`. Unless an error occurs, the response includes a message body JSON object, as specified in the following table.

Table 161: Message body JSON objects for File persona quota creation

Member	JSON Type	API Type	Description
<code>links</code>	Array of links.	Array of URL links	Links include the self URL: <code>/api/v1/ filepersonaquotas/ <id></code>

Errors

Table 162: File persona creation error codes

API Error	HTTP Code	Description/Error message
<code>UNLICENSED_FEATURE</code>	403 Forbidden	This system is not licensed for File Services.
<code>INV_INPUT_MISSING_REQUIRED</code>	400 Bad Request	invalid input: some or all required parameters are missing
<code>EXISTENT_FILE_PERSONA_QUOTA</code>	409	The File Persona quota already exists.

Modifying File Persona quota information

Use the HTTP POST method and the following URI:

`https://<storage_system>:8080/api/v1/filepersonaquotas/<id>`

The `<id>` variable contains the unique ID of the File Persona you want to modify.

The message body is a JSON object with members described in the following table:

Table 163: Message body JSON object for File Persona quota modification

Member	JSON Type	API Type	Ignored Values	Description
<code>softFileLimit</code>	number	Uint32	Negative values.	Specifies the soft limit for the number of stored files.
<code>rmSoftFileLimit</code>	number	boolean		<p>Resets <code>softFileLimit</code>:</p> <ul style="list-style-type: none">• <code>true</code> —resets to 0• <code>false</code> — ignored if <code>false</code> and <code>softFileLimit</code> is set to 0. <p>Set to limit if <code>false</code> and <code>softFileLimit</code> is a positive value.</p>
<code>hardFileLimit</code>	number	Uint32	Negative values.	Specifies the hard limit for the number of stored files

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
rmHardFileLimit	number	boolean		<p>Resets hardFileLimit:</p> <ul style="list-style-type: none"> • true —resets to 0 • If false , and hardFileLimit is set to 0, ignores. • If false , and hardFileLimit is a positive value, then set to that limit.
softBlockMiB	number	Uint32	Negative values.	Specifies an integer value in MB for the soft capacity storage quota.
rmSoftBlockMiB	number	boolean		<p>Resets softBlockMiB:</p> <ul style="list-style-type: none"> • true —resets to 0 • If false , and softBlockMiB is set to 0, ignores. • If false , and softBlockMiB is a positive value, then set to that limit.

Table Continued

Member	JSON Type	API Type	Ignored Values	Description
hardBlockMiB	number	Uint32	Negative values.	specifies an integer value in MB for the hard capacity storage quota
rmHardBlockMiB	number	boolean		Resets hardBlockMiB: <ul style="list-style-type: none"> • <code>true</code> —resets to 0 • If <code>false</code>, and hardBlockMiB is set to 0, ignores. • If <code>false</code>, and hardBlockMiB is a positive value, then set to that limit.

Success

A successful request to modify a volume returns the HTTP code 200 OK. Unless an error occurs, the response includes a JSON object as described in the following table.

Table 164: Message body JSON objects for File Persona quota modification

Member	JSON Type	API Type	Description
links	Array of links	Array of URI links	Links include the URI to the new resource: <code>v1/</code> <code>filepersonaquotas/</code> <code><id></code>

Errors

Table 165: File Persona quota modification request error codes

API Error	HTTP Code	Description/Error message
NON_EXISTENT_FSQUOTA	404 Not Found	Specified quota doesn't exist.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Missing some or all required parameters.

Removing a File Persona quota

Use the HTTP DELETE method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/filepersonaquotas/<Quota_id>`

Success

A File Persona quota removal returns the HTTP status code 200 OK and no response body.

Errors

Table 166: File Persona quota removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_FSQUOTA	404 Not Found	Specified quota does not exist.
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for File Services.
OTHER	400 Bad Request	Unlisted errors map to OTHER.

Querying File Persona quotas

Query for File Persona quotas using the following methods:

- Querying all File Persona quotas
- Querying a single File Persona quota
- Querying for selected File Persona quotas using filters

Querying all quotas

Use the HTTP GET method with the following URI with no message body:

`https://<storage_system>:8080/api/v1/filepersonaquotas`

Success

A successful query returns the HTTP status code 200 OK. The response is a message body with JSON objects as described in following table:

Table 167: Response message body JSON objects for File Persona quota query

Member	JSON type	API type	Description
total	number	int32	Total number of quota objects returned; total number of objects in the collection.
members	Array of objects	See, File Persona Quota properties object	File persona quota properties objects returned as an array of zero or more JSON objects.
links	Array of URI links	Array of URI links	Links include the self URI.

Table 168: File Persona quota properties object

Member	JSON type	API type	Description
name	string	print255	Quota name, depending on type: <ul style="list-style-type: none">• Type 1 – File Service user name.• Type 2 – FSG name.• Type 3 – File Store name.
id	string	print255	Quota ID.
key	number	uint64	Quota ID, depending on type: <ul style="list-style-type: none">• Type 1 – File Service ID.• Type 2 – FSG ID.• Type 3 – File Store ID.
type	number	See, QuotaType enumeration	Type of Quota.
fpg	string	name21	FPG name.
overallState	number	See, State enumeration	Over all state of Quota.

Table Continued

Member	JSON type	API type	Description
<code>vfs</code>	string	name255	Name of the VFS on which you created the quota.
<code>currentFileLimit</code>	number	uint64	Specifies the current limit for the number of stored files.
<code>softFileLimit</code>	number	uint64	Specifies the soft limit for the number of stored files.
<code>hardFileLimit</code>	number	uint64	Specifies the hard limit for the number of stored files.
<code>graceFileLimitInSec</code>	number	uint64	<p>Specifies the remaining grace time (in seconds) after a <code>hardFileLimit</code> breach.</p> <ul style="list-style-type: none"> • 0 = none • -1 = reached • >0 is the grace limit in seconds, computed based on <p><code>inodeGraceTimeSec</code></p> <p>setting for the VFS.</p>
<code>currentBlockMiB</code>	number	uint64	Specifies an integer value in MB for the current capacity storage quota.
<code>softBlockMiB</code>	number	uint64	Specifies an integer value in MB for the soft capacity storage quota.
<code>hardBlockMiB</code>	number	uint64	Specifies an integer value in MB for the hard capacity storage quota.

Table Continued

Member	JSON type	API type	Description
graceBlockInSec	number	uint64	<p>Specifies the remaining grace time (in seconds) after a <code>hardBlockMib</code> breach.</p> <ul style="list-style-type: none"> 0 = none -1 = reached >0 is the grace limit in seconds, computed based on <code>blockGraceTimeSec</code> setting for the VFS.
links	Array of URI links	Array of URI links	<p>Links include:</p> <ul style="list-style-type: none"> Self URI: <pre>v1/ filepersonaquota s/<quota_compId></pre> URI for FPG: <pre>v1/fpgs? query="name EQ <fpg>"</pre> URI for VFS: <pre>v1/ virtualfileserve rs?query="name EQ <vfs name> AND fpg EQ <fpg>"</pre> URI for File Store: <pre>v1/filestores? query=\"name EQ <fstore> AND fpg EQ <fpg>AND vfs EQ <vfs>\"</pre>

Errors

See, [File services query error codes](#).

Querying a single File Persona quota

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/filepersonaquota/<Quota_Id>`

The `<Quota_Id>` uniquely identifies the Quota to query.

Success

A successful query returns the HTTP code 200 OK.

Unless an error occurs, the response includes JSON objects as described in [Members objects for File Persona quota properties query](#).

Errors

Table 169: Single quota query error codes

API Error	HTTP Code	Description
NON_EXISTENT_FSQUOTA	404 Not Found	Specified quota does not exist.

In addition see, [File services query error codes](#).

Querying File Persona quotas using filters

Use the following filters to query quotas:

- `name` (user, group, or fstore name)
- `key` (user, group, or fstore id)
- `type` (Quota type)
- `vfs` (VFS name)
- `fpg` (FPG name)

Query Quotas using multiple filters using the HTTP GET method with the AND operator in the query string. For example:

- To query Quotas with Quota name and FPG name, use the following URI:
`https://<storage_system>:8080/api/v1/filepersonaquotas?query="name EQ <quota_name> AND fpg EQ <fpg_name>"`
- To query Quotas with quota name, use the following URI:
`https://<storage_system>:8080/api/v1/filepersonaquotas?query="name EQ <quota_name>"`
- To query Quotas with id, use the following URI:
`https://<storage_system>:8080/api/v1/filepersonaquotas?query="id EQ <id>"`
- To query Quotas with VFS name, use the following URI:
`https://<storage_system>:8080/api/v1/filepersonaquotas?query="vfs EQ <vfs_name>"`
- To query Quotas with quota name and type:
`https://<storage_system>:8080/api/v1/filepersonaquotas?query="name EQ <quota_name> AND type EQ <quota_type>"`
- To query Quotas with FPG name, using the following URI:

```
https://<storage_system>:8080/api/v1/filepersonaquotas?query="fpg EQ  
<fpg_name>"
```

Success

A successful query returns the HTTP code 200 OK, and a response message body with JSON objects as described in the following table:

Table 170: Response message body for querying file person quotas using filters

Member	JSON type	API type	Description
total	number	int32	Total number of quota objects returned; total number of objects in the collection.
members	array of objects	See, File Persona Quota properties object	File persona quota properties returned as an array of zero or more JSON objects.

Table 171: File Persona Quota properties object

Member	JSON type	API type	Description
name	string	print255	Quota name, depending on type: <ul style="list-style-type: none">Type 1 – File Service username.Type 2 – File Services Group name.Type 3 – File Store name.
id	string	print255	Quota ID.
key	number	uint64	Quota key, depending on type: <ul style="list-style-type: none">Type 1 – File Service user ID.Type 2 – File Services Group ID.Type 3 – File Store ID.
type	number	See, QuotaType enumeration	Type of Quota created.
fpg	string	name21	The name of FPG.
overallState	number	See, State enumeration	Over all state of Quota

Table Continued

Member	JSON type	API type	Description
<code>vfs</code>	string	name255	Name of the VFS on which the quota was created.
<code>currentFileLimit</code>	number	uint32	Specifies the current limit for the number of stored file.
<code>softFileLimit</code>	number	uint32	Specifies the soft limit for the number of stored file.
<code>hardFileLimit</code>	number	uint32	Specifies the hard limit for the number of stored file.
<code>graceFileLimitInSec</code>	number	uint64	<p>Specifies the remaining grace time (in seconds) after a <code>hardFileLimit</code> breach:</p> <ul style="list-style-type: none"> • 0 = none • -1 = reached • >0 = the grace block in seconds, computed based on the <p><code>graceFileLimitInSec</code> setting for the VFS.</p>
<code>currentBlockMiB</code>	number	uint32	Specifies an integer value in MB for the current capacity storage quota.
<code>softBlockMiB</code>	number	uint32	Specifies an integer value in MB for the soft capacity storage quota.
<code>hardBlockMiB</code>	number	uint32	Specifies an integer value in MB for the hard capacity storage quota.

Table Continued

Member	JSON type	API type	Description
graceBlockInSec	number	uint64	<p>Specifies the remaining grace time (in seconds) after a hardBlockMiB breach:</p> <ul style="list-style-type: none"> • 0 = none • -1 = reached • >0 = the grace block in seconds, computed based on the <code>blockGraceTimeSec</code> setting for the VFS.
links	array of URI links	array of URI links	<p>Links include:</p> <ul style="list-style-type: none"> • Self URI: <code>v1/filepersonaquotas/<quota_id></code> • URI for FPG: <code>v1/fpgs?query="name EQ <fpg>"</code> • URI for VFS: <code>v1/virtualfileserve rs?query="name EQ <vfs name> AND fpg EQ <fpg>"</code> • URI for FileStore: <code>v1/filestores?query=\"name EQ <fstore> AND fpg EQ <fpg>AND vfs EQ <vfs>\"</code>

Table 172: QuotaType enumeration

Symbol	Value	Description
user	1	user quota type.
group	2	group quota type.
fstore	3	fstore quota type.

Errors

See, [Queries using filters error codes](#).

Archiving a File Persona quota

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/filepersonaquotas/`

The request message body is a JSON object with two members, as described in the following table:

Table 173: Request message body JSON object for File Persona quota archive

Member	JSON Type	API Type	Ignored values	Description
action	number	QUOTA_ARCHIVE (See, quotaArchiveRest ore enumeration)	None. Required field.	The action to be performed on the VFS quotas.
parameters	object	See, quotaArchivePara meter object	None. Required field.	The UUID of the VFS that contains the quotas to be archived.

Table 174: quotaArchiveParameter object

Member	JSON Type	API Type	Ignored values	Description
quotaArchivePar ameter	string	UUID string	None. Required field.	VFS UUID

Success

A successful quota archive returns HTTP code 200 OK with an empty Location header. Unless an error occurs, the response message body includes a JSON object as defined in the following table.

Table 175: Response message body JSON objects for File Persona quota archive

Member	JSON Type	API Type	Description
links	Array of links.	Array of URL links	Links include the URL query for File Persona quota: /api/v1/ filepersonaquotas ? query="fpg EQ fpg1 AND vfs EQ vfs1"
archivedPath	string	name255	The path to the file where the file persona quotas are archived.

Errors

Table 176: Archive quota query error codes

API Error	HTTP Code	Description
NON_EXISTENT_VFS	404 Not Found	Specified VFS does not exist.

Restoring a File Persona quota

Use the HTTP POST method on the following URI:

`https://<storage_system>:8080/api/v1/filepersonaquotas/`

The message body is a JSON object with two members, as described in the following table:

Table 177: Message body JSON object for File Persona quota restore

Member	JSON type	API type	Ignored values	Description
action	number	See, <u>quotaArchiveRestore enumeration</u>	None. Required field.	Specifies the action to be performed on the VFS quotas. Use QUOTA_RESTORE.
parameters	object	See, <u>quotaRestoreParameter objects</u>	None. Required field.	Restore parameter for File Persona quota.

Table 178: quotaArchiveRestore enumeration

Symbol	Value	Description
QUOTA_ARCHIVE	1	Archives the File Persona Quota for the specified VFS.
QUOTA_RESTORE	2	Restores the File Persona Quota for the specified VFS.

Table 179: quotaRestoreParameter objects

Member	JSON Type	API Type	Ignored values	Description
vfsUUID	string	UUID string	None. Required field.	VFS UUID
archivedPath	string	name255	None.	The path to the archived file from which the file persona quotas are to be restored.

Success

A successful quota restore returns the HTTP code 200 OK with an empty response body. Unless an error occurs, the location header includes the query string needed to query for the File Persona quota:

```
/api/v1/filepersonaquotas?query="fpg EQ fpg1 AND vfs EQ vfs1"
```

Errors

Table 180: Restore quota query error codes

API Error	HTTP Code	Description
NON_EXISTENT_VFS	404 Not Found	Specified VFS does not exist.

Host management

Use any of the following methods to manage hosts:

- [Creating a host](#)
- [Modifying a host](#)
- [Removing a host](#)
- [Querying hosts](#)

Creating a host

❗ **IMPORTANT:** Any user with Super or Edit role, or any role granted `host_create` permission, can perform this operation. Requires access to all domains.

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/hosts`

The request message body returns JSON objects, as described in the following table. Creating a host requires a hostname. Other members are optional.

Table 181: Request message body JSON objects for host creation

Member	JSON type	API type	Mandatory	Ignored Values	Description
<code>descriptors</code>	object	descriptors objects	No	Null	(WSAPI 1.2 and later)
<code>domain</code>	string	name31	No	Null	Create the host in the specified domain, or in the default domain, if unspecified. (WSAPI 1.2 and later)
<code>FCWWNs</code>	array of string	WWN	No	Null	Set one or more WWNs for the host. (WSAPI 1.2 and later)
<code>forceTearDown</code>	boolean	boolean	No	None	If set to <code>true</code> , forces tear down of low-priority VLUN exports. (WSAPI 1.2 and later)
<code>iSCSINames</code>	array of string	name223	No	Null	Set one or more iSCSI names for the host. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Mandatory	Ignored Values	Description
name	string	name31	Yes	Null (Required)	Specifies the host name. Required for creating a host. (WSAPI 1.2 and later)
persona	number	<u>hostPersona enumeration</u>	No	Zero and negative values	ID of the persona to assign to the host. Uses the default persona unless you specify the host persona. 3PAR OS 3.1.3 and later use the default persona <code>Generic-ALUA</code> . OS 3.1.2 and earlier, uses the default persona <code>General</code> . (WSAPI 1.2 and later)
port	array of <code>portpos</code> objects	<u>portPos objects</u>	No	Null	Specifies the desired relationship between the array ports and the host for target-driven zoning. Use this option when the Smart SAN license is installed only. Specify at least one FCWWN. (WSAPI 1.6.3 and later)

Success

A successful host creation returns the HTTP code 201 `Created`. The Location portion of the response header contains the URI for the newly created host in the following format:

```
/api/v1/hosts/<host_name>
```

With `port` option specified, the response body includes links to the newly created resources as shown in following table:

Member	JSON type	API type	Description
links	array of links	array of URL links	Links include the URI to the newly created target driven zones in the following format: /v1/portdevices/ targetdrivenzones/ <n:s:p>

Host creation example

URI:

```
https://<Storage Server>:8080/api/v1/hosts
```

Post:

```
{"name":"apitesthost","persona":5}
```

Response:

```
HTTP/1.1 201 Created  
with the Location header:  
/api/v1/hosts/apitesthost
```

Errors

Table 182: Host creation error codes

API Error	HTTP Code	Description
EXISTENT_HOST	409 Conflict	Host name is already used. (WSAPI 1.2 and later)
EXISTENT_PATH	409 Conflict	iSCSI name or WWN is already claimed by other host. (WSAPI 1.2 and later)
INV_INPUT_EMPTY_STR	400 Bad Request	Input string (for domain name, iSCSI name, etc.) is empty. (WSAPI 1.2 and later)
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	Host name, domain name, or iSCSI name is too long. (WSAPI 1.2 and later)
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Any error from host-name or domain-name parsing. (WSAPI 1.2 and later)

Table Continued

API Error	HTTP Code	Description
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Name not specified. (WSAPI 1.2 and later)
INV_INPUT_PARAM_CONFLICT	400 Bad Request	Specified both iSCSI names and FCWWNs. (WSAPI 1.2 and later)
INV_INPUT_TOO_MANY_WWN_OR_iSCSI	400 Bad Request	More than 1024 WWNs or iSCSI names are specified. (WSAPI 1.2 and later)
INV_INPUT_WRONG_TYPE	400 Bad Request	The length of WWN is not 16. WWN specification contains non-hexadecimal digit. (WSAPI 1.2 and later)
NO_SPACE	400 Bad Request	No space to create host.
INVALID_PORT_CONFIG	400 Bad Request	Port is not configured for target driven zoning. (WSAPI 1.6.3 and later)
NON_EXISTENT_PORT	404 Not Found	Port does not exist. (WSAPI 1.6.3 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Add or remove a host WWN from target-driven zoning

- ❗ **IMPORTANT:** Any user with Super or Edit role, or any role granted `host_create` permission, can perform this operation. Requires access to all domains.

Use the HTTP POST method with the following URI:

https://<storage_system>:8080/api/v1/hosts/<host_name>

The request message body uses JSON objects, as described in the following table.

Table 183: Request message body JSON objects for adding a host WWN to target-driven zoning

Member	JSON type	API type	Mandatory	Ignored Values	Description
<code>action</code>	number	<u>hostWWNAction enumeration</u>	No	Null	Specifies action to be performed.
<code>parameters</code>	object	<u>hostWWNParameter</u>	No	Null	Specifies the parameter to perform the host WWN zoning action

Table 184: hostWWNAction enumeration

Symbol	Value	Description
<code>ADD_WWN_TO_HOST</code>	1	Recommended method for adding WWN to host. Functions the same as using a <code>PUT</code> method with the <code>pathOperation</code> specified as <code>ADD</code> . (WSAPI 1.6.3 and later.)
<code>REMOVE_WWN_FROM_HOST</code>	2	Recommended method for removing WWN from host. Functions the same as using the <code>PUT</code> method with the <code>pathOperation</code> specified as <code>REMOVE</code> . (WSAPI 1.6.3 and later.)
<code>ADD_WWN_TO_TZONE</code>	3	Adds WWN to target driven zone. Creates the target driven zone if it does not exist, and adds the WWN to the host if it does not exist.
<code>REMOVE_WWN_FROM_TZONE</code>	4	Removes WWN from the target-zone. Removes the target driven zone unless it is the last WWN. Does not remove the last WWN from the host.

Table 185: hostWWNParam

Member	JSON type	API type	Mandatory	Ignored Values	Description
FCWWNs	array of string	WWN	Yes	None	One or more WWNs of the host.
port	array of portPOS objects	<u>portPos</u> <u>objects</u>	No	None	<p>Specifies the ports for target-driven zoning.</p> <p>Use this option only when the Smart SAN license is installed.</p> <p>This field is NOT supported for the following actions: ADD_WWN_TO_HOST REMOVE_WWN_FROM_HOST,</p> <p>It is a required field for the following actions: ADD_WWN_TO_TZONE REMOVE_WWN_FROM_TZONE.</p>

Success

A successful custom action returns the HTTP code 200 Okay. A custom action of ADD_WWN_TO_TZONE also includes a link to the target driven zones affected for each port in the port array.

Both REMOVE_WWN_FROM_HOST and ADD_WWN_TO_HOST actions return an empty response body.

Member	JSON type	API type	Description
links	array of links	array of URL links	<p>Links include the URI to the newly created target driven zones in the following format:</p> <pre>/v1/portdevices/ targetdrivenzones/ <n:s:p></pre>

Errors

Table 186: WWN tzone error codes

API Error	HTTP Code	Description
INVALID_PORT_CONFIG	400 Bad Request	Port is not configured for target driven zoning.
NON_EXISTENT_PORT	404 Not Found	Port does not exist.
NON_EXISTENT_HOST	404 Not Found	Host does not exist.

Modifying a host

- ❗ **IMPORTANT:** Any user with Super or Edit role, or any role granted `host_set` permission, can perform this operation. Requires access to all domains.

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/hosts/<host_name>`

Table 187: Request message body JSON objects for host modification

Member	JSON type	API type	Ignored Values	Description
chapName	string	name223	Null	The chap name. (WSAPI 1.2 and later)
chapOperationMode	number	<u>chapOperationMode enumeration</u>	Zero and negative values	Initiator or target. (WSAPI 1.2 and later)
chapRemoveTargetOnly	boolean	boolean	None	If <code>true</code> , then remove target chap only. (WSAPI 1.2 and later)
chapSecret	string	string	Null	The chap secret for the host or the target (WSAPI 1.2 and later)
chapSecretHex	boolean	boolean	None	If <code>true</code> , then <code>chapSecret</code> is treated as Hex. (WSAPI 1.2 and later)
chapOperation	number	<u>hostEditOperation enumeration</u>	Zero and negative values	Add or remove. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Ignored Values	Description
descriptors	HostDescriptors	<u>descriptors JSON objects</u>	Null	The description of the host. (WSAPI 1.2 and later)
FCWWNs	array of string	WWN	Null	One or more WWN to set for the host. (WSAPI 1.2 and later)
forcePathRemoval	boolean	boolean	None	If <code>true</code> , remove WWN(s) or iSCSI(s) even if there are VLUNs that are exported to the host. (WSAPI 1.2 and later)
iSCSINames	array of string	Name223	Null	One or more iSCSI names to set for the host. (WSAPI 1.2 and later)
newName	string	name31	Null	New name of the host (WSAPI 1.2 and later)
pathOperation	number	<u>hostEditOperation enumeration</u>	Zero and negative values	If adding, adds the WWN or iSCSI name to the existing host. If removing, removes the WWN or iSCSI names from the existing host. (WSAPI 1.2 and later)
persona	number	<u>hostPersona enumeration</u>	Zero and negative values	The ID of the persona to modify the host's persona to. (WSAPI 1.2 and later)

Table 188: hostEditOperation enumeration

Symbol	Value	Description
ADD	1	Add host chap or path. (WSAPI 1.2 and later)
REMOVE	2	Remove host chap or path. (WSAPI 1.2 and later)

Table 189: chapOperationMode enumeration

Symbol	Value	Description
INITIATOR	1	Set the initiator CHAP authentication information on the host. (WSAPI 1.2 and later)
TARGET	2	Set the target CHAP authentication information on the host. (WSAPI 1.2 and later)

Table 190: hostPersona enumeration

Symbol	Value
GENERIC	1
GENERIC_ALUA	2
GENERIC_LEGACY	3
HPUX_LEGACY	4
AIX_LEGACY	5
EGENERA	6
ONTAP_LEGACY	7
VMWARE	8
OPENVMS	9
HPUX	10
WindowsServer	11
AIX_ALUA	12

Success

A successful host modification returns the HTTP code 200 OK with no response message body. The `Location` portion of the response header contains the URI of the updated host, as follows:

```
/api/v1/hosts/<host_name>
```

For details about persona capabilities, see the *HPE 3PAR Command Line Interface Administrator's Guide*, available from the [HPE Storage Information Library](#).

Errors

Table 191: Host modification error codes

API Error	HTTP Code	Description
INV_INPUT	400 Bad Request	Missing host name.
INV_INPUT_PARAM_CONFLICT	400 Bad Request	<p>If <code>pathOperation</code> is specified, then the following descriptors cannot be specified:</p> <ul style="list-style-type: none"><code>newName</code><code>persona</code><code>chapOperation</code> <p>If <code>chapOperation</code> is specified, then the following descriptors cannot be specified:</p> <ul style="list-style-type: none"><code>newName</code><code>persona</code><code>pathOperation</code> <p><code>forcePathRemoval</code> is specified and <code>pathOperation</code> is <code>Add</code>.</p> <p>The <code>forcePathRemoval</code> operation can be used only with path removal.</p> <p>Both <code>iSCSINames</code> and <code>FCWWNs</code> are specified.</p> <p>The system can handle either FC WWN or iSCSI names in one operation, but not both. (Multiple FC WWN or iSCSI names can be specified.)</p> <p><code>chapOperation</code> is <code>Add</code>, and <code>chapRemoveTargetOnly</code> is specified.</p> <p><code>chapRemoveTargetOnly</code> is for chap removal only.</p> <p><code>chapOperation</code> is <code>remove</code>, and <code>chapSecret</code>, <code>chapOperationMode</code>, <code>chapName</code>, or <code>chapSecretHex</code> is specified.</p> <p><code>chapSecret</code>, <code>chapOperationMode</code>, <code>chapName</code>, or <code>chapSecretHex</code> are for chap addition (not removal).</p>

Table Continued

API Error	HTTP Code	Description
INV_INPUT_ONE_REQUIRED	400 Bad Request	<p><code>pathOperation</code> is specified and no <code>FCWWNs</code> or <code>iSCSINames</code> is specified.</p> <p>At least one WWN or iSCSI name should be specified.</p> <hr/> <p>Either <code>FCWWNs</code> or <code>iSCSINames</code> is specified and no <code>pathOperation</code> is specified.</p> <p>If <code>pathOperation</code> is not specified, then the system does not know whether to add or remove the specified path.</p> <hr/> <p><code>forcePathRemoval</code> is specified and <code>pathOperation</code> is not specified or null.</p> <p><code>forcePathRemoval</code> can be used only with path removal.</p> <hr/> <p>None of the following is specified:</p> <ul style="list-style-type: none"> <code>pathOperation</code> <code>newName</code> <code>descriptor</code> <code>chapOperation</code> <p>At least one operation for the host update should be specified.</p>
INV_INPUT_BAD_ENUM_VALUE	400 Bad Request	<p>Invalid <code>enum</code> value.</p> <p>The persona is not specified by a valid persona number.</p>
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Required fields are missing.
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	Host descriptor argument length, new host name, or iSCSI name is too long.
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Any error from host or iSCSI name parsing.
EXISTENT_HOST	409 Conflict	New host name is already used.
NON_EXISTENT_HOST	404 Not Found	Host to be modified does not exist.
INV_INPUT_TOO_MANY_WWN_OR_iSCSI	400 Bad Request	More than 1024 WWNs or iSCSI names are specified.

Table Continued

API Error	HTTP Code	Description
INV_INPUT_WRONG_TYPE	400 Bad Request	Input value is of the wrong type.
EXISTENT_PATH	409 Conflict	WWN name or iSCSI name is already claimed by other host.
INV_INPUT_BAD_LENGTH	400 Bad Request	CHAP hex secret length is not 16 bytes, or chap ASCII secret length is not 12–16 characters.
NO_INITIATOR_CHAP	404 Not Found	Setting target CHAP without initiator CHAP.
NON_EXISTENT_CHAP	404 Not Found	Remove non-existing CHAP.
NON_UNIQUE_CHAP_SECRET	409 Conflict	CHAP secret is not unique.
EXPORTED_VLUN	409 Conflict	Setting persona with active export. Remove a host path on an active export.
NON_EXISTENT_PATH	404 Not Found	Removing a non-existent path.
LUN_HOSTPERSONA_CONFLICT	409 Conflict	LUN number and persona capability conflict.
INV_INPUT_DUP_PATH	400 Bad Request	Duplicate path specified.

More information

[WSAPI error codes and descriptions](#) on page 34

Removing a host

! **IMPORTANT:** Any user with Super or Edit role, or any role granted `host_remove` permission, can perform this operation. Requires access to all domains.

To remove a host, use the HTTP DELETE method with the following URI:

`https://<storage_system>:8080/api/v1/hosts/<host_name>`

Success

A successful host removal returns the HTTP code 200 OK with no message body.

Errors

Table 192: Host removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_HOST	404 Not Found	Host not found.
HOST_IN_SET	409 Conflict	Host is a member of a set. (WSAPI 1.2 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying hosts

Use the following methods to query hosts:

[Querying all hosts](#)

[Querying a single host](#)

[Querying host information with WWN filtering](#)

[Querying a single host persona](#)

[Querying multiple host personas](#)

[Querying persona information using filters](#)

Querying all hosts

Query hosts using the HTTP GET method. Use the following URI with no request message body:

`https://<storage_system>:8080/api/v1/hosts`

Success

See, [Response message body JSON objects for host query](#).

Errors

See, [WSAPI error codes and descriptions](#).

Querying a single host

Use the following URI with no request message body:

`https://<storage_system>:8080/api/v1/hosts/<host_name>`

Success

A successful query returns the HTTP status code 200 OK. Unless an error occurs, the response message body includes a JSON array of zero or more JSON objects, as described in the following table.

Table 193: Response message body JSON objects for host query

Member	JSON type	API type	Description
name	string	name31	Specifies the name of the host. (WSAPI 1.2 and later)
id	number	number	Specifies the ID of the host.
persona	number	<u>hostPersona enumeration</u>	ID of the persona to assigned to the host. (WSAPI 1.2 and later)
links	link	array of links	Link to detailed persona info
FCPaths	array of objects	<u>Host FCPaths JSON objects</u>	A host object query response can include an array of one or more FCPaths objects. (WSAPI 1.2 and later)
iSCSIPaths	array of objects	<u>HostiSCSIPaths JSON objects</u>	A host object query response can include an array of one or more iSCSIPaths objects. (WSAPI 1.2 and later)
domain	string	name31	The domain or associated with this host. (WSAPI 1.2 and later)
descriptors	<u>descriptors objects</u>	<u>descriptors objects</u>	An optional sub-object of the host object for creation and modification. The host object returns the HostDescriptors sub-object following a query. (WSAPI 1.2 and later)
agent	<u>agent objects</u>	<u>agent objects</u>	(WSAPI 1.2 and later)
initiatorChapName	string	name223	Initiator Chap Name (WSAPI 1.2 and later)
initiatorChapEnabled	boolean	boolean	Flag to determine whether or not the chap initiator is enabled. (WSAPI 1.2 and later)
targetChapName	string	name223	Target chap name. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Description
targetChapEnabled	boolean	boolean	Flag to determine whether or not the chap target is enabled. (WSAPI 1.2 and later)
initiatorEncryptedChapSecret	string	name16	Encrypted CHAP secret of initiator. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
targetEncryptedChapSecret	string	name16	Encrypted CHAP secret of target. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Table 194: Host descriptors objects

Member	JSON type	API type	Description
location	string	string	The host's location. (WSAPI 1.2 and later)
IPAddr	string	string	The host's IP address. (WSAPI 1.2 and later)
os	string	string	The operating system running on the host. (WSAPI 1.2 and later)
model	string	string	The host's model. (WSAPI 1.2 and later)
contact	string	string	The host's owner and contact. (WSAPI 1.2 and later)
comment	string	string	Any additional information for the host. (WSAPI 1.2 and later)

Table 195: Host FCPaths objects

Member	JSON type	API type	Description
WWN	string	string	A WWN assigned to the host. (WSAPI 1.2 and later)
portPos	<u>portPos objects</u>	<u>portPos objects</u>	
firmwareVersion	string	string	HBA firmware version. (WSAPI 1.2 and later)
vendor	string	string	HBA vendor. (WSAPI 1.2 and later)
model	string	string	HBA model. (WSAPI 1.2 and later)
driverVersion	string	string	HBA driver version (WSAPI 1.2 and later)
hostSpeed	string	string	HBA host speed (WSAPI 1.2 and later)

Table 196: HostiSCSIPaths objects

Member	JSON type	API type	Description
name	string	string	An iSCSI name to be assigned to the host. (WSAPI 1.2 and later)
portPos	<u>portPos objects</u>	<u>portPos objects</u>	(WSAPI 1.2 and later)
IPAddr	string	string	IP address for Remote Copy. (WSAPI 1.2 and later)
firmwareVersion	string	string	HBA firmware version. (WSAPI 1.2 and later)
vendor	string	string	HBA vendor. (WSAPI 1.2 and later)
model	string	string	HBA model. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Description
driverVersion	string	string	HBA driver version (WSAPI 1.2 and later)
hostSpeed	string	string	HBA host speed. (WSAPI 1.2 and later)

Table 197: portPos objects

Member	JSON type	API type	Description
node	number	igint32 (0 – 7)	System node.
slot	number	igint32 (0–5)	PCI bus slot in the node.
cardPort	number	igint32 (0–4)	Port number on the FC card.

Table 198: agent objects

Member	JSON type	API type	Description
reportedName	string	name255	The host name reported by the agent. (WSAPI 1.2 and later)
IPAddr	string	name255	The host agent IP address. (WSAPI 1.2 and later)
architecture		name255	The architecture description of the host agent. (WSAPI 1.2 and later)
os	string	name255	Operating system of the host agent. (WSAPI 1.2 and later)
osVersion	string	name255	The operating system version of the host agent. (WSAPI 1.2 and later)
osPatch	string	name255	The operating system patch level of host agent. (WSAPI 1.2 and later)
multiPathSoftware	string	name255	The multipathing software in use by the host agent. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Description
multiPathSoftwareVersion	string	name255	The multipathing software version. (WSAPI 1.2 and later)
clusterName	string	name255	Name of the host cluster of which the host is a member. (WSAPI 1.2 and later)
clusterSoftware	string	name255	Host clustering software in use on host. (WSAPI 1.2 and later)
clusterVersion	string	name255	Version of the host clustering software in use. (WSAPI 1.2 and later)
clusterId	string	name255	Identifier for the cluster. (WSAPI 1.2 and later)
hosted	string	name255	Identifier for the host agent (WSAPI 1.2 and later)

Errors

Table 199: Host query error codes

API Error	HTTP Code	Description
INV_INPUT	400 Bad Request	Invalid URI syntax. (WSAPI 1.2 and later)
NON_EXISTENT_HOST	404 Not Found	Host not found.
INT_SERV_ERR	500 Internal Server Error	Internal server error.
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Host name contains invalid character.

More information

[WSAPI error codes and descriptions](#) on page 34

Querying host information with WWN filtering

To query a host with a given WWN or iSCSI name, use the HTTP GET method and specify the `FCPaths` WWN or the `iSCSIPaths` name in the URI.

For example:

```
https://<storage_system>:8080/api/v1/hosts?query=" FCPaths[wwn EQ 5001438024226EAE OR
wwn EQ 20010002AC000999 OR
wwn EQ 100000000C98C4D95] OR
```

```
iSCSIPaths[name EQ ign.1991-05.com.microsoft:fakeISCSIHost1 OR
name EQ ign.1991-05.com.microsoft:fakeISCSIHost2 OR
name EQ ign.1991-05.com.microsoft:fakeISCSIHost3 OR
name EQ ign.1991-05.com.microsoft:fakeISCSIHost4 OR
name EQ ign.1991-05.com.microsoft:fakeISCSIHost5] "
```

Success

A successful query filtering operation returns a message body JSON object as described in the following table.

Table 200: Message body JSON objects for host query with a WWN filtering

Member	JSON type	API type	Description
total	number	int32	Number of host objects returned. If the host record matching the WWN is found, the number of hosts will be 1; otherwise, it will be 0. (WSAPI 1.3 and later)
members	array of objects	See, Response message body JSON objects for host query	Storage host properties. Returns an array of size 1 if it finds a host matching the WWN; otherwise, returns an empty array. (WSAPI 1.3 and later)

Errors

See, [Queries using filters error codes](#).

Querying a single host persona

To query a single host persona, use the HTTP GET method on the following URI and no message body:

`https://<storage_system>:8080/api/vi/hostpersonas/<id>`

The `<id>` parameter is the host persona id you want to query.

Success

A successful query returns the HTTP status code 200 OK.

The body of the response includes a JSON object as described in [JSON objects for host persona queries](#).

Errors

Table 201: Single host persona query error codes

API Error	HTTP Code	Description
NON_EXISTENT_PERSONA	404 Not found	Persona does not exist

Querying multiple host personas

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/hostpersonas`

Success

A successful query returns the HTTP status code 200 OK.

The body of the response includes an object as described in the following table:

Table 202: Message body objects for host persona query

Member	JSON type	API type	Description
total	number	int32	Total number of host personas
members	Array of objects	<u>JSON objects for host persona queries</u>	Host persona objects
links	Array of URL links	Array of URL links	Links include the self URL

As is the case with all collection queries, the total object is the number of objects in the collection. The members object is a JSON array of zero or more JSON objects as listed in the following table:

Table 203: JSON objects for host persona queries

Member	JSON type	API type	Description
id	number	uint32	Persona Id.
name	string	string	Persona name.
wsapiAssignedId	number	uint32	Persona ID assigned by WSAPI.
OS	string	Array of string	List of supported operating systems.
capabilities	string	Array of string	List of capabilities.
links	Array of URL links	Array of URL links	Link to the persona single instance URI.

Errors

Table 204: Host persona query error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error.

Querying persona information using filters

- To filter by `wsapiAssignedId` use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/hostpersonas?query="wsapiAssignedId EQ  
<wsapiAssignedId>"
```

- Use the OR operator to filter requests for multiple `wsapiAssignedId`:

```
https://<storage_system>:8080/api/v1/hostpersonas?query="wsapiAssignedId EQ  
<wsapiAssignedId1> OR wsapiAssignedId EQ <wsapiAssignedId2>"
```

- To query the host personas with `wsapiAssignedId` 1 or 2, use HTTP GET with the following URI:

```
https://<storage_system>:8080/api/v1/hostpersonasnl?query="wsapiAssignedId EQ  
1 OR wsapiAssignedId EQ 2"
```

Success

A successful query returns the HTTP status code 200 OK, and a message body containing JSON object members as defined in **JSON objects for host persona queries**.

If the filtering does not match any host persona, the system returns zero for the total and an empty array for members.

Errors

See, **Queries using filters error codes**.

Host sets and virtual volume sets

Use the following methods to manage sets for volumes and hosts:

- Creating a host set or VV set
- Modifying a host set or VV set
- Removing a host set or VV set
- Querying all host sets or VV sets
- Querying single host sets or single VV sets
- Exporting a VLUN from a VV set
- Setting and querying Flash Cache policy for a VV set.

For information about exporting a VLUN to a host set, see [Creating a VLUN](#).

For information about creating, querying, and removing Flash Cache, see [Flash Cache](#).

For information about setting and querying Flash Cache policy for the entire system, see [Setting Flash Cache policy](#).

Creating a host set or VV set

! **IMPORTANT:** Any user with the Super or Edit role can create a host set or VV set. Any role granted `hostset_set` permission can add hosts to a host set. Any role granted `vvset_set` permission can add volumes to a VV set.

- To create a host set, use the HTTP POST method with the following URI and a message body as described in
`https://<storage_system>:8080/api/v1/hostsets/`
- To create a VV set, use the HTTP POST method with the following URI, and message body parameters as described in
`https://<storage_system>:8080/api/v1/volumesets/`

Table 205: Message body JSON objects for host-set and VV-set creation

Member	JSON type	API type	Mandatory	Ignored Values	Description
name	string	name27	Yes	None. Required field.	Name of the VV set or host set to be created.
comment	string	print255	No	Null, empty string	Comment for the VV set or host set.

Table Continued

Member	JSON type	API type	Mandatory	Ignored Values	Description
domain	string	name31	No	Null, empty string	The domain in which the VV set or host set will be created.
setmembers	array of string	array of string	No	Null	The virtual volume or host to be added to the set. The existence of the volume or will not be checked.

You can add hosts to a host set, or volumes to a VV set using a glob-style pattern. A glob-style pattern is not supported when removing hosts or volumes from sets. For additional information about glob-style patterns, see “Glob-Style Patterns” in the *HPE 3PAR Command Line Interface Reference*.

More information

[Creating a VV-set snapshot on page 296](#)
<http://www.hpe.com/info/storage/docs/>

Success

A successful creation of the host set returns the HTTP status code `HTTP_CREATED`. The `Location` portion of the response header contains the URI for the newly created host in the following format:

```
api/v1/hostsets/<host_set_name>
```

A successful creation of the VV set returns the HTTP status code `HTTP_CREATED`. The `Location` portion of the response header contains the URI for the newly created VV set in the following format:

```
api/v1/volumesets/<volume_set_name>
```

Errors

Table 206: Host-set or VV-set creation error codes

API Error	HTTP Code	Description
EXISTENT_SET	400 Bad Request	The set already exists. (WSAPI 1.3 and later)
NON_EXISTENT_DOMAIN	404 Not Found	The domain does not exist. (WSAPI 1.3 and later)
MEMBER_IN_DOMAINSET	409 Conflict	The host is in a domain set. (WSAPI 1.3 and later)

Table Continued

API Error	HTTP Code	Description
MEMBER_IN_SET	409 Conflict	The object is already part of the set. (WSAPI 1.3 and later)
MEMBER_NOT_IN_SAME_DOMAIN	409 Conflict	Objects must be in the same domain to perform the operation. (WSAPI 1.3 and later)
INV_INPUT_DUP_NAME	400 Bad Request	Invalid input (duplicate name).
VV_IN_INCONSISTENT_STATE	403 Forbidden	The volume has an internal inconsistency error. (WSAPI 1.3 and later)
VV_IS_BEING_REMOVED	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
NON_EXISTENT_VOL	404 Not Found	The volume does not exist.
NON_EXISTENT_HOST	404 Not Found	The host does not exist.
INV_OPERATION_VV_SYS_VOLUME	403 Forbidden	The operation is not allowed on a system volume.
INV_OPERATION_VV_INTERNAL_VOLUME	403 Forbidden	The operation is not allowed on an internal volume.

More information

[WSAPI error codes and descriptions](#) on page 34

Modifying a host set or VV set

- ❗ **IMPORTANT:** Any user with the Super or Edit role can modify a host set or VV set. Any role granted `hostset_set` permission can add a host to the host set or remove a host from the host set. Any role granted `vvset_set` permission can add volumes to the VV set or remove volumes from the VV set.

Use one of the following methods and include a request message body as defined in **Request message body JSON objects for modifying a host set or VV set**.

- To modify a host set, use the HTTP PUT method with the following URI:
`https://<storage_system>:8080/api/v1/hostsets/<host_set_name>`
- To modify a VV set, use the HTTP PUT method in the following URI:
`https://<storage_system>:8080/api/v1/volumesets/<volume_set_name>`

Table 207: Request message body JSON objects for modifying a host set or VV set

Member	JSON type	API type	Ignored Values	Description
action	number	<u>Action enumeration</u>	Zero and negative values.	Add or remove.
newName	string	Name27	Null	New name of the set.
comment	string	name255	Null	New comment for the VV set or host set. To remove the comment, use "".
setmembers	array of string	array of string	Null	The volume or host to be added to or removed from the set.
priority	number	TaskPriorityEnum	Zero and negative values. The default is 2, medium. This applies only if the action is 3 (resynchronize the physical copy).	1: high 2: medium 3: low

You can add hosts to a host set, or volumes to a VV set, using a glob-style pattern. A glob-style pattern is not supported when removing hosts or volumes from sets.

For additional information about glob-style patterns, see “Glob-Style Patterns” in the *HPE 3PAR Command Line Interface Reference*, available from the [HPE Storage Information Library](#).

Success

A successful modification of a host set or VV set returns the HTTP code 200 OK with no message body.

The response header contains the URI of the updated host as follows:

```
/api/v1/hostsets/<host_set_name>
```

```
/api/v1/volumesets/<volume_set_name>
```

Errors

Table 208: Host-set or VV-set modification error codes

API Error	HTTP Code	Description
EXISTENT_SET	400 Bad Request	The set already exists. (WSAPI 1.3 and later)
NON_EXISTENT_SET	404 Not Found	The set does not exist. (WSAPI 1.3 and later)
MEMBER_IN_DOMAINSET	409 Conflict	The host is in a domain set. (WSAPI 1.3 and later)
MEMBER_IN_SET	409 Conflict	The object is already part of the set. (WSAPI 1.3 and later)
MEMBER_NOT_IN_SET	404 Not Found	The object is not part of the set. (WSAPI 1.3 and later)
MEMBER_NOT_IN_SAME_DOMAIN	409 Conflict	Objects must be in the same domain to perform the operation. (WSAPI 1.3 and later)
VV_IN_INCONSISTENT_STATE	403 Forbidden	The volume has an internal inconsistency error. (WSAPI 1.3 and later)
VV_IS_BEING_REMOVED	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
NON_EXISTENT_VOL	404 Not Found	The volume does not exist.
INV_OPERATION_VV_SYS_VOLUME	403 Forbidden	The operation is not allowed on a system volume.
INV_OPERATION_VV_INTERNAL_VOLUME	403 Forbidden	The operation is not allowed on an internal volume.
INV_INPUT_DUP_NAME	400 Bad Request	Invalid input (duplicate name).
INV_INPUT_PARAM_CONFLICT	400 Bad Request	Invalid input (parameters cannot be present at the same time).
LUN_ID_CONFLICT	400 Bad Request	LUN ID conflict.

More information

[WSAPI error codes and descriptions](#) on page 34

[Errors](#) on page 300

Removing a host set or VV set

Any user with Super or Edit role can perform this operation.

- To remove a host set , use the HTTP DELETE method with the following URI, and no message body:
`https://<storage_system>:8080/api/v1/hostsets/<host_set_name>`
- To remove a VV set , use the HTTP DELETE method with the following URI, and no message body:
`https://<storage_system>:8080/api/v1/volumesets/<volume_set_name>`

Success

A successful removal returns the HTTP code 200 OK with no message body.

Errors

A glob-style pattern is not supported when removing hosts or volumes from sets. If you attempt to remove hosts or volumes from sets using a glob-style pattern, the `INV_INPUT_ILLEGAL_CHAR` error code (400 Bad Request) is returned.

For additional information about glob-style patterns, see *HPE 3PAR Command Line Interface Reference*, available from the HPE Storage Information Library.

Table 209: Host-set or VV-set removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_SET	404 Not Found	The set does not exist. (WSAPI 1.3 and later)
EXPORTED_VLUN	409 Conflict	The host set has exported VLUNs. The VV set was exported. (WSAPI 1.3 and later)
VVSET_QOS_TARGET	409 Conflict	The VV set is the target of a QoS rule. (WSAPI 1.3 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

<http://www.hpe.com/info/storage/docs/>

Setting and querying a VV-set Flash Cache policy

Use the HTTP PUT method with the following URI, and a message body as described in [Message body JSON objects for Flash Cache policy](#).

`https://<storage_system>:8080/api/v1/volumesets/<volumesetname>`

You can get VV-set Flash Cache policy information by querying a VV-set. See [Querying all host sets or all VV sets](#).

Success

A successful policy setting returns the HTTP code 200 OK with no message body. Unless an error occurs, the response contains a message body JSON object as described in the following table:

Table 210: Message body JSON objects for Flash Cache policy

Member	JSON type	API type	Description
flashCachePolicy	number	flashCachePolicyEnum (see, flashCachePolicyEnum values)	(WSAPI 1.4.2 and later with 3PAR OS 3.2.1 MU2)

Table 211: flashCachePolicyEnum values

Symbol	Value	Description
Enable	1	(WSAPI 1.4.2 and later with 3PAR OS 3.2.1 MU2)
Disable	2	(WSAPI 1.4.2 and later with 3PAR OS 3.2.1 MU2)

Errors

Table 212: Flash Cache policy setting error codes

API Error	HTTP Status Code	Description
NON_EXISTENT_SET	404 Not Found	The VV set does not exist.
INV_INPUT_EXCEEDS_LENGTH	413 Request Entity Too Large	Invalid input: string length exceeds limit.
NON_EXISTENT_FLASH_CACHE	404 Not Found	The Flash Cache does not exist. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying all host sets or all VV sets

- To query information about all host sets, use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/hostsets`

- To query information about all VV sets, use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/volumesets`

Success

Unless an error occurs, the response is a message body with members as described in the following table.

Table 213: Message body for all-host-set or all-VV-set query response

Member	JSON type	API type	Description
<code>total</code>	number	int32	Number of set objects returned.
<code>members</code>	array of objects	<u>SetObjectProperty array</u>	A JSON array of zero or more JSON objects, one array for each set on the system.

Table 214: SetObjectProperty array

Member	JSON type	API type	Description
<code>name</code>	string	name27	Name of the set.
<code>uuid</code>	string	uuid string	UUID of the set.
<code>id</code>	number	int32	Set identifier.
<code>domain</code>	string	name31	Set domain.
<code>comment</code>	string	print255	Comment for the set.
<code>setmembers</code>	array of string	array of name31	The members of the set.
<code>flashCachePolicy</code>	number	<u>flashCachePolicyEnum values</u>	The <code>flashCachePolicy</code> member is valid for volumes sets only. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
<code>qosEnabled</code>	boolean	boolean	The vvset QOS rule is enabled (<code>true</code>) or disabled (<code>false</code>)
<code>count</code>	number	int32	Total count of set members.
<code>vvolStorageContainerEnabled</code>	boolean	boolean	The virtual volume set vvol storage container is enabled (<code>true</code>) or disabled (<code>false</code>). Valid for volume set only.

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Querying a single host set or a single VV set

- To query information about a single host set, use the HTTP GET method with the following URI and no message body:
`https://<storage_system>:8080/api/v1/hostsets/<host_set_name>`
- To query information about a single VV set, use the HTTP GET method with the following URI, without a message body:
`https://<storage_system>:8080/api/v1/volumesets/<volume_set_name>`

Success

Unless an internal server error occurs, a single-instance query returns a `SetObjectProperty` array, with members as described in [Message body response JSON objects for SetObjectProperty array](#).

Errors

Table 215: Host-set or VV set removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_SET	404 Not Found	The set does not exists. (WSAPI 1.3 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying all host sets or all volume sets using filters

Use the following filters to query host or volume sets (WSAPI 1.6 and later):

- `setMembers`
- `id`
- `uuid`

Procedure

1. To query information about a volume set using filters, use the HTTP GET method with the following URI:
`https://<storage_system>:8080/api/v1/volumesets?query="setmembers EQ <vvname1> OR setmembers EQ <vvname2> OR .."`

Use the OR operator to query a volume set using multiple filters:
`https://<storage_system>:8080/api/v1/volumesets?query="setmembers EQ <vvname1> OR setmembers EQ <vvname2> OR id EQ <set_id> OR uuid EQ <set_uuid> OR .."`
2. To query information about a host set using filters, use the HTTP GET method with the following URI:


```
https://<storage_system>:8080/api/v1/hostsets?query="setmembers EQ <hostname1>  
OR setmembers EQ <hostname1> OR id EQ <set_id> OR uuid EQ <set_uuid> OR .."
```

Success

A successful query returns the HTTP code 200 OK, with a response body that includes members as described in **Message body for all-host-set or all-VV-set query response**.

Errors

See, **Queries using filters error codes**.

Ports and switches

Port configuration and enumeration objects

Port operations use the enumeration and configuration objects listed in the following tables.

Host portPos configuration JSON objects lists the Inform API server configuration object `portPos` definitions.

Table 216: portMode enumeration

Symbol	Value	Description
SUSPENDED	1	Target port that has yet to be initialized by the system. (WSAPI 1.2 and later)
TARGET	2	Target port connects to hosts or fabric. (WSAPI 1.2 and later)
INITIATOR	3	Initiator port connects to disks. (WSAPI 1.2 and later)
PEER	4	Peer port is an Ethernet port used for Remote Copy. (WSAPI 1.2 and later)

Table 217: portLinkState enumeration

Symbol	Value	Description
CONFIG_WAIT	1	Configuration wait. (WSAPI 1.2 and later)
ALPA_WAIT	2	ALPA wait. (WSAPI 1.2 and later)
LOGIN_WAIT	3	Login wait. (WSAPI 1.2 and later)
READY	4	Link is ready. (WSAPI 1.2 and later)
LOSS_SYNC	5	Link is loss sync. (WSAPI 1.2 and later)
ERROR_STATE	6	In error state. (WSAPI 1.2 and later)

Table Continued

Symbol	Value	Description
XXX	7	xxx (WSAPI 1.2 and later)
NONPARTICIPATE	8	Link did not participate. (WSAPI 1.2 and later)
COREDUMP	9	Taking coredump. (WSAPI 1.2 and later)
OFFLINE	10	Link is offline. (WSAPI 1.2 and later)
FWDEAD	11	Firmware is dead. (WSAPI 1.2 and later)
IDLE_FOR_RESET	12	Link is idle for reset. (WSAPI 1.2 and later)
DHCP_IN_PROGRESS	13	DHCP is in progress. (WSAPI 1.2 and later)
PENDING_RESET	14	Link reset is pending. (WSAPI 1.2 and later)

Table 218: portConnType enumeration

Symbol	Value	Description
HOST	1	FC port connected to hosts or fabric. (WSAPI 1.2 and later)
DISK	2	FC port connected to disks. (WSAPI 1.2 and later)
FREE	3	Port is not connected to hosts or disks. (WSAPI 1.2 and later)
IPORT	4	Port is in iport mode. (WSAPI 1.2 and later)
RCFC	5	FC port used for Remote Copy. (WSAPI 1.2 and later)

Table Continued

Symbol	Value	Description
PEER	6	FC port used for data migration. (WSAPI 1.2 and later)
RCIP	7	IP (Ethernet) port used for Remote Copy. (WSAPI 1.2 and later)
ISCSI	8	iSCSI (Ethernet) port connected to hosts. (WSAPI 1.2 and later)
CNA	9	CNA port, which can be FCoE or iSCSI. (WSAPI 1.2 and later)
FS	10	Ethernet File Persona ports.

Table 219: portProtocol enumeration

Symbol	Value	Description
FC	1	Fibre Channel. (WSAPI 1.2 and later)
iSCSI	2	iSCSI. (WSAPI 1.2 and later)
FCOE	3	Fibre Channel over Ethernet. (WSAPI 1.2 and later)
IP	4	Internet Protocol (Remote Copy) (WSAPI 1.2 and later)
SAS	5	Serial-attached SCSI. (WSAPI 1.2 and later)

Table 220: portFailOverState enumeration

Symbol	Value	Description
NONE	1	No failover in operation. (WSAPI 1.2 and later)
FAILOVER_PENDING	2	In the process of failing over to partner. (WSAPI 1.2 and later)

Table Continued

Symbol	Value	Description
FAILED_OVER	3	Failed over to partner. (WSAPI 1.2 and later)
ACTIVE	4	The partner port is failed over to this port. (WSAPI 1.2 and later)
ACTIVE_DOWN	5	(WSAPI 1.2 and later)
ACTIVE_FAILED	6	The partner port is failed over to this port, but this port is down. (WSAPI 1.2 and later)
FAILBACK_PENDING	7	In the process of failing back from partner. (WSAPI 1.2 and later)

Querying ports

Querying all ports

Use the HTTP GET method with the following URI and no request message body:

`https://<storage_system>:8080/api/v1/ports`

Success

A successful query returns HTTP Code 200 OK. Unless an error occurs, the response message body includes JSON objects as specified in the following table:

Table 221: Response message body JSON objects for ports

Member	JSON type	API type	Description
total	number	int32	Number of port objects returned, representing the total number of objects in the collection. (WSAPI 1.2 and later)
members	array of objects	<u>Port Property objects</u>	Storage port properties returned as a JSON array of zero or more JSON objects, one object for each port on the system. (WSAPI 1.2 and later)

Table 222: Port Property objects

Member	JSON type	API type	Description
portPos	object	<u>Host portPos configuration JSON objects</u>	Port n:s:p. (WSAPI 1.2 and later)
mode	number	<u>portMode enumeration</u>	Port mode. (WSAPI 1.2 and later)
linkState	number	<u>portLinkState enumeration</u>	Port link state. (WSAPI 1.2 and later)
nodeWWN	string	WWN	Node WWN that is unique across all ports. (WSAPI 1.2 and later)
portWWN	string	WWN	Port WWN for FCoE and FC ports. Not included in JSON for other ports. (WSAPI 1.2 and later)
type	number	<u>portConnType enumeration</u>	Port connection type. (WSAPI 1.2 and later)
HWAddr	string	MAC	Hardware address for RCIP and iSCSI ports. Not included in JSON for other ports.
protocol	number	<u>portProtocol enumeration</u>	Indicates the port protocol type: <ul style="list-style-type: none"> • FC • FCoE • IP (Remote Copy) • iSCSI • – : No mode selected (for CNA ports) (WSAPI 1.2 and later)
label	string	string	Configurable, human-readable label identifying the HBA port. Maximum length is 15 characters. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Description
device	array of string	array of name31	Array of device name (cage0, host1, etc.) of the device connected to the port. (WSAPI 1.2 and later)
partnerPos	object	<u>portMode enumeration</u>	Location of failover partner port in <Node><Slot><Port> format. (WSAPI 1.2 and later)
failoverState	number	<u>portFailOverState enumeration</u>	The state of the failover operation, shown for the two ports indicated in the N:S:P and Partner columns. The value can be one of the following: <ul style="list-style-type: none"> • none: No failover in operation. • failover_pending: In the process of failing over to partner. • failed_over: Failed over to partner. • active: The partner port is failed over to this port. • active_down: The partner port is failed over to this port, but this port is down. • failback_pending: In the process of failing back from partner. (WAPI 1.2 and later)
IPAddr	string	string	For RCIP and iSCSI ports only; not included in the JSON object for other ports. (WSAPI 1.2 and later)
iSCSIName	string	Name223	For iSCSI port only; not included in the JSON object for other ports. (WSAPI 1.2 and later)
enodeMACAddr	string	MAC	Ethernet node MAC address.
pfcMask	string	Hex	PFC mask.
iSCSIPortInfo	object	<u>iSCSI-port property objects</u>	Contains information related to iSCSI port properties. (WSAPI 1.5 and later.)
iSCSIVlans	object	<u>iSCSIVlans property objects</u>	Contains VLAN information for the iSCSI port.

Table Continued

Member	JSON type	API type	Description
hardwareType	number	<u>hardwareTypeEnum</u>	Port hardware type.
connectionType	number	<u>connectionTypeEnum</u>	Connection type.
connectionMode	number	<u>connectionModeEnum</u>	Connection mode.
configurableRate	string	string	Configurable bit rate of the port.
maxRate	string	string	Maximum bit rate supported by the port.
class2	number	<u>portClass2Enum</u>	Class 2 state and configuration.
smartSANStatus	number	<u>smartSANStatusEnum</u>	Smart SAN fabric status.
uniqueNodeWWN	number	<u>optionEnum</u>	Host operating systems, such as ONTAP, require each port to present a unique World Wide Name (WWN) when presenting multiple interfaces. Normally, the storage system presents the same Node World Wide Name (NWWN) on all ports. Enabling the uniqueNodeWWN on the ports allows them to present a unique NWWN.
vcn	number	<u>optionEnum</u>	VLUN change notification setting.
interruptCoalesce	number	<u>optionEnum</u>	Interrupt coalesce setting
targetModeWriteOptimization	number	<u>optionEnum</u>	Target mode write optimization setting.

Table 223: iSCSI-port property objects

Member	JSON type	API type	Description
ipAddr	string	string	iSCSI port only, not included in the JSON object for other ports.
iSCSIName	string	name223	iSCSI port only, not included in the JSON object for other ports.
netmask	string	string	Netmask for Ethernet port.
gateway	string	string	IP address of the gateway.

Table Continued

Member	JSON type	API type	Description
mtu	number	uint32	MTU size in bytes.
stgt	number	uint32	Send Targets Group Tag of the iSCSI target (replaces DHCP in WSAPI 1.5 and later).
iSNSPort	number	uint32	TCP port number for the iSNS server.
iSNSAddr	string	string	iSNS server IP address.
rate	string	string	Data transfer rate for the iSCSI port.
tpgt	number	uint32	Target portal group tag.
vlangs	boolean	boolean	Indicates whether the port supports VLANs.

Table 224: iSCSIVlangs property objects

Member	JSON type	API type	Description
ipAddr	string	string	IP address for the iSCSI port.
netmask	string	string	Netmask for Ethernet port.
gateway	string	string	IP address of the gateway.
vlanTag	number	uint32	VLAN ID.
mtu	number	uint32	MTU size in bytes.
stgt	number	uint32	Send Targets Group Tag of the iSCSI target.
tpgt	number	uint32	Target Portal Group Tag of the iSCSI target.
iSNSPort	number	uint32	TCP port number for the iSNS server.
iSNSAddr	string	string	iSNS server IP address.

Table 225: connectionTypeEnum

Symbol	Value	Description
LOOP	1	Loop connection.
POINT	2	Point-to-point connection.

Table Continued

Symbol	Value	Description
LOOP-POINT	3	Loop or point-to-point connection.
UNKNOWN	99	Unknown connection type.

Table 226: connectionModeEnum

Symbol	Value	Description
DISK	1	Disk connection.
HOST	2	Host connection.
RCFC	3	FCFC connection.
PEER	4	Data migration connection.
UNKNOWN	99	Unknown connection mode.

Table 227: portClass2Enum

Symbol	Value	Description
ACK0	1	Ack0
ACK1	2	Ack1
DISABLED	3	Disabled
UNKNOWN	99	Unknown port class.

Table 228: smartSANStatusEnum

Symbol	Value	Description
ENABLED	1	Smart SAN is supported and enabled for the fabric and switch.
DISABLED	2	Smart SAN is supported but disabled for the fabric and switch.
UNSUPPORTED	3	Smart SAN is not supported for the fabric and switch.
UNLICENSED	4	Smart SAN license is not installed.
UNKNOWN	99	Unable to determine Smart SAN status for the fabric and switch.

Table 229: optionEnum

Symbol	Value	Description
ENABLED	1	Option is enabled.
DISABLED	2	Option is disabled.
NA	3	Option is not applicable.
UNKNOWN	99	Unknown option type.

Table 230: hardwareTypeEnum

Symbol	Value	Description
FC	1	Fibre Channel HBA
ETH	2	Ethernet NIC
iSCSI	3	iSCSI HBA
CNA	4	Converged Network Adapter
SAS	5	SAS HBA
COMBO	6	—
UNKNOWN	99	Unknown hardware type.

Errors

See, [WSAPI query error causes](#).

More information

[WSAPI error codes and descriptions](#) on page 34

Querying a single port

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>`

The <n:s:p> variable uses the port values for <node>:<slot>:<port>.

Success

A successful query returns the HTTP code 200 OK.

Unless an internal server error occurs, the response includes a message body as specified in the following table.

Table 231: Port collection message body for a single-port query

JSON type	API type	Description
object	Port Property object (see, Message body Port Property JSON objects for all-ports query)	Storage port properties. (WSAPI 1.2 and later)

Errors

Table 232: Single-port query error codes

API Code	HTTP Code	Description
INV_INPUT_PORT_SPECIFICATION	400 Bad Request	Incorrect port specification. (WSAPI 1.2 and later)
NON_EXISTENT_PORT	404 Not Found	Port does not exist. (WSAPI 1.2 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying iSCSI VLANs for an iSCSI port

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>/iSCSIVlans/`

Success

A successful query returns HTTP Code 200 OK. Unless an error occurs, the response message body includes JSON objects as specified in the following table.

Table 233: Response message body JSON objects for ports

Member	JSON type	API type	Description
total	number	int32	Number of VLAN objects returned, or zero if none found.
iSCSIVlans	array of objects	iSCSIVlans property objects	VLAN information for the iSCSI port.
links	array of URL links	array of URL links	Links, including the self-URL.

Errors

Table 234: iSCSI port query error codes

API Code	HTTP Code	Description
NON_EXISTENT_PORT	404 Not Found	Port does not exist.
NON_EXISTENT_VLAN	404 Not Found	VLAN does not exist.

More information

[WSAPI error codes and descriptions](#) on page 34

Querying an iSCSI VLAN for an iSCSI port

Use the HTTP GET method on the following URI with no request message body:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>/iSCSIVlans/<VLANTag>`

Success

A successful query returns HTTP Code 200 OK. Unless an error occurs, the response message body includes JSON objects as specified in [iSCSIVlans property objects](#).

Errors

See, [iSCSI port query error codes](#).

Querying ports with type filtering

Use the HTTP GET method on the following URI with no message body (WSAPI 1.5 and later):

`https://<storage_system>:8080/api/v1/ports?query="type EQ <value1> OR type EQ <value2> OR type EQ <valueN>"`

A type filtering request supports only the **OR** operator.

Success

A successful query returns a message body with JSON object members as described in the following table.

Table 235: Message body JSON objects for type filtering

Member	JSON type	API type	Description
total	number	int32	Number of port objects returned, or zero if no types matched port records
member	array of objects	An array of port property objects (see, Message body Port Property JSON objects for all-ports query)	Storage port properties.

Errors

See, [Queries using filters error codes](#).

Querying initiators in the unzoned name server

Use the HTTP GET method with the following URI and no request message body:

```
https://<storage_system>:8080/api/v1/portdevices/initiatorsuns/<n:s:p>
```

The <n:s:p> variable indicates *node:slot:port*.

Success

A successful query returns HTTP Code 200 OK. Unless an error occurs, the message body includes JSON objects as shown in the following table.

Table 236: Message body JSON objects for querying target driven zones

Member	JSON type	API type	Description
total	number	int32	Number of <code>InitiatorPortInfo</code> objects returned, representing the total number of objects in the collection.
members	array of objects	<u>Non-principal zone member objects</u>	Storage port properties returned as a JSON array of zero or more JSON objects. Same as Non-Principal Zone Member Object.

Errors

See, [WSAPI query error causes](#).

Querying port devices

Querying all port devices

WSAPI 1.6.3 provides two methods for querying all port devices.

1. **Preferred method:** Use the HTTP GET method with the following URI and no message body:

```
https://<storage_system>:8080/api/v1/portdevices/all/<n:s:p>
```

The <n:s:p> variable identifies the node, slot, and port of the device.

2. **Obsolete method:** Use the HTTP GET method with the following URI and no message body. Use the OR operand to expand your query to multiple port devices.

```
https://<storage_system>:8080/api/v1/portdevices?query="portPos EQ <n:s:p>"
```

```
https://<storage_system>:8080/api/v1/portdevices?query="portPos EQ 1:2:3" OR  
portPos EQ 0:1:2"
```

Success

A successful query returns HTTP Code 200 OK. The response message body includes JSON objects as described in the following table.

Table 237: Message body JSON objects for portDevices query

Member	JSON type	API type	Description
total	number	int32	Number of <code>portDevices</code> objects returned, representing the number of objects in the collection. (WSAPI 1.3 and later)
members	array of objects	array of <code>portDevices</code> property objects (see, Message body for portDevices JSON object)	Port device properties returned as an array of zero or more JSON objects, one for each device connected to the port. (WSAPI 1.3 and later)

Table 238: Message body for portDevices JSON object

Member	JSON type	API type	Description
portId	string	Hex	Port ID of the device. (WSAPI 1.3 and later)
loopId	string	Hex	Arbitrated loop physical address of the device. (WSAPI 1.3 and later)
hardAddr	string	Hex	Hard address on the loop for the device. (WSAPI 1.3 and later)
nodeWWN	string	WWN	Node WWN of the device. (WSAPI 1.3 and later)
portWWN	string	WWN	Port WWN of the device. (WSAPI 1.3 and later)
commonFeatures	string	Hex	PLOGI ACC common features. (WSAPI 1.3 and later)
serviceParams	string	Hex	PRLI service parameters. (WSAPI 1.3 and later)
bufferToBufferCredit	string	Hex	PLOGI ACC buffer-to-buffer credit. (WSAPI 1.3 and later)

Table Continued

Member	JSON type	API type	Description
frameLength	string	Hex	PLOGI ACC frame length. (WSAPI 1.3 and later)
virtualportWWN	string	WWN	Virtual port WWN that is associated with the device. (WSAPI 1.3 and later)
deviceName	string	name31	Device name, including: <ul style="list-style-type: none"> • Host name • Port N:S:P • Physical Disk • Cage number (WSAPI 1.6 and later)

Errors

Table 239: Port device query errors

API error code	HTTP code	Description
INV_INPUT_PORT_SPECIFICAT ION	400 Bad Request Found	Incorrect port specification.
NON_EXISTENT_PORT	404 Not Found	Port does not exist.

Querying for port device target-driven zones

Use the HTTP GET method with the following URI and no request message body:

`https://<storage_system>:8080/api/v1/portdevices/targetdrivenzones/`

Success

A successful query returns HTTP Code 200 OK. Unless an error occurs, the message body includes JSON objects as shown in the following table.

Table 240: Message body JSON objects for querying target driven zones

Member	JSON type	API type	Description
total	number	int32	Number of target driven zone objects returned, representing the number of objects in the collection.
members	array of objects	<u>Target driven zone objects</u>	Returned as a JSON array of zero or more Target Driven Zone JSON objects. Each object includes the target port and target driven zone information associated with the target port.

Table 241: Target driven zone objects

Member	JSON type	API type	Description
portPOS	object	<u>portPOS</u>	Target port n:s:p
TDPZInformation	array of objects	<u>Target driven zone property objects</u>	Array of Target Driven Zone properties for a target port.

Table 242: Target driven zone property objects

Member	JSON type	API type	Description
name	string	string	Zone name.
count	number	int32	Number of entries in zone.
state	number	<u>TDPZStateEnum</u>	Zone state.
principleMember	string	string	Principal zone member (WWN of target port).
nonPrincipalMembers	array of objects	<u>Non-principal zone member objects</u>	Array of non-principal zone members.

Table 243: TDPZStateEnum

Symbol	Value	Description
CHECK_NEEDED	1	Check needed.
CHECKING	2	Checking.
CHECK_WAITING	3	Check waiting.

Table Continued

Symbol	Value	Description
UPDATE_NEEDED	4	Update needed.
UPDATING	5	Updating.
UPDATE_WAITING	6	Update waiting.
UP_TO_DATE	7	Up to date.
UNABLE_TO_UPDATE	8	Unable to update.
SWITCH_CHECK_NEEDED	9	Switch check needed.
SWITCH_CHECK_WAITING	10	Switch check waiting.
UNKNOWN	99	Unknown.

Table 244: Non-principal zone member objects

Member	JSON type	API type	Description
number	number	uint32	Index number of zone member or initiator.
WWN	string	string	WWN of zone member or initiator.
aliasName	array of strings	array	Alias name for zone member or initiator.
hostName	string	string	Host name.
HBAManufacturer	string	string	HBA manufacturer.
HBAModel	string	string	HBA model.
HBADriverVersion	string	string	HBA driver version.
HBAFirmwareVersion	string	string	HBA firmware version.
HBAOSNameVersion	string	string	HBA OS name and version.
portSpeedSupportedGbps	array of number	array of float	Port supported speeds in Gbps.
portSpeedCurrentGbps	number	float	Port current speed in Gbps.
portOSDeviceName	string	string	Port OS Device Name.
portSSANQoSsupport	boolean	boolean	Port Smart SAN QoS support True for supported False for not supported.
portSSANSecuritySupport	number	<u>PortSANSecurityEnum</u>	Port Smart SAN security support.

Table 245: PortSANSecurityEnum

Symbol	Value	Description
UNSUPPORTED	1	Unsupported
TIER1	2	Tier 1
TIER2	3	Tier 2
TIER3	4	Tier 3
UNKNOWN	99	Unknown

Errors

More information

[WSAPI query error causes](#) on page 32

Querying for a port device target-driven zone instance

Use the HTTP GET method with the following URI and no request message body:

`https://<storage_system>:8080/api/v1/portdevices/targetdrivenzones/<n:s:p>`

Success

A successful query returns HTTP Code 200 OK. Unless an error occurs, the message body includes JSON objects as shown in **Target driven zone objects**.

Errors

Table 246: TZONE port query error codes

API Code	HTTP Code	Description
NON_EXISTENT_TZONE	404 Not Found	No Target Driven Zone found for specified port.
INV_INPUT_PORT_SPECIFICATION	400 Bad Request	Incorrect port specified.

More information

[WSAPI query error causes](#) on page 32

Querying FC switches

Query for a list of all FC switches connected to a specified port.

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/portdevices/fcswitch/<n:s:p>`

The <n:s:p> variable is <node:slot:port>.

Success

A successful query response includes a message body JSON object as described in the following table.

Table 247: Message body JSON objects for FCswitches query

Member	JSON type	API type	Description
total	number	int32	Number of <code>FCswitches</code> objects returned, representing the number of objects in the collection. (WSAPI 1.3 and later)
members	array of objects	array of <code>FCswitches</code> property objects (see, Message body JSON object for FCswitches query)	FC switch properties, returned an array of zero or more JSON objects, one for each FC switch connected to the port. (WSAPI 1.3 and later)

Table 248: Message body JSON object for FCswitches query

Member	JSON type	API type	Description
name	string	WWN	The name of the fabric switch or port. (WSAPI 1.3 and later)
logicalName	string	print256	The logical name of a fabric interconnect. (WSAPI 1.3 and later)
type	number	<code>fabricType</code> enum (see, fabricType enumeration for FCswitches query)	The port type of a fabric port. (WSAPI 1.3 and later)
vendor	string	print64	The vendor name of the fabric interconnect. (WSAPI 1.3 and later)
ports	number	uint32	The number of ports on the fabric interconnect. (WSAPI 1.3 and later)

Table 249: fabricType enumeration for FCswitches query

Symbol	Value	Description
UNKNOWN	1	Type is unknown. (WSAPI 1.3 and later)
SWITCH	2	Type is switch. (WSAPI 1.3 and later)
HUB	3	Type is hub. (WSAPI 1.3 and later)
BRIDGE	4	Type is bridge. (WSAPI 1.3 and later)

Errors

See, [Port device query errors](#).

Managing iSCSI ports

Configure and query iSCSI ports.

Configuring iSCSI ports

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>`

The `<n:s:p>` parameter identifies the port you want to configure.

Success

A successful configuration of all parameters returns HTTP Code 200 OK.

The response message body is a JSON object with members as described in the following table.

Member	JSON type	API type	Ignored values	Description
iSCSIPortInfo	object	<u>iSCSIPort objects</u>	Required field.	Object that contains the iSCSI port parameters you want to configure.

Table 250: iSCSIPort objects

Member	JSON type	API type	Description
ipAddr	string	string	Port IP address
netmask	string	string	Netmask for Ethernet

Table Continued

Member	JSON type	API type	Description
gateway	string	string	Gateway IP address
mtu	number	uint32	MTU size in bytes
iSNSPort	number	uint32	TCP port number for the iSNS server
iSNSAddr	string	string	iSNS server IP address

Errors

Table 251: iSCSI port configuration error codes

API Error	HTTP Code	Description
PARTIAL_EXECUTION_SUCCESS	400 Bad Request	Completed configuration of some attributes successfully. Some errors exist.
ALL_EXECUTION_FAILED	400 Bad Request	All configuration requests failed.
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Requires iSCSIPort object.

Creating a VLAN on an iSCSI port

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>/iSCSIVlans/`

The `<n:s:p>` parameter identifies the port you want to configure.

The request message body is a JSON object as described in the following table.

Table 252: Request message body for iSCSI port with new VLAN

Member	JSON type	API type	Ignored values	Description
ipAddr	string	string	None. Required field.	iSCSI port IP address
netmask	string	string	None. Required field.	Netmask for Ethernet
vlanTag	number	uint32	None. Required field.	VLAN tag

Success

A successful configuring returns HTTP code 201 `CREATED`. The location portion of the Response Header contains the new URI for the newly created VLAN entry.

Errors

Table 253: iSCSI port with new VLAN configuration error codes

API Error	HTTP Code	Description
INV_INPUT_PORT_SPECIFICATION	404 Not Found	Incorrect port specified.
EXISTENT_VLAN	409 Conflict	VLAN exists on the specified port.
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Missing required attributes object.

Updating a VLAN configuration on an iSCSI port

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>/iSCSIVlans/<vlanTag>`

The `<n:s:p>` parameter identifies the port with the VLAN you want to configure.

The request message body is a JSON object as described in the following table.

Table 254: Request message body for iSCSI port with existing VLAN

Member	JSON type	API type	Description
<code>ipAddr</code>	string	string	iSCSI port IP address
<code>netmask</code>	string	string	Netmask for Ethernet.
<code>gateway</code>	string	string	Gateway IP address.
<code>mtu</code>	number	uint32	MTU size in bytes.
<code>stgt</code>	number	uint32	Send Targets Group Tag of the iSCSI target.
<code>iSNSPort</code>	number	uint32	TCP port number for the iSNS server.
<code>iSNSAddr</code>	string	string	iSNS server IP address.

Success

A successful configuring returns HTTP code 200 OK.

Errors

Table 255: iSCSI port configuration with VLAN error codes

API Error	HTTP Code	Description
NON_EXISTENT_VLAN	404 Not Found	Specified VLAN does not exist on the specified port.
PARTIAL_EXECUTION_SUCCESS	400 Bad Request	Successfully completed configuration of some attributes. Errors exist.
ALL_EXECUTION_FAILED	400 Bad Request	All configuration requests failed.
INV_INPUT_PORT_SPECIFICATION	400 Bad Request	Request specified an incorrect port.

Using iSCSI ports to ping an IP address

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>`

The `<n:s:p>` parameter identifies the port you want to use.

The request message body is a JSON object with members as described in the following table.

Table 256: Request message body JSON objects for iSCSI ping

Member	JSON type	API type	Description
action	number	<u>iSCSIPortActionEnum</u>	Specifies the action (PING1) to be taken on port.
parameters	object	<u>iSCSIPingParam objects</u>	Parameter list for the request.

Table 257: iSCSIPortActionEnum

Symbol	Value	Description
PING	1	Ping port and its VLAN subresource
RESET	2	Reset port configuration

Table 258: iSCSIPingParam objects

Member	JSON type	API type	Description
IPAddr	string	string	IP address to ping from iSCSI port.

Success

A successful configuring returns HTTP code 200 OK.

Errors

Table 259: iSCSI port ping error codes

API Error	HTTP Code	Description
HOST_NOT_REACHABLE	400 Bad Request	Cannot reach host.
NON_EXISTENT_PORT	404 Not Found	Port specified does not exist.
INV_INPUT_BAD_ENUM_VALUE	400 Bad Request	Invalid input. Bad enum value provided.
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Invalid input. Missing some or all required parameters.
INV_INPUT_PORT_SPECIFICATION	400 Bad Request	Incorrect port specification.
OTHER	400 Bad Request	A more specific error could not be determined.

Resetting an iSCSI port configuration

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>`

The `<n:s:p>` parameter identifies the port you want to reset.

Member	JSON type	API type	Description
action	number	<u>PortActionEnum</u>	Specifies the action (RESET) to be taken on the port.

Success

A successful operation returns HTTP code 200 OK.

Errors

See [iSCSI port error codes](#).

Removing an iSCSI port VLAN

Use the HTTP DELETE method with the following URI:

`https://<storage_system>:8080/api/v1/ports/<n:s:p>/iSCSIVlans/<vlanTag>`

The `<n:s:p>` parameter identifies the port from which to remove the VLAN.

Success

A successful operation returns HTTP code 200 OK.

Errors

Table 260: iSCSI port VLAN removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_VLAN	404 Not Found	VLAN does not exist.
NON_EXISTENT_PORT	404 Not Found	Port specified does not exist.
INV_INPUT_PORT_SPECIFICATION	400 Bad Request	Incorrect port specification.
OTHER	400 Bad Request	A more specific error could not be determined.

Virtual LUNs

A Virtual LUN (VLUN) is a pairing between a virtual volume (VV) and a LUN, expressed as either a VLUN template or an active VLUN.

A VLUN template sets up an association between a volume and one of the following combinations by establishing the export rule, the manner in which the volume is exported. If, when a VLUN template is created, the current system state meets the conditions established by the template, then active VLUNs—for example, exports that are seen as LUNs by the host—are the result. Depending on the conditions of the VLUN template, a single template can produce more than one active VLUN.

VLUN configuration and enumeration objects

Table 261: VLUN portPos JSON objects

Members	JSON type	API type	Description
node	number	igint32	System node (0–7).
slot	number	igint32	PCI bus slot in the node (0–5).
cardPort	number	igint32	Port number on the FC card (0–4).

Table 262: VLUNType enumeration

Symbol	Value	Description
EMPTY	1	Empty.
PORT	2	Port.
HOST	3	Host.
MATCHED_SET	4	Matched set.
HOST_SET	5	Host set.

Table 263: VLUN multipathing configuration enumeration

Symbol	Value	Description
UNKNOWN	1	Unknown.
ROUND_ROBIN	2	Round Robin.
FAILOVER	3	Failover.

Table 264: VLUN failedPathPol configuration enumeration

Symbol	Value	Description
UNKNOWN	1	Unknown.
SCSI_TEST_UNIT_READY	2	SCSI test unit is ready.
INQUIRY	3	Inquiry.
READ_SECTOR0	4	Read Sector 0.

Creating a VLUN

! **IMPORTANT:** Any user with Super or Edit role, or any role granted `vlun_create` permission, can perform this operation.

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/vluns`

The request message body includes a JSON object as described in the following table.

Table 265: Request message body JSON objects for VLUN template

Member	JSON type	API type	Ignored Values	Description
volumeName	string	name31	None. Required field.	Name of the volume or VV set to export. Use the following format for the VV set: <code>set:set:volumeset_name</code>
lun	number	igint32	None. Required field.	LUN ID.
hostname	string	name31	None. Required field.	Name of the host or host set to which the volume or VV set is to be exported. The host set should be in <code>set:hostset_name</code> format.
portPos	object	portPos	None.	System port of VLUN exported to. It includes node number, slot number, and card port number.

Table Continued

Member	JSON type	API type	Ignored Values	Description
noVcn	boolean	boolean	None. Optional field.	Specifies that a VCN not be issued after export (-novcn). Default: false.
overrideLowerPriority	boolean	boolean	None. Optional field.	Existing lower priority VLUNs will be overridden (-ovrd). Use only if hostname member exists. Default: false.
autoLun	boolean	boolean		States whether the lun number should be autosigned. (WSAPI 1.2 and later and later)
maxAutoLun	number			If autoLun is true, the lun number should be in the range of lun and maxAutoLun. If maxAutoLun is 0, then no max. (WSAPI 1.2 and later and later)

Required VLUN elements

Required elements for creating a VLUN include the `VolumeName`, `lun` members, and either `hostname` or `portPos` (or both in the case of matched sets). Optional elements are the `noVcn` and `overrideLowerPriority` members.

The system can assign the LUN number within the specified LUN range, if you specify a range. A range is `n+` (minimal `n`) or `m-n` (`m` to `n`). To support auto lun, the fields `autoLun` and `maxAutoLun` are now supported in the message body for VLUN creation.

Creating a matched-set or port-present VLUN requires the `portPos` member. Otherwise, the request creates a host set or host-set VLUN.

The following example creates a matched VLUN type template for `test_vv02` volume.

Create a matched VLUN type template request

```
POST /api/v1/vluns HTTP/1.1
Host: storsys1.example.com:8080
Accept: application/json
Content-Type: application/json
X-HP3PAR-WSAPI-SessionKey: 2-33fe8891e288b34b3f914410e7cc7907-a93d1c50
{
  "volumeName": "test_vv02",
  "lun": 252,
  "hostname": "mysystem",
  "portPos": {
```

```

"node": 2,
"slot": 2,
"cardPort": 4
},
"noVcn":false,
"overrideLowerPriority":false
}

```

Create a matched VLUN type template response

```

HTTP/1.1 201 Created
Date: Mon, 16 Apr 2012 06:44:26 GMT
Server: hp3par-wsapi
Cache-Control: no-cache
Pragma: no-cache
Location: /api/v1/vluns/test_vv02,252,mysystem,2:2:4

```

Success

A successful VLUN creation returns the HTTP status code 201 `Created`, without a message body.

The response includes the location response header and the URI for the newly created VLUN in the following format:

```
/api/v1/vluns/<volume_name>,<lun>,<host_name>,[<port>]
```

- `<volume_name>` is the volume that the newly created VLUN exports.
- The `<host_name>` or `[<port>]` information, or both (depending on the VLUN type), are the host name and port for the newly created VLUN. The `port` information will not be displayed for a `host-type` VLUN.
- If the `<host_name>` information was not provided, then the location will be: `/api/v1/vluns/<volume_name>,<lun>,<port>`

Errors

Table 266: VLUN creation error codes

API Error	HTTP Code	Description
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Missing <code>volumeName</code> or incomplete port info, specifying override option without hostname. LUN number and the host persona capability conflict. WSAPI 1.2 and later and later.
INV_INPUT	400 Bad Request	Missing <code>volumeName</code> or LUN or both <code>hostname</code> and <code>portPos</code> members. Incomplete port info, specifying override option without hostname.

Table Continued

API Error	HTTP Code	Description
NON_EXISTENT_VOL	404 Not found	Specified volume does not exist.
NON_EXISTENT_HOST	404 Not found	Specified hostname not found.
NON_EXISTENT_PORT	404 Not found	Specified port does not exist. (WSAPI 1.2 and later and later)
MISSING_VLUN_EXPORT_INFO	400 Bad Request	Missing both <code>hostname</code> and <code>portPos</code> for VLUN creation.
BAD_PORT_TYPE	404 Not found	Specified port is of invalid port type.
EXISTENT_LUN	409 Conflict	LUN already exists.
INV_INPUT_PORT_SPECIFICATION	400 Bad Request	Incorrect <code>portPos</code> specification or the <code>node</code> or <code>slot</code> or <code>cardPort</code> in <code>portPos</code> object maybe out of range.
INV_INPUT_PARAM_CONFLICT	400 Bad Request	<code>OverrideLowerPriority</code> is being specified without <code>hostname</code> .
TOO_LARGE	400 Bad Request	LUN is greater than 16384.
AUTO_LUN_ID_UNAVAILABLE	409 Conflict	LUN ID cannot be assigned within the specified range. (WSAPI 1.2 and later and later)
INV_OPERATION_VLUN_PCOPY_TARGET_VV	409 Conflict	The volume is the target of physical copy.
INV_INPUT_EMPTY_VVSET	400 Bad Request	The VV set is empty. WSAPI 1.3
INV_INPUT_MATCHED_HOSTSET	400 Bad Request	Cannot export host sets with port (matched set). (WSAPI 1.3 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Removing a VLUN

! **IMPORTANT:** Any user with the Super or Edit role, or any role granted with the `vlun_remove` right, can perform this operation.

Use the HTTP DELETE method with the following URI:

```
https://<storage_system>:8080/api/v1/vluns/<volume_name>,<lun>,<host_name>[,<port>][?<option>]
```

Parameters and examples

shows the URI parameters that are sent in the URI for VLUN removal.

Table 267: URI parameters for VLUN removal

URI Parameter ¹	Ignored Values	Description
<code><volume_name></code>	None (Required)	Name of the volume or VV set to be exported. The VV set should be in <code>set:<volumeset_name></code> format.
<code><lun></code>	None (Required)	LUN.
<code><host_name></code>	None (required if volume is exported to host or host set, or to both the host or host set and port)	Name of the host or host set to which the volume or VV set is to be exported. For VLUN of port type, the value is empty. The host set should be in <code>set:<hostset_name></code> format.
<code><port></code>	None (required if volume is exported to port, or to both host and port)	Specifies the system port of the VLUN export. It includes the system node number, PCI bus slot number, and card port number on the FC card in the format: <code><node>:<slot>:<port></code>
<code><option></code>	None	Can be replaced with a boolean value: <ul style="list-style-type: none">• <code>noVcn=true</code>• <code>noVcn=false</code>

¹ Must be percent-encoded as described in RFC 3968 for reserved characters.

In the following example, the VLUN for volume `test_vv02` with LUN 252, which is exported to `mysystem` through port `2:5:2`, is deleted. The optional port information is also sent because the VLUN is of matched type.

Deleting an exported VLUN request

```
DELETE /api/v1/vluns/test_vv02,252,mysystem,2:2:4 HTTP/1.1
Host: storsys1.example.com:8080
Accept: application/json
Content-Type: application/json
X-HP3PAR-WSAPI-SessionKey: 2-33fe8891e288b34b3f914410e7cc7907-a93d1c50
```

Deleting an exported VLUN response

```
HTTP/1.1 200 OK
Date: Mon, 16 Apr 2012 07:16:39 GMT
Server: hp3par-wsapi
Cache-Control: no-cache
Pragma: no-cache
Connection: close
```


Success

A successful removal returns the HTTP status code 200 OK and no message body.

Errors

Table 268: VLUN removal error codes

API Error	HTTP Code	Description
INV_INPUT	400 Bad Request	Incomplete VLUN information. Invalid URL percent-encoding. (WSAPI 1.2 and later and later)
NON_EXISTENT_HOST	404 Not Found	Specified hostname not found.
NON_EXISTENT_VLUN	404 Not Found	Incorrect LUN or volumeName
INV_INPUT_PORT_SPECIFICATION	400 Bad Request	Specified port is invalid.
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	The LUN specified exceeds expected range.
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Incomplete VLUN info. Missing volumeName or lun, or both hostname and port.
NON_EXISTENT_VLUN	404 Not Found	Incorrect LUN or volumeName

Querying all VLUNs

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/vluns`

Conditions and examples (query vlun all)

To support a large number of volumes and VLUNs in the 3PAR OS, WSAPI 1.3 and later uses HTTP chunked transfer encoding to send a response in chunked format, and includes an HTTP response header similar to the following:

Each chunk starts with the `chunk-size` field, which is a string of hexadecimal digits and a CRLF sequence followed by the chunk data. The chunk is terminated by CRLF. The last chunk is a regular chunk, except that its length is zero.

VLUN chunked transfer encoding HTTP response

```
HTTP/1.1 200 OK
Date:&nbsp;&nbsp;&nbsp;Fri, 22 May 2013 18:05:43 GMT
Server:&nbsp;&nbsp;&nbsp;hp3par-wsapi
```

```
Cache-Control:&nbsp;no-cache
Pragma:&nbsp;no-cache&nbsp;
Content-Type:&nbsp;application/json
Connection:&nbsp;close
Transfer-Encoding: chunked
```

The following query returns all VLUN templates or active VLUNs, including all active and template VLUNs on the storage system:

VLUN query HTTP request

```
GET /api/v1/vluns HTTP/1.1
Host: storsys1.example.com:8080
Accept: application/json
Content-Type: application/json
X-HP3PAR-WSAPI-SessionKey: 2-33fe8891e288b34b3f914410e7cc7907-a93d1c50
```

VLUN query HTTP response

```
{
  "total": 2,
  "members": [
    {
      "lun": 1,
      "volumeName": "vol1.0",
      "hostname": "host",
      "remoteName": "10000000C978500E",
      "portPos": {
        "node": 0,
        "slot": 4,
        "cardPort": 1
      },
      "type": 4,
      "volumeWWN": "60002AC00000000000000020D0000017D",
      "multipathing": 1,
      "failedPathPol": 1,
      "failedPathInterval": 0,
      "active": true
    },
    {
      "lun": 10,
      "volumeName": "vol1.0",
      "portPos": {
        "node": 0,
        "slot": 4,
        "cardPort": 1
      },
      "type": 4,
      "volumeWWN": "60002AC00000000000000020D0000017D",
      "multipathing": 1,
      "failedPathPol": 1,
      "failedPathInterval": 0,
      "active": false
    }
  ]
}
```

```
]
}
```

Success

A successful query returns the HTTP status code 200 OK and a response message body with members as described in the following table.

Table 269: Response message body JSON objects for VLUN queries

Member	JSON type	API type	Description
total	number	int32	Number of VLUN objects returned.
serial	string	string	VLUN serial number.
members	array of objects	See, VLUN property objects	VLUN properties returned as a JSON array of zero or more JSON objects, one for each VLUN on the system.

Table 270: VLUN property objects

Member	JSON type	API type	Description
lun	number	uint32	Exported LUN value.
volumeName	string	name31	Name of exported virtual volume name or VV-set name.
hostname	string	name31	Host name or host set name to which the VLUN is exported.
remoteName	string	name31	Host WWN, or iSCSI name, or SAS address; depends on port type.
portPos	object	See, VLUN portPos JSON objects	System port of VLUN exported to. It includes node number, slot number, and cardPort number.
type	number	See, VLUNType enumeration	VLUN type.
volumeWWN	string	WWN	WWN of exported volume. If a VV set is exported, this value is null.
multipathing	number	See, VLUN multipathing configuration enumeration	Multipathing method in use.

Table Continued

Member	JSON type	API type	Description
<code>failedPathPol</code>	number	See, VLUN failedPathPol configuration enumeration	Failed path monitoring method.
<code>failedPathInterval</code>	number	uint32	Monitoring interval in seconds after which the host checks for failed paths.
<code>hostDeviceName</code>	string	name31	The device name for this VLUN on the host.
<code>active</code>	boolean	boolean	Specified if the VLUN is an active VLUN or a VLUN template. <code>true</code> for active VLUN. <code>FALSE</code> for VLUN template.

Errors

For information about chunking errors that might occur during an all VLUNs query, see **Errors** related to Querying all volumes.

More information

[WSAPI error codes and descriptions](#) on page 34

Querying a single VLUN

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/vluns/<vln_id>`

Available parameters include:

- `<vln_id>` is the VLUN identifier returned in the `Location` header after the VLUN was created.
- `<vln_id>` format can be one of the following:
 - `<vvname>, <lunID>, <hostname>, <portPos>`
 - `<vvname>, <lunID>, <hostname>`
 - `<vvname>, <lunID>, <portPos>`

The `<vvname>` and `<lunID>` fields are mandatory, and one or both `<hostname>` and `<portPos>` must be specified.

❗ IMPORTANT: WSAPI 1.2 does not support the use of patterns or sets when querying volumes and hosts. To query a single instance of a VLUN object, specify the volume name and host name.

Success

A successful VLUN query returns the HTTP code `200 OK`, with a response body including members as described in **[Response message body JSON objects for VLUN queries](#)**.

In a single VLUN query, there is no need for chunking, because the data sent back to the client is small and there is no issue with memory allocation. The WSAPI server does not use chunked transfer encoding when the request is for a single volume or VLUN.

Errors

Table 271: Single VLUN query error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server	Internal server error.
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Some or all required parameters are missing (volume name and LUN ID are mandatory). Either one or both of host name and port need to be specified. (WSAPI 1.2 and later)
INV_INPUT_WRONG_TYPE	400 Bad Request	Invalid input: wrong type for value (LUN ID is invalid) (WSAPI 1.2 and later)
NON_EXISTENT_VLUN	404 Not found	Requested VLUN does not exist. Failure to specify a VLUN with the volume name, LUN, and host and/or port also returns this error. (WSAPI 1.2 and later)
NON_EXISTENT_VOL	404 Not found	Requested volume does not exist. (WSAPI 1.2 and later)
NON_EXISTENT_HOST	404 Not found	Requested host does not exist.
INV_INPUT_PORT_SPECIFICATION	400 Bad Request	Incorrect port specification. (WSAPI 1.2 and later)
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Volume name or host name contains invalid character. (WSAPI 1.2 and later)
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	LUN ID exceeds range. (WSAPI 1.2 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying VLUNs using filters

Use the following methods to query VLUNs using filters:

Use the HTTP GET method with the following URI. Include the OR operator in the query string and no message body:

```
https://<storage_system>:8080/api/v1/vluns?query="volumeWWN EQ <value1> OR  
remoteName EQ <value2> OR volumeWWN EQ <value3> ... OR remoteName EQ <valueN>"
```

Other examples include:

- To query VLUNs using additional filters, use the HTTP GET method with the OR operator in the query string:

```
volumeWWN EQ <volumeWWNvalue> OR remoteName EQ <remoteNamevalue>
```

The value of *<volumeWWN>* is the WWN of the exported volume, and the *<remoteName>* value is the host WWN or an iSCSI pathname.

- To query VLUNs without an FC path or iSCSI path, use `remoteName EQ null` in the URI:

```
https://<storage_system>:8080/api/v1/vluns?query="remoteName EQ null"
```

- To query for volumes using a serial number, use `serial EQ <VLUN serial number>` in the URI:

```
https://<storage_system>:8080/api/v1/vluns?query="serial EQ <VLUN serial  
number>"
```

- To query VLUNs using a hostname, use `hostname EQ <VLUN host name>` in the URI:

```
https://<storage_system>:8080/api/v1/vluns?query="hostname EQ <VLUN host  
name>"
```

Available filters for VLUN queries

Use the following filters to query VLUNs:

- `volumeWWN`
- `remoteName`
- `volumeName`
- `hostname`
- `serial`

Success

A successful VLUN query returns the HTTP code 200 OK, with a response body including members as described in the following table.

Table 272: Message body JSON objects for VLUN query using filters response

Member	JSON type	API type	Description
total	number	int32	Number of VLUN objects returned.
members	array of objects	array of VLUN Property objects (see, VLUN property objects for members JSON object)	VLUN properties. (WSAPI 1.2 and later)

Errors

Table 273: VLUN query using filters error codes

API Error	HTTP Code	Description
INPUT_TOO_LONG	400 Bad Request	The client request is too long. (WSAPI 1.3 and later.1 MU1)

In addition see, [Queries using filters error codes](#).

Copy operations

You can use the WSAPI server to make snapshots of volumes and VV sets, make physical copies of volumes and VV sets, resynchronize a physical copy to its parent volume or VV set, and to stop a physical-copy operation.

License information

Setting retention times for virtual volumes

The optional 3PAR Virtual Lock Software provides functionality that enforces the retention period of any volume or copy of a volume. You must purchase the Virtual Lock software license to use the `retentionHours` field.

Creating a volume snapshot

Use the HTTP POST method with the following URI:

```
https://<storage_system>:8080/api/v1/volumes/<volume_name>
```

The `<volume_name>` parameter specifies the name of the volume from which you want to copy.

The request message body is a JSON object with two members, as described in the following table.

Table 274: Request message body JSON object members for creating a volume snapshot

Member	JSON type	API type	Ignored Values	Description
<code>action</code>	string	string	Required field	Requires the value <code>createSnapshot</code> .
<code>parameters</code>	object	See, <u>snapshot creation parameters</u>	Required field	Specifies the parameters required to create a snapshot.

Table 275: snapshot creation parameters

Member	JSON type	API type	Ignored values	Description
<code>name</code>	string	name31	None (Required)	Specifies a snapshot volume name up to 31 characters in length. For a snapshot of a volume set, use name patterns that are used to form the snapshot volume name. See, VV Name Patterns in the HPE 3PAR Command Line Interface Reference, available from the HPE Storage Information Library.
<code>id</code>	number	igint32	Negative values	Specifies the ID of the snapshot. If not specified, the system chooses the next available ID. Not applicable for VV-set snapshot creation.
<code>comment</code>	string	print511	None	Specifies any additional information up to 511 characters for the volume.
<code>readOnly</code>	boolean	boolean	None	<code>true</code> —Specifies that the copied volume is read-only. <code>false</code> —(default) The volume is read/write.
<code>expirationHours</code>	number	igint32	Negative values	Specifies the relative time from the current time that the volume expires. Value is a positive integer and in the range of 1–43,800 hours, or 1825 days.
<code>retentionHours</code>	number	igint32	Negative values	Specifies the relative time from the current time that the volume will expire. Value is a positive integer and in the range of 1–43,800 hours, or 1825 days.
<code>addToSet</code>	string	name27	None	The name of the volume set to which the system adds your created snapshots. If the volume set does not exist, it will be created.

More information

[Creating a physical copy of a volume on page 285](#)

[Creating a physical copy of a VV set on page 299](#)

<http://www.hpe.com/info/storage/docs/>

Success

A successful operation returns the HTTP status code `201 Created`. The response Location header contains the newly created snapshot URI.

The response includes a message body JSON object as defined in the following table.

Table 276: Response message body JSON objects for creating a snapshot

Member	JSON type	API type	Description
<code>links</code>	array of URI links	array of URI links	Array of links including the self URI. If you used the <code>addToSet</code> member, the array of URI links includes the link to <code>volumeset</code> .

Errors

Table 277: Create a snapshot query using filters error codes

API Error	HTTP Code	Description
<code>NON_EXISTENT_VOL</code>	404 Not Found	Specified parent volume does not exist. (WSAPI 1.6 and later.)
<code>INV_INPUT_EXCEEDS_RANGE</code>	400 Bad Request	Volume id is out of range. (WSAPI 1.6 and later.)
<code>INV_INPUT_INVALID_CHAR</code>	400 Bad Request	Invalid character in input. (WSAPI 1.6 and later.)
<code>EXISTENT_ID</code>	409 Conflict	The ID already exists. (WSAPI 1.6 and later.)
<code>EXISTENT_VOL</code>	409 Conflict	The volume already exists. (WSAPI 1.6 and later.)
<code>INV_INPUT_RETAIN_GT_EXPIRE</code>	400 Bad Request	Requested retention time is greater than expiration time. (WSAPI 1.6 and later.)
<code>INV_INPUT_TIME</code>	400 Bad Request	Invalid time specified. (WSAPI 1.6 and later.)
<code>NO_SNAP_CPG</code>	409 Conflict	No available snapshot space. (WSAPI 1.6 and later.)

Creating group snapshots of a virtual volumes list

Use the HTTP POST method with the following URI:

`https://<storage_system>/api/v1/volumes`

The request message body is a JSON object with two members, as shown in the following table.

Table 278: Request message body JSON object members for volumes

Member	JSON type	API type	Ignored Values	Description
<code>action</code>	number	<u>Volume custom action enumeration</u>	Required field	Specifies the action to be taken for the specified volume.
<code>parameters</code>	object	<u>parameters objects for group snapshot creation</u>	Required field	Specifies the parameter objects for creating a snapshot

Table 279: parameters objects for virtual volume group snapshot creation

Member	JSON type	API type	Description
<code>volumeGroup</code>	array of objects	<u>volumeSnap objects</u>	Specifies the volumes from which to capture group snapshots.
<code>comment</code>	string	print511	Specifies any additional information for the volume.
<code>readOnly</code>	boolean	boolean	Specifies that the copied volumes are read-only. Do not combine with the <code>match</code> member.
<code>match</code>	boolean	boolean	By default, all snapshots are created read-write. Specifies the creation of snapshots that match the read-only or read-write setting of parent. Do not combine the <code>readOnly</code> and <code>match</code> options.
<code>expirationHours</code>	number	igint32	Specifies the time relative to the current time that the copied volumes expire. Value is a positive integer with a range of 1–43,800 hours (1825 days).
<code>retentionHours</code>	number	igint32	Specifies the time relative to the current time that the copied volumes are retained. Value is a positive integer with a range of 1–43,800 hours (1825 days).

Table Continued

Member	JSON type	API type	Description
<code>skipBlock</code>	boolean	boolean	Occurs if the host IO is blocked while the snapshot is being created.
<code>addToSet</code>	string	name27	The name of the volume set to which the system adds your created snapshots. If the volume set does not exist, it will be created.

Table 280: volumeSnap objects

Member	JSON type	API type	Description
<code>volumeName</code>	string	string	Name of the volume being copied. Required.
<code>snapshotName</code>	string	string	If not specified, the system generates the snapshot name.
<code>snapshotId</code>	number	number	ID of the <code>snapshot</code> volume. If not specified, the system chooses an ID.
<code>snapshotWWN</code>	string	WWN	WWN of the snapshot Virtual Volume. With no <code>snapshotWWN</code> specified, a WWN is chosen automatically.
<code>readWrite</code>	boolean	boolean	Optional. A <code>True</code> setting applies read-write status to the snapshot. A <code>False</code> setting applies read-only status to the snapshot. Overrides the <code>readOnly</code> and <code>match</code> settings for the snapshot.

Success

A successful operation returns the HTTP status code `300 Multiple Choice` with a message body that describes the volume-to-snapshot-volume mapping for each volume in the volume group.

The response message body provides links to each volume and snapshot volume, as described in the following table:

Table 281: Response message body JSON members for volume group snapshot

Member	JSON type	API type	Description
<code>volumeName</code>	string	string	The volume name in the group snapshot.
<code>snapshotVolume</code>	string	string	The snapshot volume name for the volume.
<code>links</code>	Array of URL links	Array of URL links	The link to the volume <code>volumeName</code> and <code>snapshotVolume</code> . If you use <code>addToSet</code> , also returns a link to the specified volume set.

Errors

Table 282: Group snapshot error definitions

API error	HTTP code	Description
NON_EXISTENT_VOL	404 Not found	Specified parent volume does not exist
EXISTENT_VOL	400 Bad request	Specified snapshot volume already exists
INV_INPUT_INVALID_CHAR	400 Bad request	Invalid character in input
INV_INPUT_EXCEEDS_RANGE	400 Bad request	Volume id is out of range

Creating a physical copy of a volume

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/volumes/<volume_name>`

The `<volume_name>` parameter specifies the name of the volume to copy.

The request message body is a JSON object with two members as described in the following table.

Member	JSON type	API type	Description
action	string	string	Requires the value <code>createPhysicalCopy</code>
parameters	object	<ul style="list-style-type: none">• <u>Online or offline copies</u>• <u>Online copies only</u>• <u>Offline or unspecified copies only</u>	Setting depends on whether online is enabled or disable.

Table 283: Online or offline copies

Member	JSON type	API type	Ignored Values	Description
destVolume	string	name31	Required field.	Specifies the destination volume. (WSAPI 1.3 and later)
destCPG	string	name31	Null. Required if <code>online</code> is <code>true</code> . Not accepted if <code>online</code> is <code>false</code> .	Specifies the destination CPG for an online copy. (WSAPI 1.3 and later)
online	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) whether to perform the physical copy online. Defaults to <code>false</code> . (WSAPI 1.3 and later)
wwn	string	string	None.	Specifies the WWN of the online copy virtual volume.

Table 284: Online copies only

Member	JSON type	API type	Ignored values	Description
tpvv	boolean	boolean	None	Enables (<code>true</code>) or disables (<code>false</code>) whether the online copy is a TPVV. Defaults to <code>false</code> . <code>tpvv</code> and <code>tdvv</code> cannot be set to <code>true</code> at the same time. (WSAPI 1.3 and later)
tdvv	boolean	boolean	None	Enables (<code>true</code>) or disables (<code>false</code>) whether the online copy is a TDVV. Defaults to <code>false</code> . <code>tpvv</code> and <code>tdvv</code> cannot be set to <code>true</code> at the same time.
snapCPG	string	name31	Null	Specifies the snapshot CPG for an online copy. (WSAPI 1.3 and later)

Table Continued

Member	JSON type	API type	Ignored values	Description
skipZero	boolean	boolean	None.	<p>Enables (<code>true</code>) or disables (<code>false</code>) copying only allocated portions of the source VV from a thin provisioned source.</p> <p>Use only on a newly created destination, or if the destination was re-initialized to zero. Does not overwrite pre-existing data on the destination VV to match the source VV unless the same offset is allocated in the source.</p> <p>(WSAPI 1.3 and later)</p>
compression	boolean	boolean	Optional. Ignored if the value is <code>false</code> .	<p>For online copy only:</p> <p>Enables (<code>true</code>) or disables (<code>false</code>) compression of the created volume. Only <code>tpvv</code> or <code>tdvv</code> are compressed.</p> <p>Defaults to <code>false</code>.</p>

Table 285: Offline or unspecified copies only

Member	JSON type	API type	Ignored values	Description
saveSnapshot	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) saving the the snapshot of the source volume after completing the copy of the volume. Defaults to <code>false</code> (WSAPI 1.3 and later)
priority	number	<u>taskPriorityEnum</u>	Zero and negative numbers.	Does not apply to online copy. (WSAPI 1.3 and later)

Table 286: taskPriorityEnum

Symbol	Value	Description
HIGH	1	High priority.
MED	2	Medium priority.
LOW	3	Low priority.

Success

A successful operation returns the HTTP status code `201 CREATED`. The response `Location` header contains the destination-volume URI. The body of the JSON object returns the task ID of the physical-copy task.

Errors

Possible errors during the creation, resynchronization, or stopping of physical copies of volumes are shown in the table below. Certain fields are only valid based on the `onlinevalue` (`true` or `false`). Errors related to an incompatible parameter based on the online setting return a `code-42` for invalid use of fields with `online true/false`.

Table 287: Physical copies of volumes error codes

API Error	HTTP Code	Description
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Invalid volume name, CPG name, or WWN character.
NON_EXISTENT_CPG	404 Not Found	The CPG does not exist. (WSAPI 1.3 and later)
CPG_NOT_IN_SAME_DOMAIN	403 Forbidden	The CPG is not in the current domain. (WSAPI 1.3 and later)
NON_EXISTENT_VOL	404 Not Found	The volume does not exist. (WSAPI 1.3 and later)
VV_NOT_IN_SAME_DOMAIN	403 Forbidden	The volume is not in the current domain. (WSAPI 1.3 and later)
INV_INPUT_BAD_ENUM_VALUE	400 Bad Request	The priority value is not in the valid range (1–3). (WSAPI 1.3 and later)
EXISTENT_VOL	409 Conflict	The volume already exists. (WSAPI 1.3 and later)
INV_OPERATION_VV_SYS_VOLUME	403 Forbidden	The volume is a system volume. This operation is not allowed on a system volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_NON_BASE_VOLUME	403 Forbidden	The destination volume is not a base volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_IN_REMOTE_COPY	403 Forbidden	The destination volume is involved in Remote Copy. (WSAPI 1.3 and later)
INV_OPERATION_VV_EXPORTED	403 Forbidden	The volume is exported. (WSAPI 1.3 and later)
INV_OPERATION_VV_COPY_TO_SELF	403 Forbidden	The destination volume is the same as the parent volume (WSAPI 1.3 and later)

Table Continued

API Error	HTTP Code	Description
INV_OPERATION_VV_READONLY_SNAPSHOT	403 Forbidden	The parent volume is a read-only snapshot. (WSAPI 1.3 and later)
INV_OPERATION_VV_COPY_TO_BASE	403 Forbidden	The destination volume is the base volume of a parent volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_VOLUME_CONV_IN_PROGRESS	409 Conflict	The volume is in a conversion operation. (WSAPI 1.3 and later)
INV_OPERATION_VV_NO_SNAPSHOT_ALLOWED	403 Forbidden	Invalid operation: The parent volume must allow snapshots. (WSAPI 1.3 and later)
INV_OPERATION_VV_ONLINE_COPY_IN_PROGRESS	409 Conflict	The volume is the target of an online copy. (WSAPI 1.3 and later)
INV_OPERATION_VV_CLEANUP_IN_PROGRESS	403 Forbidden	Cleanup of internal volume for the volume is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_CIRCULAR_COPY	403 Forbidden	The parent volume is a copy of the destination volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_PEER_VOLUME	403 Forbidden	The operation is not allowed on a peer volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_INTERNAL_VOLUME	403 Forbidden	The operation is not allowed on an internal volume. (WSAPI 1.3 and later)
VV_IS_BEING_REMOVED	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
INV_OPERATION_VV_NOT_IN_NORMAL_STATE	403 Forbidden	The volume is not in the normal state. (WSAPI 1.3 and later)

Table Continued

API Error	HTTP Code	Description
VV_IN_INCONSISTENT_STATE	403 Forbidden	The volume has an internal consistency error. (WSAPI 1.3 and later)
INV_OPERATION_VV_PCOPY_IN_PROGRESS	409 Conflict	The destination volume has a physical copy in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_FAILED_ONLINE_COPY	409 Conflict	Online copying of the destination volume has failed. (WSAPI 1.3 and later)
INV_OPERATION_VV_COPY_PARENT_TOO_BIG	409 Conflict	The size of the parent volume is larger than the size of the destination volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_NO_PARENT	403 Forbidden	The volume has no physical parent. (WSAPI 1.3 and later)
IN_USE	409 Conflict	The resynchronization snapshot is in use. (WSAPI 1.3 and later)
VV_IN_STALE_STATE	403 Forbidden	The volume is in a stale state. (WSAPI 1.3 and later)
NON_EXISTENT_VVCOPY	404 Not Found	Physical copy not found. (WSAPI 1.3 and later)
INV_OPERATION_VV_PCOPY_ONLINE	409 Conflict	Only valid for online operation.
OTHER	400 Bad Request	WWN <wwn> is used.

More information

[WSAPI error codes and descriptions](#) on page 34

Resynchronizing a physical copy to its parent volume or stopping a physical copy

Use the HTTP PUT method with the following URI:

https://<storage_system>:8080/api/vi/volumes/<volume_name>

The <volume_name> parameter specifies the name of the destination volume you want to resynchronize.

The request message body has a single JSON object member, *action*, as described in the following table.

Table 288: Request message body JSON object for resynchronizing

Member	JSON type	API type	Description
<code>action</code>	number	<u>Volume custom action enumeration</u>	Specifies the action to resynchronize (resyncPhysicalCopy) or stop (stopPhysicalCopy) a physical copy. Do not use with other volume modification fields.

Success

A successful request to resynchronize the physical copy of a volume to its parent volume returns the HTTP code 200 OK. The response message body includes the task ID of the physical-copy resynchronization. A physical-copy stop action returns an empty response message body.

Errors

Possible errors during the creation, resynchronization, or stopping of physical copies of volumes are shown in **Physical copies of volumes error codes**.

More information

[WSAPI error codes and descriptions](#) on page 34

Promoting a virtual copy

To promote the changes from a virtual copy back onto the base volume, thereby overwriting the base volume with the virtual copy, use the HTTP PUT method on the following URI:

`https://<storage_system>:8080/api/vi/volumes/<virtual_copy_name>`

The `<virtual_copy_name>` parameter specifies the name of the virtual copy to be promoted.

The request message body is a JSON object with members as described in the following table.

Table 289: Request message body JSON objects for promoting a virtual copy

Member	JSON type	API type	Ignored Values	Description
<code>action</code>	number	<u>Volume custom action enumeration</u>	Required field.	Specifies whether to initiate the promote task(promoteVirtualCopy) or stop (stopPromoteVirtualCopy) the promote task.
<code>online</code>	boolean	boolean		Enables (true) or disables (false) executing the promote operation on an online volume. The default setting is false.

Table Continued

Member	JSON type	API type	Ignored Values	Description
priority	number	See, taskPriorityEnum enumeration	Zero and negative numbers.	Does not apply to online promote operation or to stop promote operation.
allowRemoteCopyParent	boolean	boolean		Allows the promote operation to proceed even if the RW parent volume is currently in a Remote Copy volume group, if that group has not been started. If the Remote Copy group has been started, this command fails. (WSAPI 1.6 and later.)

Success

A successful copy promotion returns the HTTP code 200 OK. The message body shows the task ID of the promote operation as well as an array of links, including one that contains an href to itself ("self").

A successful stop of the promoteVirtualCopy task returns the HTTP code 200 Ok, with an empty message body.

Errors

Table 290: Virtual copy promotion error codes

API Error	HTTP Code	Description
VV_NOT_STARTED	403 Forbidden	The volume is not started. (WSAPI 1.3 and later)
VV_IS_BEING_REMOVED	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
VV_IN_STALE_STATE	403 Forbidden	The volume is in a stale state. (WSAPI 1.3 and later)
INV_OPERATION_CANNOT_STOP_ONLINE_PROMOTE	403 Forbidden	Invalid operation: The online promote cannot be stopped. Instead, use canceltask. (WSAPI 1.3 and later.1 with 3PAR OS 3.1.3 MU1)

Table Continued

API Error	HTTP Code	Description
INV_OPERATION_VV_BASE_VOLUME	409 Conflict	Invalid operation: The volume is a base volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_PCOPY_IN_PROGRESS	409 Conflict	The volume has a copy in progress. (WSAPI 1.3 and later)
INV_OPERATION_PARENT_PCOPY_IN_PROGRESS	403 Forbidden	Invalid operation: The parent is involved in a physical copy. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_TUNE_IN_PROGRESS	409 Conflict	Invalid operation: Volume tuning is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_IN_REMOTE_COPY	403 Forbidden	The volume is involved in Remote Copy. (WSAPI 1.3 and later)
INV_OPERATION_PARENT_VV_EXPORTED	403 Forbidden	Invalid operation: The parent volume is exported. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_EXPORTED	403 Forbidden	The parent volume is exported. (WSAPI 1.3 and later)
INV_OPERATION_PROMOTE_TARGET_NOT_BASE_VV	403 Forbidden	Invalid operation: The promote target is not a base volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_PARENT_SIZE_HAS_INCREASED	409 Conflict	Invalid operation: The parent volume size has increased. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_PARAM_CONFLICT	409 Conflict	Invalid Input: Parameters cannot be present at the same time.

Table Continued

API Error	HTTP Code	Description
INV_OPERATION_VV_IS_BUSY	409 Conflict	Invalid operation: Volume is currently busy. (WSAPI 1.3 and later)
INV_OPERATION_VV_PROMOTE_IN_PROGRESS	409 Conflict	Invalid operation: Volume promotion is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_PROMOTE_IS_NOT_IN_PROGRESS	409 Conflict	Invalid operation: Volume promotion is not in progress. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)

More information

[WSAPI error codes and descriptions](#) on page 34

Creating a VV-set snapshot

- ❗ **IMPORTANT:** Any user with the Super or Edit role or any role granted `sv_create` permission (for snapshots) can create a VV-set snapshot.

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/volumesets/<volume_set_name>`

The `<volume_set_name>` parameter specifies the name of the VV set to copy.

The request message body is a JSON object with two members, as described in the following table.

Member	JSON type	API type	Description
action	string	string	Requires the value <code>createSnapshot</code>
parameters	object	See, snapshot creation parameters	Parameters required to create a snapshot of the volume set.

Success

A successful creation of the VV-set snapshot returns HTTP status code `HTTP_CREATED`. The response includes a message body JSON object as specified in the following table.

Table 291: Message body JSON objects for creating a volume set snapshot

Member	JSON type	API type	Ignored Values	Description
links	array	Array of URL links		Includes an array of links, including the self-URL. If you included the <code>addToSet</code> member, the response also includes a link to the <code>volumeset</code> .

Errors

Table 292: VV-set snapshot creation error codes

API Error	HTTP Code	Description
INVALID_INPUT_VV_PATTERN	400 Bad Request	Invalid volume pattern specified. (WSAPI 1.3 and later)
NON_EXISTENT_SET	404 Not Found	The set does not exist. (WSAPI 1.3 and later)
EMPTY_SET	404 Not Found	The set is empty. (WSAPI 1.3 and later)
VV_LIMIT_REACHED	503 Service Unavailable	Maximum number of volumes has been reached. (WSAPI 1.3 and later)
NON_EXISTENT_VOL	404 Not Found	The storage volume does not exist.
VV_IS_BEING_REMOVED	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
INV_OPERATION_VV_READONLY_TO_READONLY_SNAP	403 Forbidden	Creating a read-only copy from a read-only volume is not permitted. (WSAPI 1.3 and later)
NO_SNAP_CPG	409 Conflict	No snapshot CPG has been configured for the volume. (WSAPI 1.3 and later)
INV_INPUT_DUP_NAME	400 Bad Request	Invalid input. (WSAPI 1.3 and later)

Table Continued

API Error	HTTP Code	Description
INV_OPERATION_VV_SNAP_PARENT_SAME_BASE	403 Forbidden	Two parent snapshots share the same base volume. (WSAPI 1.3 and later)
INV_OPERATION_VV_ONLINE_COPY_IN_PROGRESS	409 Conflict	Invalid operation. Online copy is in progress. (WSAPI 1.2 and later)
VV_ID_LIMIT_REACHED	503 Service Unavailable	Maximum number of volume IDs has been reached. (WSAPI 1.3 and later)
EXISTENT_VOL	409 Conflict	The storage volume already exists.
VV_IN_STALE_STATE	403 Forbidden	The volume is stale. (WSAPI 1.3 and later)
VV_NOT_STARTED	403 Forbidden	The volume is not started. (WSAPI 1.3 and later)
VV_UNAVAILABLE	403 Forbidden	The volume is not accessible. (WSAPI 1.3 and later)
SNAPSHOT_LIMIT_REACHED	503 Service Unavailable	Maximum number of snapshots has been reached. (WSAPI 1.3 and later)
CPG_ALLOCATION_WARNING_REACHED	503 Service Unavailable	The CPG has reached the allocation warning. (WSAPI 1.3 and later)
INV_OPERATION_VV_VOLUME_CONV_IN_PROGRESS	409 Conflict	Invalid operation: Volume conversion is in progress (WSAPI 1.2 and later)
INV_OPERATION_VV_CLEANUP_IN_PROGRESS	403 Forbidden	Internal volume cleanup is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_PEER_VOLUME	403 Forbidden	The operation is not allowed on a peer volume. (WSAPI 1.2 and later)
INV_OPERATION_VV_ONLINE_COPY_IN_PROGRESS	409 Conflict	Invalid operation: Online copy is in progress. (WSAPI 1.2 and later)

Table Continued

API Error	HTTP Code	Description
INV_OPERATION_VV_INTERNAL_VOLUME	403 Forbidden	The operation is not allowed on an internal volume. (WSAPI 1.2 and later)
EXISTENT_ID	409 Conflict	An ID exists.
INV_OPERATION_VV_NOT_IN_NORMAL_STATE	403 Forbidden	The volume state is not normal. (WSAPI 1.3 and later)
VV_IN_INCONSISTENT_STATE	403 Forbidden	The volume has an internal inconsistency error. (WSAPI 1.3 and later)
INV_INPUT_RETAIN_GT_EXPIRE	400 Bad Request	The volume retention time is greater than the expiration time.
INV_INPUT_TIME	400 Bad Request	Invalid time specified.
INV_OPERATION_SNAPSHOT_NOT_SAME_TYPE	403 Forbidden	Some snapshots in the volume set are read-only, some are read-write. (WSAPI 1.4 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Creating a physical copy of a VV set

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/volumesets/<volume_set_name>`

The `<volume_set_name>` parameter specifies the name of the VV set to copy.

The request message body is a JSON object with two members, as described in the following table.

Table 293: Request message body JSON object members for physical copy of a vv-set

Member	JSON type	API type	Ignored Values	Description
action	string	string	Required field	Requires the value <code>createPhysicalCopy</code> .
parameters	object	See, parameters for VV set physical copy	Required field	Parameters required to create a physical copy of the volume set.

Table 294: parameters for VV set physical copy

Member	JSON type	API type	Ignored Values	Description
destVolume	string	name31	None. Required field.	Specifies the destination volume set. WSAPI 1.3
saveSnapshot	boolean	boolean		Enables (<code>true</code>) or disables (<code>false</code>) whether to save the source volume snapshot after completing VV set copy. (WSAPI 1.3)
priority	number	See, <u>taskPriorityEnum enumeration</u>	Zero and negative values. The default is medium.	Task priority. (WSAPI 1.3 and later)

Success

A successful operation returns the HTTP status code 201 `Created`.

The `Location` portion of the response header contains the URI for the newly created physical copy of the VV set, in the following format:

```
api/v1/volumesets/<volume_set_name>
```

The response message body returns an array of JSON objects for each volume in the parent VV set, as described in the following table.

Table 295: JSON objects for each volume

Member	JSON type	API type	Description
child	string	name31	Specifies the destination volume.
parent	string	name31	Specifies the parent volume.
taskid	integer	int32	The task ID for the physical-cop task.

For information about checking the status of a physical-copying task, see **Querying the status of all tasks**.

Errors

Possible error codes for creating physical copies of VV sets are shown in the table below, and in **Physical copies of volumes error codes**.

Table 296: Physical copy of a VV set error codes

API Error	HTTP Code	Description
NON_EXISTENT_SET	404 Not Found	The set does not exist. (WSAPI 1.3 and later)
SET_SIZE_NOT_SAME	400 Bad Request	The set sizes are different. (WSAPI 1.3 and later)
INV_INPUT_EMPTY_VVSET	400 Bad Request	The VV set is empty. (WSAPI 1.3 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Resynchronizing or stopping a VV set physical copy

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/vi/volumesets/<volume_set_name>`

The `<volume_set_name>` specifies the name of the destination VV set to resynchronize.

The request message body has a single JSON object member, `action`.

For a request to resynchronize a physical-copy, the request message body can have `priority` and `action` JSON object members, as described in the following table.

The message body of a request to stop a physical copy of a VV set is empty.

Table 297: Request message body JSON objects for resynchronizing a VV set

Member	JSON type	API type	Ignored Values	Description
<code>priority</code>	number	See, taskPriorityEnum enumeration	Zero and negative values.	Defaults to medium priority. (WSAPI 1.3 and later)
<code>action</code>	number	See, VV set custom action enumeration	Zero and negative values.	Action to perform. Required for resynchronizing or stopping a physical copy.

Table 298: VV set custom action enumeration

Symbol	Value	Description
memAdd	1	Adds a member to the VV set. (WSAPI 1.3 and later)
memRemove	2	Removes a member from the VV set. (WSAPI 1.3 and later)
resyncPhysicalCopy	3	Resynchronize the physical copy to its VV set. (WSAPI 1.3 and later)
stopPhysicalCopy	4	Stops the physical copy. (WSAPI 1.3 and later)
promoteVirtualCopy	5	Promote virtual copies in a VV set. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
stopPromoteVirtualCopy	6	Stops the promote virtual copy operations in a VV set. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)

Success

A successful resynchronizing operation returns the HTTP status code 200 OK, as well as an array of task IDs for each of the volumes in the VV set. For information on each member of the array, see **Task ID JSON objects for creating a physical copy of a VV set or for resynchronizing a physical copy to a VV set**.

A successful physical-copy stop action returns the HTTP status code 200 OK with an empty response body.

Errors

For possible errors following a request to synchronize a physical copy to its VV set, or for stopping the physical copy of a VV set, see **Errors**.

Promoting a VV-set virtual copy

Use the HTTP PUT method on the following URI:

https://<storage_system>:8080/api/vi/volumesets/<volume_set_name>

The <volume_set_name> specifies the name of the VV set containing virtual copies that need to be promoted or stopped.

The message body is a JSON object with members as described in the following table.

Table 299: Request message body JSON objects for promoting a VV-set virtual copy

Member	JSON type	API type	Ignored Values	Description
action	number	See, <u>VV set custom action enumeration</u>	Required field.	Specifies whether to initiate the promote task(promoteVirtualCopy) or stop (stopPromoteVirtualCopy) the promote task.
Online	boolean	boolean		Enables (true) or disables (false) executing the promote operation on an online volume. Defaults to false.
priority	number	See, <u>taskPriorityEnum enumeration</u>	Zero and negative numbers.	Does not apply to online promote operation or to stop promote operation.
allowRemoteCopyParent	boolean	boolean		Allows the promote operation to proceed even if the RW parent volume is currently in a Remote Copy volume group, if that group has not been started. If the Remote Copy group has been started, this command fails.

Success

A successful copy promotion returns the HTTP code 200 OK. The message body shows an array of task IDs for each of the virtual copies in the VV set, as well as an array of links which, by default, contain an href to "self".

A successfully stopped VV-set virtual copy promote operation returns the HTTP code 200 OK with no message body.

VV set copy promotion response

```
{
  tasks: [2]
    -0 {
      taskid: 7650
    }
    -1 {
      taskid: 7651
    }
  links: [ 1 ]
    - 0: {
      href: "https://<server_name>:8080/api/v1/volumesets/vvset"
      rel: "self"
    }
  }
```

Errors

Table 300: VV-set virtual-copy promotion error codes

API Error	HTTP Code	Description
VV_NOT_STARTED	403 Forbidden	The volume is not started. (WSAPI 1.3 and later)
VV_IS_BEING_REMOVED	403 Forbidden	The volume is being removed. (WSAPI 1.3 and later)
VV_IN_STALE_STATE	403 Forbidden	The volume is in a stale state. (WSAPI 1.3 and later)
INV_OPERATION_CANNOT_STOP_ONLINE_PROMOTE	403 Forbidden	Invalid operation: The online promote cannot be stopped. Instead, use canceltask. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_BASE_VOLUME	409 Conflict	Invalid operation: The volume is a base volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_PCOPY_IN_PROGRESS	409 Conflict	The volume has a copy in progress. (WSAPI 1.3 and later)
INV_OPERATION_PARENT_PCOPY_IN_PROGRESS	403 Forbidden	Invalid operation: The parent is involved in a physical copy. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_VV_TUNE_IN_PROGRESS	409 Conflict	Invalid operation: Volume tuning is in progress. (WSAPI 1.3 and later)
INV_OPERATION_VV_IN_REMOTE_COPY	403 Forbidden	The volume is involved in Remote Copy. (WSAPI 1.3 and later)
INV_OPERATION_PARENT_VV_EXPORTED	403 Forbidden	Invalid operation: The parent volume is exported. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)

Table Continued

API Error	HTTP Code	Description
INV_OPERATION_VV_EXPORTED	403 Forbidden	The parent volume is exported. (WSAPI 1.3 and later)
INV_OPERATION_PROMOTE_TARGET_NOT_BASE_VV	403 Forbidden	Invalid operation: The promote target is not a base volume. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_PARENT_SIZE_HAS_INCREASED	409 Conflict	Invalid operation: The parent volume size has increased. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_PARAM_CONFLICT	409 Conflict	Invalid Input: Parameters cannot be present at the same time.
INV_OPERATION_VV_IS_BUSY	409 Conflict	Invalid operation: Volume is currently busy. (WSAPI 1.3 and later)
INV_OPERATION_VV_PROMOTE_IN_PROGRESS	409 Conflict	Invalid operation: Volume promotion is in progress. (WSAPI 1.3 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying the status of a VV-set physical copy

To query the status of a VV-set physical copy, use the task ID returned after creating the physical-copy or the resynchronization operation response. Be sure to check the status of the task. For information about querying task status, see [Querying the status of all tasks](#).

Updating virtual copies or VV-sets

Use the HTTP POST method with the following URI:

`https://<storage_server>:8080/api/v1/volumes/`

The request message body is a JSON object with two members, as described in the following table.

Table 301: Request message body JSON object members for updating virtual copies or vv-sets

Member	JSON type	API type	Ignored Values	Description
action	number	See, <u>Volume custom action enumeration</u>	Required field	Specifies the action to be taken for the specified volume.
parameters	object	See, <u>parameters for virtual volume or volume set update</u>	Required field	Specifies the parameter of the volume/ volume set update action.

Table 302: parameters for virtual volume or volume set update

Member	JSON type	API type	Ignored values	Description
volumeSnapshotList	Array of string	Name31	Required field.	List one or more volume snapshots to update. If specifying a vvset, use the following format <code>set:vvset_name</code> .
readOnly	boolean	boolean	None.	Specifies that if the virtual copy is read-write, the command updates the read-only parent volume also.

Success

A successful update returns the HTTP code 200 OK.

- ❗ **IMPORTANT:** To update each snapshot volume, generate an ACL using the `setuseracl` CLI command so that the user has permission to update the specified virtual volumes.

Errors

Table 303: Virtual copy update error codes

API code	HTTP code	Description
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed with promote

HPE 3PAR Remote Copy

❗ **IMPORTANT:** WSAPI 1.4 and later support several HPE 3PAR Remote Copy actions. Because the Remote Copy group members object defined in both WSAPI 1.4.0 and WSAPI 1.4.1 are obsolete, Hewlett Packard Enterprise recommends using WSAPI 1.4.2 or later.

For more information about using 3PAR Remote Copy, see the *HPE 3PAR Remote Copy Software User Guide*, available from the **HPE Storage Information Library**.

License information

Hewlett Packard Enterprise 3PAR Remote Copy requires a minimum of two 3PAR StoreServ Storage systems. In addition, you must have 3PAR Multi-system Software Suite licenses for all storage systems participating in Remote Copy replication. For more information about licensing and features, see the 3PAR StoreServ Storage concepts guide.

Managing Remote Copy groups using WSAPI

WSAPI provides a number of processes for managing Remote Copy groups.

Creating a Remote Copy group

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/remotecopygroups`

The request includes message body JSON objects as described in the following table.

Table 304: Message body JSON objects for creating a Remote Copy group

Member	JSON type	API type	Ignored Values	Description
name	string	name31	Required field.	Specifies the name of the Remote Copy group to create.
domain	string	name31	Optional field.	Specifies the domain in which to create the Remote Copy group.
targets	array of object	<u>remoteCopyTarget objects</u>	Required field.	Specifies the attributes of the target of the Remote Copy group.

Table Continued

Member	JSON type	API type	Ignored Values	Description
localUserCPG	string	name31	Required if you specify localSnapCPG; Otherwise, optional.	Specifies the local user CPG used for auto-created volumes.
localSnapCPG	string	name31	Required if you specify localUserCPG; Otherwise, optional.	Specifies the local snap CPG used for auto-created volumes.

Table 305: remoteCopyTarget objects

Member	JSON type	API type	Ignored Values	Description
targetName	string	name31	Required field.	Specifies the target name associated with the Remote Copy group to be created.
mode	number	rcopyGroupModeEnum	Required field.	Specifies the volume group mode.
userCPG	string	name31	Required if you specify localUserCPG; Otherwise, optional.	Specifies the user CPG used for auto-created target volumes.
snapCPG	string	name31	Required if you specify localSnapCPG; Otherwise, optional.	Specifies the snap CPG used for auto-created target volumes.

Table 306: rcopyGroupModeEnum

Symbol	Value	Description
SYNC	1	Remote Copy group mode is synchronous.
PERIODIC	2	Remote Copy group mode is periodic. Although WSAPI 1.5 and later supports PERIODIC 2, Hewlett Packard Enterprise recommends using PERIODIC 3.

Table Continued

Symbol	Value	Description
PERIODIC	3	Remote Copy group mode is periodic. (WSAPI 1.5 and later)
ASYNC	4	Remote Copy group mode is asynchronous. (WSAPI 1.5 and later)

Success

A successful creation of a Remote Copy group returns the HTTP code 201 `CREATED`. The response body contains a link to the newly created Remote Copy group.

remoteCopyGroupCreated

```
{
  "links": [1]
-0: {
  "rel": "remoteCopyGroupCreated",
  "href": "https://<server_name>:8080/api/v1/remotecopygroups/<group_name>"
}
}
```

Errors

Table 307: Remote Copy group creation error codes

API Error	HTTP Code	Description
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Invalid character in the Remote Copy group or volume name.
EXISTENT_RCOPY_GROUP	404 Not Found	The Remote Copy group already exists.
RCOPY_GROUP_TOO_MANY_TARGETS	409 Conflict	Too many Remote Copy group targets have been specified.
INV_INPUT_BAD_ENUM_VALUE	400 Bad Request	The mode is not valid.
RCOPY_GROUP_TARGET_NOT_UNIQUE	400 Bad Request	The Remote Copy group target is not unique.
RCOPY_IS_NOT_READY	403 Forbidden	The Remote Copy configuration is not ready for commands.

Table Continued

API Error	HTTP Code	Description
RCOPY_GROUP_MODE_NOT_SUPPORTED	403 Forbidden	The Remote Copy group mode is not supported.
RCOPY_GROUP_MAX_GROUP_REACHED_PERIODIC	409 Conflict	The maximum number of Remote Copy groups in periodic mode has been reached.
RCOPY_GROUP_MAX_GROUP_REACHED_SYNC	409 Conflict	The maximum number of Remote Copy groups in synchronous mode has been reached.
RCOPY_GROUP_SECONDARY_GROUP_MORE_THAN_ONE_BACKUP_TARGET	403 Forbidden	Secondary groups should have only one target that is not a backup.
RCOPY_GROUP_MORE_THAN_ONE_SYNC_TARGET	503 Service Unavailable	Remote Copy groups can have no more than one synchronous-mode target.
RCOPY_GROUP_MORE_THAN_ONE_PERIODIC_TARGET	503 Service Unavailable	Remote Copy groups can have no more than one periodic-mode target.
RCOPY_GROUP_ONE_TO_ONE_CONFIG_FOR_MIXED_MODE	403 Forbidden	Mixed mode is supported in a 1-to-1 Remote Copy configuration.
RCOPY_GROUP_INV_TARGET	403 Forbidden	The specified target is not a target of the Remote Copy group.
RCOPY_TARGET_IN_PEER_PERSISTENCE_SYNC_GROUP_ONLY	501 NOT IMPLEMENTED	The Remote Copy target is configured with peer persistence; only synchronous groups can be added.
RCOPY_TARGET_MODE_NOT_SUPPORTED	501 NOT IMPLEMENTED	The Remote Copy target mode is not supported.

Table Continued

API Error	HTTP Code	Description
RCOPY_TARGET_MULTI_TARGET_NOT_SUPPORTED	501 NOT IMPLEMENTED	The Remote Copy target was created in an earlier version of the 3PAR OS that does not support multiple targets.
RCOPY_TARGET_VOL_AUTO_CREATION_NOT_SUPPORTED	501 NOT IMPLEMENTED	The Remote Copy target is in an older version of the 3PAR OS that does not support autocreation of volumes.
RCOPY_GROUP_MIXED_MODES_ON_ONE_TARGET	400 Bad Request	Remote Copy groups with different modes on a single target are not supported.
NON_EXISTENT_CPG	404 Not Found	The CPG does not exist.
CPG_NOT_IN_SAME_DOMAIN	403 Forbidden	The CPG is not in the same domain as the Remote Copy group. (WSAPI 1.2 and later)
NON_EXISTENT_DOMAIN	404 Not Found	The domain does not exist.
RCOPY_GROUP_HAS_NO_CPG	403 Forbidden	No CPG has been defined for the Remote Copy group on the target.
RCOPY_MAX_SYNC_TARGET_REACHED	503 Service Unavailable	The maximum number of Remote Copy synchronous targets has been reached.
RCOPY_MAX_PERIODIC_TARGET_REACHED	503 Service Unavailable	The maximum number of Remote Copy periodic targets has been reached.
RCOPY_GROUP_INV_POLICY_FOR_GROUP_TARGET	403 Forbidden	The policy is not valid for Remote Copy group's target

More information

[WSAPI error codes and descriptions](#) on page 34

Modifying a Remote Copy group

Use the HTTP PUT method with the following URI, with a request message body as defined in the following table.

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>`

Table 308: Request message body JSON objects for modifying a Remote Copy group

Member	JSON type	API type	Ignored Values	Description
localUserCPG	string	name31	Optional	Specifies the local user CPG for use by autocreated volumes. Specify together with: <ul style="list-style-type: none">localSnapCPGremoteUserCPGremoteSnapCPG (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
localSnapCPG	string	name31	Optional	Specifies the local snap CPG for use by autocreated volumes. Specify together with: <ul style="list-style-type: none">localSnapCPGremoteUserCPGremoteSnapCPG (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
targets	array of objects	<u>modifyRemoteCopyTarget</u>	Optional	Specifies the attributes of the Remote Copy group target. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)

Table Continued

Member	JSON type	API type	Ignored Values	Description
unsetUserCPG	boolean	boolean	Optional	Enables (<code>true</code>) or disables (<code>false</code>) setting the <code>localUserCPG</code> and <code>remoteUserCPG</code> of the Remote Copy group. Defaults to <code>false</code> . (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
unsetSnapCPG	boolean	boolean	Optional	Enables (<code>true</code>) or disables (<code>false</code>) setting the <code>localSnapCPG</code> and <code>remoteSnapCPG</code> of the Remote Copy group. Defaults to <code>false</code> . (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)

Table 309: modifyRemoteCopyTarget

Member	JSON type	API type	Ignored Values	Description
targetName	string	name31	Optional. Required when the syncPeriod, rmSyncPeriod, mode, and CPG parameters are specified. Not required or ignored when unset CPG parameters are used. Not mandatory when policies are specified.	Specifies the target name associated with the created Remote Copy group. Specify together with: <ul style="list-style-type: none"> • localSnapCPG • remoteUserCPG • remoteSnapCPG (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
remoteUserCPG	string	name31	Optional	Specifies the user CPG on the target used by autocreated volumes. Specify together with: <ul style="list-style-type: none"> • localSnapCPG • localUserCPG • remoteSnapCPG (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
remoteSnapCPG	string	name31	Optional	Specifies the snap CPG on the target for use by autocreated volumes. Specify together with: <ul style="list-style-type: none"> • localSnapCPG • localUserCPG • remoteUserCPG (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)

Table Continued

Member	JSON type	API type	Ignored Values	Description
syncPeriod	number	int32	Optional	Specifies periodic synchronization of asynchronous periodic Remote Copy groups to the <period_value>. Range is 300–31622400 seconds (1 year). (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
rmSyncPeriod	boolean	boolean	Optional Ignored if false, the syncPeriod value is 0 (zero).	Enables (true) or disables (false) resetting the syncPeriod time to 0 (zero). If false, and the syncPeriod value is positive, the synchronizaiton period is set. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
mode	number	<u>rcopyGroupModeEnum enumeration</u>	Optional	Volume group mode.
snapFrequency	number	int32	Optional	Async mode only. Specifies the interval in seconds at which Remote Copy takes coordinated snapshots. Range is 300–31622400 seconds (1 year). (WSAPI 1.5 and later)

Table Continued

Member	JSON type	API type	Ignored Values	Description
rmSnapFrequency	boolean	boolean	Optional. Ignored if false and the snapFrequency value is 0 (zero).	Enables (true) or disables (false) resetting the snapFrequency time to 0 (zero). If false, and the snapFrequency value is positive, sets the snapFrequency value. (WSAPI 1.5 and later)
policies	object	<u>policy objects</u>	Optional.	The policy assigned to the Remote Copy group. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)

Table 310: policy objects

Member	JSON type	API type	Ignored Values	Description
autoRecover	boolean	boolean		If the Remote Copy is stopped as a result of links going down, the Remote Copy group can be automatically restarted after the links come back up. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
overPeriodAlert	boolean	boolean		If synchronization of an asynchronous periodic Remote Copy group takes longer to complete than its synchronization period, an alert is generated. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
autoFailover	boolean	boolean		Automatic failover on a Remote Copy group. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)

Table Continued

Member	JSON type	API type	Ignored Values	Description
<code>pathManagement</code>	boolean	boolean		Automatic failover on a Remote Copy group. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
<code>multiTargetPeerPersistence</code>	boolean	boolean		Specifies that the group is participating in a Multi-target Peer Persistence configuration. The group must have two targets, one of which must be synchronous. The synchronous group target also requires <code>pathManagement</code> and <code>autoFailover</code> policy settings.

Parameters for Remote Copy group modification

Remote Copy modification parameter sets

Specify one set of Remote Copy modification parameters only in a request. If you specify more than one set of parameters, WSAPI returns an error. The sets are as follows:

- Remote Copy group `policies`
- Remote Copy group `mode`
- Remote Copy group `syncPeriod`
- Remote Copy group CPG parameters:
 - `localUserCPG`
 - `localSnapCPG`
 - `remoteUserCPG`
 - `remoteSnapCPG`
- Unset CPG parameters:
 - `unsetUserCPG`
 - `unsetSnapCPG`

SLD Remote Copy modification parameters

On an SLD Remote Copy setup:

- Set CPG parameters for all the targets of the Remote Copy group
- Specifying one target when setting policies sets the policy for the entire Remote Copy group. Specifying more than one target returns an error.
- Specify the following parameters one target of the Remote Copy group at a time:
 - mode
 - syncPeriod
 - rmSyncPeriod

Success

A successful request to modify a Remote Copy group returns the HTTP code 200 OK.

Unless an internal server error occurs, the `Location` portion of the response header contains the URI for the Remote Copy volume group, as specified in the following table.

Table 311: JSON objects for Remote Copy modification request

Member	JSON type	API type	Description
links	array of URL links	array of URL links	Self URL for <group_name>. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)

Errors

Table 312: Remote Copy group modification error codes

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	The Remote Copy group does not exist. (WSAPI 1.4)
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	403 Forbidden	The operation should be performed only on the primary side. Group settings can be changed only on primary Remote Copy groups. (WSAPI 1.4)
RCOPY_GROUP_IS_NOT_PERIODIC	403 Forbidden	Target in group is not periodic. (WSAPI 1.4)
RCOPY_GROUP_INV_POLICY_FOR_PERIODIC_GROUP	403 Forbidden	Invalid policy for a periodic group. (WSAPI 1.4)

Table Continued

API Error	HTTP Code	Description
RCOPY_GROUP_INV_POLICY_FOR_SYNC_GROUP	403 Forbidden	Invalid policy for a synchronous target. The <code>over_per_alert</code> and <code>no_over_per_alert</code> policies are valid for asynchronous periodic groups only. The target is not in asynchronous periodic mode. (WSAPI 1.4.2 and later with 3PAR OS 3.2.1 MU2)
NON_EXISTENT_CPG	404 Not Found	The CPG does not exist. (WSAPI 1.4)
RCOPY_GROUP_INV_TARGET	403 Forbidden	The specified target is not a target of the Remote Copy group. (WSAPI 1.4)
CPG_NOT_IN_SAME_DOMAIN	403 Forbidden	The snap CPG is not in the same domain as the user CPG. (WSAPI 1.2 and later)
INV_INPUT_BELOW_RANGE	400 Bad Request	The minimum allowable period is 300 seconds. (WSAPI 1.3 and later)
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	Invalid input: the period is too long. (WSAPI 1.3 and later)
RCOPY_GROUP_STARTED	403 Forbidden	The Remote Copy group has already been started. (WSAPI 1.4)
RCOPY_GROUP_INV_OPERATION_ON_MULTIPLE_TARGETS	403 Forbidden	The operation is not supported on multiple targets. (WSAPI 1.4.2 and later with 3PAR OS 3.2.1 MU2)
RCOPY_GROUP_TARGET_NOT_UNIQUE	400 Bad Request	The Remote Copy group target is not unique. (WSAPI 1.4)

Table Continued

API Error	HTTP Code	Description
RCOPY_GROUP_IS_NOT_ASYNC	403 Forbidden	Target in group is not async.. (WSAPI 1.5 and later)
RCOPY_GROUP_INV_TARGET_NUMBER	403 Forbidden	The wrong number of targets is specified for the Remote Copy group. (WSAPI 1.4)

More information

[WSAPI error codes and descriptions](#) on page 34

Starting a Remote Copy group

Use the HTTP PUT method with the following URI, and a request message body as described in the following table.

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>`

Table 313: Message body JSON objects for starting a Remote Copy group

Member	JSON type	API type	Ignored Values	Description
<code>action</code>	number	<u>remoteCopyGroupPUTOperation enumeration</u>	Required field.	Specifies the action to be taken for the specified volume group—in this case, <code>START_GROUP</code> .
<code>skipInitialSync</code>	number	boolean	None.	If <code>true</code> , the volume should skip the initial synchronization and sets the volumes to a synchronized state. The default setting is <code>false</code> .
<code>targetName</code>	string	name31	None	The target name associated with this group.
<code>startingSnapshots</code>	array of objects	<u>startingSnapshotPairs</u>	None	When used, you must specify all the volumes in the group. While specifying the pair, the starting snapshot is optional. When not used, the system performs a full resynchronization of the volume.

Table 314: startingSnapshotPairs

Member	JSON type	API type	Description
volumeName	string	name31	volume name.
snapshotName	string	name31	Snapshot name.

Success

A successful request to start a Remote Copy group returns the HTTP code 200 OK.

The `Location` portion of the response header contains the URI for the Remote Copy group:

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>`

Unless an error occurs, the response includes a message body as specified in the following table.

Table 315: JSON objects for Remote Copy group start response

Member	JSON type	API type	Description
links	array of URL links	array of URL links	Links include the Remote Copy group<group_name>.
tasks ¹	array of task IDs	array of task IDs (see, Task ID JSON objects for creating a physical copy of a VV set or for resynchronizing a physical copy to a VV set)	Array of task IDs for each volume in the Remote Copy group.

¹ The response includes the task member under the following conditions:

- The Remote Copy group is in synchronous mode
- The first time only, if the Remote Copy group is in periodic mode

Errors

Table 316: Remote Copy group start error codes

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	The Remote Copy group does not exist.
RCOPY_GROUPINV_TARGET	403 Forbidden	The specified target is not a target of the Remote Copy group.
RCOPY_GROUP_STARTED	403 Forbidden	The Remote Copy group has already been started. The operation is allowed only on a stopped Remote Copy group.
RCOPY_GROUP_EMPTY	400 Bad Request	The Remote Copy group must contain volumes before being started.
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	403 Forbidden	The operation should be performed only on the primary side.
RCOPY_TARGET_NOT_SPECIFIED	400 Bad Request	A target must be specified to complete this operation.
RCOPY_GROUP_NOT_ALL_VOLUMES_SPECIFIED	400 Bad Request	All the volumes in the Remote Copy group must be specified to complete this operation.
RCOPY_GROUP_EXISTENT_VOL_WWN_ON_TARGET	404 Not Found	Secondary volume WWN already exists on the target.
RCOPY_GROUP_VOLUME_ALREADY_SYNCED	404 Not Found	volume is already synchronized.
RCOPY_GROUP_INCORRECT_SNAPSHOT_OR_VOLUME_SPECIFIED	400 Bad Request	An incorrect starting snapshot or volume was specified, or the snapshot or volume does not exist.

Stopping a Remote Copy group

Use the HTTP PUT method with the following URI, and a request message body as described in the following table.

https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>

Table 317: Request message body JSON objects for stopping a Remote Copy group

Member	JSON type	API type	Ignored Values	Description
action	number	<u>remoteCopyGroupPUTOperation enumeration</u>	Required field.	Specifies the action to be taken for the specified volume group—in this case, STOP_GROUP.
noSnapshot	boolean	boolean	None	If <code>true</code> , this option turns off creation of snapshots in synchronous and periodic modes, and deletes the current synchronization snapshots. The default setting is <code>false</code> .
targetName	string	name31	None	The target name associated with this group.

Success

A successful request to stop a Remote Copy group returns the HTTP code 200 OK.

The `Location` portion of the response header contains the URI for the Remote Copy group:

`https://<storage_system>:8080/api/v1/remotecpygroups/<group_name>`

Unless an error occurs, the response includes a message body as specified in the following table.

Table 318: JSON objects for Remote Copy group stop response

Member	JSON type	API type	Description
links	array of URL links	array of URL links	Links include the Remote Copy <group_name>.

Errors

Table 319: Remote Copy group stop error codes

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	The Remote Copy group does not exist.
RCOPY_TARGET_IS_NOT_READY	403 Forbidden	The Remote Copy group target is not ready.

More information

[WSAPI error codes and descriptions](#) on page 34

Synchronizing a Remote Copy group

Use the HTTP PUT method with the following URI, with a request message body as described in the following table.

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>`

Table 320: Request message body JSON objects for synchronizing a Remote Copy group

Member	JSON type	API type	Ignored Values	Description
action	number	<u>remoteCopyGroupPUTOperation enumeration</u>	Required field.	Specifies the action to be taken on the specified group. (WSAPI 1.4.2 and later with 3PAR OS 3.1.2 MU2)
noResyncSnapshot	number	boolean	None	Enables (<code>true</code>) or disables (<code>false</code>) saving the resynchronization snapshot. Applicable only to Remote Copy groups in asynchronous periodic mode. Defaults to <code>false</code> . (WSAPI 1.4.2 and later with 3PAR OS 3.1.2 MU2)

Table Continued

Member	JSON type	API type	Ignored Values	Description
targetName	string	name31	None	The target name associated with the Remote Copy group. (WSAPI 1.4.2 and later with 3PAR OS 3.1.2 MU2)
fullSync	number	boolean	None	Enables (<code>true</code>) or disables (<code>false</code>) forcing a full synchronization of the Remote Copy group, even if the volumes are already synchronized. Applies only to volume groups in synchronous mode, and can be used to resynchronize volumes that have become inconsistent. Defaults to <code>false</code> . (WSAPI 1.4.2 and later with 3PAR OS 3.1.2 MU2)

Success

A successful request to synchronize a Remote Copy group returns the HTTP code 200 OK.

Unless an internal server error occurs, the response includes a message body as specified in the following table.

Table 321: JSON objects for Remote Copy synchronization request

Member	JSON type	API type	Description
links	array of URL links	array of URL links	Self URL for <group_name>. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
tasks	array of task IDs	array of task IDs	Array of task IDs for each of the volumes in the Remote Copy group. The JSON response does not always return the <code>tasks</code> member (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)

Errors

Table 322: Remote Copy group synchronization error codes

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	The Remote Copy group does not exist. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	403 Forbidden	The operation should be performed only on the primary side. Group settings can be changed only on primary Remote Copy groups. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
UNLICENSED_FEATURE	403 Forbidden	The system is not licensed for this feature. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
RCOPY_GROUP_INV_TARGET	403 Forbidden	The specified target is not a target of the Remote Copy group. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
RCOPY_TARGET_IS_NOT_READY	403 Forbidden	The Remote Copy group target is not ready. (WSAPI 1.4.2 with 3PAR OS 3.1.2 MU2)
RCOPY_GROUP_INVOLVED_IN_SYNCHRONIZATION	403 Forbidden	The Remote Copy group is already involved in synchronization. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RCOPY_GROUP_STARTED	403 Forbidden	The Remote Copy group has already been started. (WSAPI 1.5 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Removing a Remote Copy group

- ❗ **IMPORTANT:** Any user with the Super or Edit role, or any role granted `rcopygroup_remove` permission, can perform this operation. Access to all domains is required for this operation.

Use the HTTP DELETE method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>`

To remove a Remote Copy group with the option of retaining the local volume resynchronization snapshot, use the HTTP DELETE method with the following URI:

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>[?<option>]`

The `<option>` parameter uses one of the following, case-sensitive values:

- `keepSnap=true`
- `keepSnap=false`

Success

A successful group removal returns the HTTP status code 200 OK with no message body.

Errors

Table 323: Remote Copy group removal error codes

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	The Remote Copy group does not exist.
RCOPY_GROUP_STARTED	403 Forbidden	The Remote Copy group has already been started.
RCOPY_GROUP_IS_BUSY	403 Forbidden	The Remote Copy group is currently busy; retry later.
RCOPY_TARGET_IS_NOT_READY	403 Forbidden	The Remote Copy group target is not ready.
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	403 Forbidden	The operation should be performed only on the primary side.
RCOPY_GROUP_RENAME_RESYNC_SNAPSHOT_FAILED	403 Forbidden	Renaming of the Remote Copy group resynchronization snapshot failed.
RCOPY_GROUP_IN_FAILOVER_STATE	403 Forbidden	The Remote Copy group is in failover state; both the source system and the target system are in the primary state.
RCOPY_GROUP_TARGET_VOLUME_MISMATCH	404 Not Found	Secondary group on target system has a mismatched volume configuration.

More information

[WSAPI error codes and descriptions](#) on page 34

Recovering a Remote Copy group

Use the HTTP POST method with the following URI, and a message body as defined in the following table.

`https://<storage_system>:8080/api/v1/remotecopygroups/<groupname>/`

Table 324: Message body JSON objects for recovering a Remote Copy group

Member	JSON type	API type	Ignored values	Description
action	number	<u>remoteCopyGroupPOSTOperation enumeration</u>	None	Specifies the action to be taken on the specified group. Required field.
targetName	string	name31	None	The target name associated with the group on which to perform the disaster recovery operation. If the group has multiple targets, you must specify the target you want.
skipStart	boolean	boolean	None	If <code>true</code> , the system does not start groups after completing role reversal. Valid for only <code>FAILOVER</code> , <code>RECOVER</code> , and <code>RESTORE</code> operations. Defaults to <code>false</code> .
skipSync	boolean	boolean	None	If <code>true</code> , the system does not synchronize groups after completing role reversal. Valid for <code>FAILOVER</code> , <code>RECOVER</code> , and <code>RESTORE</code> operations only. Defaults to <code>false</code> .

Table Continued

Member	JSON type	API type	Ignored values	Description
discardNewData	boolean	boolean	None	<p>If <code>true</code>, and the group has multiple targets, the system does not check other targets of the group to see where newer data is available to push.</p> <p>Valid for <code>FAILOVER</code> operation only.</p> <p>Defaults to <code>false</code>.</p>
skipPromote	boolean	boolean	None	<p>If <code>true</code>, the snapshots of the groups that are switched from secondary to primary are not promoted to the base volume.</p> <p>Valid for <code>FAILOVER</code> and <code>REVERSE</code> operations only.</p> <p>Defaults to <code>false</code>.</p>
noSnapshot	boolean	boolean	None	<p>If <code>true</code>, the system does not take snapshots of the groups that are switched from secondary to primary.</p> <p>Valid for <code>FAILOVER</code>, <code>REVERSE</code>, and <code>RESTORE</code> operations.</p> <p>Defaults to <code>false</code>.</p>

Table Continued

Member	JSON type	API type	Ignored values	Description
stopGroups	boolean	boolean	None	If <code>true</code> , the system stops the groups before performing the reverse operation. Valid for <code>REVERSE</code> operation only. Defaults to <code>false</code> .
localGroupsDirection	boolean	boolean	None	If <code>true</code> , the system changes the group direction only on the system where the operation is run. Valid for <code>REVERSE</code> operation only. Defaults to <code>false</code> .

Success

A successful recovery returns the HTTP code 200 OK. The `Location` portion of the response header contains the URI for tasks collection:

`https://<storage_system>:8080/api/v1/remotecopygroups/<groupname>`

Unless an internal server error occurs, the response includes a message body as specified in the following table.

Table 325: Message body JSON objects for Remote Copy disaster recovery

Member	JSON type	API type	Description
links	Array of URL links	Array of URL links	Self URL for <code><groupname></code> .
tasks	Array of task IDs	Array of task IDs	An array of task IDs. One ID for every group involved in the disaster operation.

Errors

Table 326: Remote Copy recovery error codes

API Error	HTTP Code	Description
NON_EXISTING_RCOPY_GROUP	404 Not Found	The Remote Copy volume group does not exist.
UNLICENSED_FEATURE	403 Forbidden	System is not licensed for this feature.
RCOPY_GROUP_INV_TARGET	400 Bad request	Specified target is not in Remote Copy group.
INV_INPUT_MISSING_REQUIRED	403 Forbidden	Invalid Operation: Group has multiple targets.
INV_OPERATION_RCOPY_GROUP_ROLE_CONFLICT	403 Forbidden	Group is not in correct role for this operation.
RCOPY_GROUP_INV_OPERATION_ON_MULTIPLE_TARGETS	403 Forbidden	The operation is not supported on multiple targets.
RCOPY_GROUP_NOT_STOPPED	403 Forbidden	Remote copy group is not stopped.
INV_OPERATION_RCOPY_GROUP_ROLE_CONFLICT	403 Forbidden	Group is not in correct role for this operation.
RCOPY_GROUP_NOT_STARTED	403 Forbidden	Remote copy not started.
INV_INPUT_PARAM_CONFLICT	400 Bad request	Invalid input: parameters cannot be present at the same time.
INV_OPERATION_VV_PROMOTE_IN_PROGRESS	403 Forbidden	Invalid operation: volume promotion is in progress.
RCOPY_GROUP_IS_BUSY	403 Forbidden	Remote copy group is currently busy.
RCOPY_GROUP_STARTED	403 Forbidden	Remote copy group has already been started.
RCOPY_GROUP_EMPTY	403 Forbidden	Remote copy group does not contain any volumes.

Table Continued

API Error	HTTP Code	Description
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	403 Forbidden	Operation should only be issued on primary side.
RCOPY_GROUP_OPERATION_ONLY_ON_SECONDARY_SIDE	403 Forbidden	Operation should only be issued on secondary side.

More information

[WSAPI error codes and descriptions](#) on page 34

Admitting a volume into a Remote Copy group

Hewlett Packard Enterprise recommends using HTTP POST to admit a volume.

1. **Method 1** —Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>`

2. **Method 2 (recommended)**—Use the HTTP POST method with the following URI (WSAPI 1.5 and later):

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>/volumes`

The request message body is a JSON object as described in the following table. The HTTP POST method does not have an action member.

Table 327: Request message body JSON objects for admitting a volume into a Remote Copy group

Member	JSON type	API type	Ignored Values	Description
action	number	See, remoteCopyGroupPUTOperation enumeration	Required field for HTTP PUT. Not required for HTTP POST.	Specifies the action to be taken for the specified volume group (HTTP PUT method only, while admitting a volume).
volumeName	string	name31	Required field.	Specifies the name of the existing virtual volume to be admitted to an existing Remote Copy group.
targets	array of objects	See, remoteCopyGroupPUTOperation enumeration	Required field.	Specify at least one pair of <code>targetName</code> and <code>secVolumeName</code> .

Table Continued

Member	JSON type	API type	Ignored Values	Description
snapshotName	string	name31	None	The optional read-only <code>snapshotName</code> is a starting snapshot when the group is started without performing a full resynchronization. Instead, for synchronized groups, the volume synchronizes deltas between this <code>snapshotName</code> and the base volume. For periodic groups, the volume synchronizes deltas between this <code>snapshotName</code> and a snapshot of the base.
volumeAutoCreation	boolean	boolean	None	If <code>volumeAutoCreation</code> is set to <code>true</code> , the secondary volumes should be created automatically on the target using the CPG associated with the Remote Copy group on that target. This cannot be set to <code>true</code> if the snapshot name is specified.

Table Continued

Member	JSON type	API type	Ignored Values	Description
<code>skipInitialSync</code>	boolean	boolean	None	<p>If <code>skipInitialSync</code> is set to <code>true</code>, the volume should skip the initial sync. This is for the admission of volumes that have been pre-synced with the target volume.</p> <p>This cannot be set to <code>true</code> if the snapshot name is specified.</p>
<code>differentSecondaryWWN</code>	boolean	boolean	None	<p>Setting <code>differentSecondaryWWN</code> to <code>true</code>, ensures that the system uses a different WWN on the secondary volume. Defaults to <code>false</code>.</p> <p>Use with <code>volumeAutoCreation</code> only.</p>

Table 328: targets objects

Member	JSON type	API type	Ignored Values	Description
<code>targetName</code>	string	name31	Required field.	The target name associated with this group.
<code>secVolumeName</code>	string	name31	Required field.	Specifies the name of the secondary volume on the target system.

Table 329: remoteCopyGroupPUTOperation enumeration

Symbol	Value	Description
<code>ADMIT_VV</code>	1	Admit a volume into the Remote Copy group.
<code>DISMISS_VV</code>	2	Dismiss a volume from the Remote Copy group.
<code>START_GROUP</code>	3	Start the Remote Copy group.
<code>STOP_GROUP</code>	4	Stop the Remote Copy group.
<code>SYNC_GROUP</code>	5	Manually synchronize the Remote Copy group.

Table 330: remoteCopyGroupPOSTOperation enumeration

Symbol	Value	Description
REVERSE_GROUP	6	Changes the current direction of the Remote Copy groups. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
FAILOVER_GROUP	7	Changes the secondary groups to primary groups on the active system. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
SWITCHOVER_GROUP	8	Migrates the Remote Copy group from the primary system to the secondary system without impacting I/O. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RECOVER_GROUP	9	Changes the primary Remote Copy group on the backup system to the secondary Remote Copy group. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
RESTORE_GROUP	10	Changes all Remote Copy groups to their natural direction and starts them. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
OVERRIDE_GROUP	11	Overrides the failsafe state that is applied to the Remote Copy group.
CLX_DR	12	Performs the Disaster Recovery operation using Cluster Extension (see, <u>Disaster recovery management using HPE 3PAR Cluster Extension software and 3PAR Remote Copy</u>).

Success

A successful admission of a volume into the Remote Copy group returns the HTTP code 200 OK. The `Location` portion of the response header contains the new URI for the updated Remote Copy volume group.

For the HTTP PUT method, the response header URI is:

`api/v1/remotecopygroups/<group_name>`

For the HTTP POST method, the response header URI is:

/api/v1/remotecopygroups/<group_name>/volumes/<volume_name>

Table 331: Response message body JSON objects for admitting a volume into a Remote Copy group

Member	JSON type	API type	Description
links	array of URL links	Array of URL links	Links include the self URL

Errors

Table 332: Volume Admission into a Remote Copy group error codes

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	Remote Copy group does not exist.
NON_EXISTENT_VOL	404 Not Found	Vvolume to be admitted to the Remote Copy group does not exist.
NON_EXISTENT_SNAPSHOT	404 Not Found	Specified snapshot does not exist.
RCOPY_GROUP_SNAPSHOT_IS_RW	403 Forbidden	Specified snapshot is read-only.
RCOPY_GROUP_VOL_IS_RO	403 Forbidden	Volume to be admitted to the Remote Copy group cannot be read-only.
RCOPY_GROUP_HAS_NO_CPG	403 Forbidden	Volume on the target cannot be created automatically because no CPG has been defined in the Remote Copy group.
RCOPY_GROUP_EXISTENT_VOL	409 Conflict	Specified volume is already in the Remote Copy group.
RCOPY_GROUP_EXISTENT_VOL_ON_TARGET	409 Conflict	Specified secondary volume to be automatically created already exists on the target.
RCOPY_GROUP_INV_TARGET	403 Forbidden	Specified target is not a target of the Remote Copy group.
RCOPY_GROUP_VOL_SIZE_NOT_MATCH	403 Forbidden	Size of the volume added to the Remote Copy group does not match the size of the volume on the target.

Table Continued

API Error	HTTP Code	Description
RCOPY_GROUP_NON_EXISTENT_VOL_ON_TARGET	404 Not Found	Specified secondary volume does not exist on the target.
RCOPY_GROUP_VOL_NO_SNAPSHOT_SPACE	403 Forbidden	Volume to be admitted into the Remote Copy group requires the allocation of snapshot space.
RCOPY_GROUP_TARGET_VOL_NO_SNAPSHOT_SPACE	403 Forbidden	Specified secondary volumes on the target require snapshot space.
RCOPY_GROUP_VOL_IS_PHYSICAL_COPY	403 Forbidden	Physical copy cannot be added to a Remote Copy group.
RCOPY_GROUP_MAX_VOL_REACHED_PERIODIC	403 Forbidden	Number of periodic-mode volumes on the system has reached the limit.
RCOPY_GROUP_MAX_VOL_REACHED_SYNC	403 Forbidden	Number of synchronous-mode volumes on the system has reached the limit.
RCOPY_GROUP_MAX_VOL_REACHED	403 Forbidden	Number of volumes on the system has reached the limit.
RCOPY_IS_NOT_READY	403 Forbidden	Remote Copy configuration is not ready for commands.
RCOPY_GROUP_VOL_INTERNAL_CONSISTENCY_ERR	403 Forbidden	Volume to be admitted into the Remote Copy group has an internal consistency error.
RCOPY_GROUP_IS_BEING_REMOVED	403 Forbidden	Volume to be admitted into the Remote Copy group is being removed.
RCOPY_GROUP_SNAPSHOT_PARENT_MISMATCH	403 Forbidden	Names of the snapshot and its parent do not match.
RCOPY_GROUP_TARGET_VOL_EXPORTED	403 Forbidden	Secondary volumes cannot be admitted when they are exported.
RCOPY_GROUP_VOL_IS_PEER_PROVISIONED	403 Forbidden	Peer-provisioned volume cannot be admitted into a Remote Copy group.
RCOPY_GROUP_VOL_ONLINE_CONVERSION	403 Forbidden	Online volume conversions do not support Remote Copy.
RCOPY_GROUP_VOL_ONLINE_PROMOTE	403 Forbidden	Online volume promotes do not support Remote Copy.
RCOPY_GROUP_VOL_ONLINE_COPY	403 Forbidden	Online volume copies do not support Remote Copy.

Table Continued

API Error	HTTP Code	Description
RCOPY_GROUP_VOL_CLEAN_UP	403 Forbidden	Cleanup of internal volume is in progress.
RCOPY_GROUP_VOL_IS_INTERNAL	403 Forbidden	Internal volumes cannot be admitted into a Remote Copy group.
RCOPY_GROUP_VOL_NOT_IN_SAME_DOMAIN	403 Forbidden	Remote Copy group has a different domain than the volume.
RCOPY_GROUP_STARTED	403 Forbidden	Remote Copy group has already been started.
RCOPY_GROUP_IS_BUSY	403 Forbidden	Remote Copy group is currently busy; retry later.
RCOPY_GROUP_VOL_IN_OTHER_GROUP	403 Forbidden	Volume is already in another Remote Copy group. A volume cannot be in more than one Remote Copy group.
RCOPY_GROUP_INV_TARGET_NUMBER	403 Forbidden	Wrong number of targets is specified for the Remote Copy group.
RCOPY_GROUP_INV_TARGET	403 Forbidden	Specified target is not the target of a Remote Copy group.
RCOPY_GROUP_NOT_SUPPORT_VOL_ID	403 Forbidden	Target for the Remote Copy group does not support volume IDs.
RCOPY_GROUP_IS_SELF_MIRRORED	403 Forbidden	Target is self-mirrored, and volumes cannot be mirrored to themselves.
RCOPY_GROUP_TARGET_VOL_IS_RO	403 Forbidden	Remote Copy target volume cannot be read-only.
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	403 Forbidden	Operation should be performed only on the primary.
RCOPY_TARGET_IS_NOT_READY	403 Forbidden	Remote Copy group target is not ready.
RCOPY_UNSUPPORTED_TARGET_VERSION	501 NOT IMPLEMENTED	Target 3PAR OS version is not supported.
RCOPY_GROUP_MULTIPLE_VOL_IN_SAME_FAMILY	403 Forbidden	Remote Copy group cannot contain multiple volumes in the same family tree.

Table Continued

API Error	HTTP Code	Description
RCOPY_GROUP_MULTIPLE_RW_SNAPSHOT_IN_SAME_FAMILY	403 Forbidden	Only one read/write snapshot in the same family can be added to a Remote Copy group.
RCOPY_GROUP_SYNC_SNAPSHOT_IN_MULTIPLE_TARGET	403 Forbidden	Synchronization snapshot cannot be set with multiple targets.
RCOPY_GROUP_ADD_VOL_FAILED	403 Forbidden	Failed to add volume to the Remote Copy group.
RCOPY_GROUP_ADD_VOL_FAILED_PARTIAL	403 Forbidden	Adding volume to Remote Copy group succeeded on some targets. Attempting to clean up.
INV_OPERATION_SET_AUTO_CREATED	403 Forbidden	Set was created automatically. Cannot add or remove members.
RCOPY_GROUP_SECONDARY_DOES_NOT_MATCH_PRIMARY	403 Forbidden	Remote Copy group is in the failover state. Both systems are in the primary state.

More information

[WSAPI error codes and descriptions](#) on page 34

Dismissing a volume from a Remote Copy group

Although you can use either HTTP PUT or HTTP DELETE, Hewlett Packard Enterprise recommends using HTTP DELETE to dismiss a volume.

- **Method 1** – Use the HTTP PUT method with the following URI: `https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>`
- **Method 2** (recommended) – Use the HTTP DELETE method with the following URI (WSAPI 1.5 and later): `https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>/volumes/<volume_name>[?<option>]`

For the `<option>` parameter, use one of the following, case-sensitive values:

- `keepSnap=true`
- `keepSnap=false`
- `removeSecondaryVolume=true`
- `removeSecondaryVolume=false`

⚠ IMPORTANT: Do not use `KeepSnap` and `removeSecondaryVolume` settings at the same time. Also, in some cases, the JSON response includes `removeSecondaryVolume` warnings pertaining to the request.

The HTTP PUT request message body includes JSON objects as described in the following table.

Table 333: Request message body JSON objects for dismissing a volume from a Remote Copy group using HTTP PUT

Member	JSON type	API type	Ignored Values	Description
action	number	<u>remoteCopyGroupPUTOperation enumeration</u>	Required field.	Specifies the action to be taken for the specified volume group (Required for HTTP PUT operation only while dismissing a volume).
volumeName	string	name31	Required field.	Specifies the name of the existing virtual volume to be admitted to an existing Remote Copy group.
keepSnap	boolean	boolean	Not required.	Enables (<code>true</code>) or disables (<code>false</code>) retention of the local volume resynchronization snapshot. Defaults to <code>false</code> . Do not use with <code>removeSecondaryVolume</code> .
removeSecondaryVolume	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) deletion of the remote volume on the secondary array from the system. Defaults to <code>false</code> . Do not use with <code>keepSnap</code> .

Success

A successful dismissal of a volume from the Remote Copy group returns the HTTP code 200 OK.

Errors

Table 334: Volume dismissal from a Remote Copy group error codes

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	The Remote Copy group does not exist.
NON_EXISTENT_VOL	404 Not Found	The volume to be dismissed from the Remote Copy group does not exist.

Table Continued

API Error	HTTP Code	Description
RCOPY_IS_NOT_READY	403 Forbidden	The Remote Copy configuration is not ready for commands.
RCOPY_GROUP_STARTED	403 Forbidden	The Remote Copy group has already been started. The operation is allowed only on a stopped Remote Copy group.
RCOPY_GROUP_IS_BUSY	403 Forbidden	The Remote Copy group is currently busy.
RCOPY_GROUP_VOL_NOT_IN_GROUP	404 Not Found	The volume is not in the Remote Copy group.
RCOPY_GROUP_RENAME_RESYNC_SNAPSHOT_FAILED	403 Forbidden	Renaming of the Remote Copy group resynchronization snapshot failed.
RCOPY_GROUP_CREATED_MIRROR_CONFIG_OFF	409 Conflict	The Remote Copy group was created when the configuration mirroring policy was turned off on the target. However, this policy is now turned on. In order to dismiss a volume from the Remote Copy group, the configuration mirroring policy must be turned off. Retry after turning the policy off. The Remote Copy group must be started before the policy can be turned on again.
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	403 Forbidden	The operation should be performed only on the primary side.
RCOPY_TARGET_IS_NOT_READY	403 Forbidden	The Remote Copy group target is not ready.

More information

[WSAPI error codes and descriptions](#) on page 34

Managing Remote Copy targets using WSAPI

WSAPI provides a number of processes for managing Remote Copy targets.

Creating a Remote Copy target

Use the HTTP POST with the following URI:

`https://<storage_system>:8080/api/v1/remotecopytargets`

The request message body is a JSON object with members as described in the following table.

Table 335: Request message body JSON Object members for Remote Copy target creation

Member	JSON type	API type	Required	Description
name	string	string	Yes.	Specifies the name of the target definition to create, up to 24 characters.
type	number	<u>linkProtocolType enumeration</u>	Yes.	Specifies the link protocol. Do not use Unknown as a linkType enumeration value when creating a Remote Copy target.
nodeWWN	string	string	Yes.	WWN of the node on the target system.
portPosAndLink	array of objects	<u>portPosAndLink object</u>	Yes.	Specifies all locations (portPos) of the local system, and all links (IP or WWN) of the remote system.
disabled	boolean	boolean	Yes.	Enable (true) or disable (false) the creation of the target in disabled mode.

Table 336: portPosAndLink object

Member	JSON type	API type	Required	Description
<code>portPos</code>	object	<u>portPos objects</u>	Yes.	Specifies the port information of the local system (n:s:p) for Remote Copy.
<code>link</code>	string	string	Yes.	Specifies the link for the remote system. If the <code>linkProtocolType</code> is <code>IP</code> , specify an IP address for the corresponding port on the remote system. If the <code>linkProtocolType</code> is <code>FC</code> , specify the WWN of the peer port on the remote system.

Success

A successful operation returns the HTTP status code `201 CREATED`. The response body includes a link to the newly created Remote Copy Target.

Table 337: JSON Object members for Remote Copy Target modification response

Member	JSON type	API type	Description
<code>links</code>	Array of URI links	Array of URI links	Links includes the URI to the new Remote Copy target: <code>.../v1/remotecopytargets/<targetName></code>

Errors

An error returns one of the codes shown in **Remote Copy targets query error codes**.

Modifying a Remote Copy target

Use the HTTP PUT with the following URI:

`https://<storage_system>:8080/api/v1/remotecopytargets/<target_name>`

The `<target_name>` parameter corresponds to the name of the Remote Copy target you want to modify.

The request message body is a JSON object with the members described in the following table.

Table 338: Request message body JSON Object members for Remote Copy target modification

Member	JSON type	API type	Ignored Values	Description
<code>policies</code>	object	<u>remotecopytarget policies</u>	Optional	Set the <code><targetName></code> policies for the specified remote copy target .

Success

A successful operation returns the HTTP status code 200 OK. The response body includes a JSON object with the members described in the following table. The location header contains the URL of the newly created Remote Copy Target.

Table 339: JSON Object members for Remote Copy Target modification response

Member	JSON type	API type	Description
<code>links</code>	Array of URI links	Array of URI links	Links includes the URL to the new resource: .../v1/remotecopytargets/<targetName>

Errors

An error returns one of the codes shown in **Remote Copy targets query error codes**.

Modifying a Remote Copy group target

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/remotecopygroups/<groupname>/targets/<target_name>`

The request message body includes JSON objects as defined in the following table. You can specify only one set of modification parameters in a request. Available sets are:

- Remote Copy group policies (see, **policy objects**)
- Remote Copy group `mode`
- Remote Copy group `syncPeriod` and `rmSyncPeriod`
- Remote Copy group `snapFrequency` and `rmSnapFrequency`

Table 340: Request message body JSON objects for Remote Copy group target modification

Member	JSON type	API type	Ignored values	Description
snapFrequency	number	int32	None.	Specifies the interval in seconds at which Remote Copy takes coordinated snapshots. Range is 300–31622400 seconds (1 year). Applicable only for Async mode.
rmSnapFrequency	boolean	boolean	Ignored if false and the snapFrequency value is zero.	Enables (true) or disables (false) the snapFrequency interval. If false, and the snapFrequency value is positive, then the snapFrequency value is set.
syncPeriod	boolean	int32	None.	Specifies that asynchronous periodic mode groups should be periodically synchronized to the <period_value>. Range is 300 – 31622400 secs (1 yr).
rmSyncPeriod	boolean	boolean	Ignored if false, and syncPeriod value is 0.	Enables (true) or disables (false) the syncPeriod reset time. If false, and syncPeriod value is positive, then set.
mode	number	<u>rcopyGroupMode Enum</u>	None.	Volume group mode.
policies	object	<u>policy objects</u>	None.	The policies to be assigned to the group.

Success

Upon successful modification of the group target, the system returns HTTP code 200 OK. The location portion of the response header contains the URI for the Remote Copy volume group target.

Unless an error occurs, the response includes a message body as specified in the following table.

Table 341: Modifying a Remote Copy group target response message body

Member	JSON type	API type	Description
links	Array of URL links	Array of URL links	Includes the self-URL for <code><groupname>/targets/<targetname></code>

Errors

See **Remote Copy group creation error codes** for possible errors following an attempt to modify a Remote Copy group.

More information

[WSAPI error codes and descriptions](#) on page 34

Admitting a target into a Remote Copy group

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>/targets`

The request message body is a JSON object as described in the following table.

Table 342: Request message body JSON objects for admitting a volume into a Remote Copy group

Member	JSON type	API type	Ignored Values	Description
targetName	string	name31	None. Required field.	Specifies the name of the target to admit to an existing Remote Copy group.
mode	number	<u>rcopyGroupModeEnum</u>	None. Required field.	Specifies the mode of the target being added.
volumeMappings	array of objects	<u>volumeMappings</u>	Optional field.	The volume names in the primary group and the corresponding volumes on the added target.

Table 343: volumeMappings

Member	JSON type	API type	Ignored Values	Description
localVolumeName	string	name	None. Required field.	Name of the volume on the primary. Limited to 31 characters
remoteVolumeName	string	name	None. Required field.	Name of the volume on the target. Limited to 31 characters

Success

A successful request returns HTTP code 200 OK. The Location portion of the response header contains the new URI for the admitted target on the Remote Copy volume group

The response header URI is:

```
/api/v1/remotecopygroups/<group_name>/targets/<target_name>
```

Errors

Table 344: Remote Copy target error codes

API Error	HTTP Code	Description
RCOPY_TARGET_IS_NOT_READY	403 Forbidden	Remote Copy group target is not ready.
RCOPY_GROUP_NOT_ALL_VOLUMES_SPECIFIED	403 Forbidden	Specify all volumes in the group.
RCOPY_GROUP_EMPTY	403 Forbidden	Remote Copy group does not contain any volumes
RCOPY_GROUP_VOL_NO_SNAPSHOT_SPACE	403 Forbidden	Remote Copy group volume requires snapshot space.

Dismissing a target from a Remote Copy group

Use the HTTP DELETE method with the following URI:

```
https://<storage_system>:8080/api/v1/remotecopygroups/<group_name>/targets/  
<targetName>
```

Success

A successful request returns HTTP code 200 OK.

Errors

See, [Remote Copy target error codes](#).

Managing a quorum witness on a Remote Copy target

Use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/remotecopygroups/<target_name>`

The request message body includes JSON objects as described in the following table.

Table 345: Request message body JSON objects for quorum witness

Member	JSON type	API type	Ignored Values	Description
action	number	<u>quorumAction enumeration</u>	Required field.	Specifies the action to perform on the Remote Copy target.
parameters	object	<u>quorumParam</u>	Optional field.	Specifies the parameters to use when performing the <code>quorumAction</code> on the Remote Copy target.

Table 346: quorumAction enumeration

Symbol	Value	Description
CREATE_QUORUM_WITNESS	1	Create an association between a synchronous target and a quorum witness.
REMOVE_QUORUM_WITNESS	2	Remove the quorum witness configuration.
START_QUORUM_WITNESS	3	Start the quorum witness associated with the target.
STOP_QUORUM_WITNESS	4	Stop the quorum witness associated with the target.
CHECK_QUORUM_WITNESS	5	Check the quorum witness associated with the target.

Table 347: quorumParam

Member	JSON type	API type	Ignored Values	Description
witnessIP	string	name255	Required field for CREATE_QUORUM_WITNESS and CHECK_QUORUM_WITNESS. Otherwise, cannot be used.	The IP address of the quorum witness application, to which the Storage System connects to update its status.
remote	boolean	boolean	Optional field.	Enables (true) or disables (false) the requested action on the remote HPE 3PAR storage system.
failTimeoutSec	number	int32	Optional field.	Fail timeout in seconds, in the range of 10 to 30.
nodeId	number	int32	Optional field for CHECK_QUORUM_WITNESS only.	Tests the connectivity to the quorum witness using the Quorum Announce process running on the specified node.

Success

A successful recovery returns the HTTP code 200 OK and a self URL.

Errors

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_TARGET	404 Not Found	Remote Copy target does not exist.
QUORUM_WITNESS_STATUS_CHECK_FAILED	404 Not Found	Quorum witness status check failed.

Creating coordinated snapshots across all Remote Copy group volumes

Use the HTTP POST method with the following URI:

`https://<storage_server>:8080/api/v1/remotecopygroups/<rcgroup-name>/volumes`

The request message body is a JSON object with two members, as described in **Request message body JSON object members for coordinated snapshots**.

Success

A successful creation of the snapshot returns the HTTP response 201 CREATED.

For Remote Copy Groups in Sync mode, the response body contains an array of links including an href to itself as shown in the following example:

```
{links":[{"href":"http://<server_name>:8080/api/v1/remotecopygroups/
<group_name>/volumes","rel":"self"}]}
```

For Remote Copy Groups in Async and Periodic modes, the message body shows the task ID for the coordinated snapshots operation, as well as an array of links that include an href to itself, as shown in the following example:

```
{"taskid": 1335, links":[{"href":"http://<server_name>:8080/api/v1/
remotecopygroups/<group_name>/volumes","rel":"self"}]}
```

Errors

Table 348: Remote copy group coordinated snapshot error codes

API error	HTTP code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	Remote copy volume group does not exist
RCOPY_GROUP_IS_BUSY	403 Forbidden	Remote copy group is currently busy
RCOPY_TARGET_IS_NOT_READY	403 Forbidden	Remote copy group target is not ready
RCOPY_GROUP_OPERATION_ONLY_ON_PRIMARY_SIDE	501 Not Implemented	Issue this operation on primary side only
RCOPY_GROUP_VOLUME_NOT_SYNCED	501 Not Implemented	Volume not synced
INV_INPUT_MISSING_REQUIRED	400 Bad Request	Invalid input: some or all required parameters missing
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	Invalid input: string length exceeds limits
RCOPY_NOT_STARTED	403 Forbidden	Remote copy not started
INV_OPERATION_RCOPY_GROUP_MODE_CONFLICT	501 Not Implemented	Remote copy target mode not supported
UNLICENSED_FEATURE	403 Forbidden	System is not licensed for this feature or functionality
EXISTENT_VOL	409 Conflict	Volume exists
RCOPY_GROUP_VOLUME_NOT_SYNCED	403 Forbidden	Volume not synced
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Illegal character in input
RCOPY_GROUP_VOL_NOT_IN_GROUP	404 Not Found	Volume is not member of any Remote Copy Group

Creating a coordinated snapshot of a single Remote Copy group volume

Use the HTTP POST method with the following URI:

`https://<storage_server>:8080/api/v1/remotecopygroups/<rcgroup-name>/volumes/<volume-name>`

The `<volume-name>` is the name of the volume to be captured (not the name of the new snapshot volume).

The request message body is a JSON object with two members, as described in the following table.

Table 349: Request message body JSON object members for coordinated snapshots

Member	JSON type	API type	Ignored Values	Description
<code>action</code>	number	<u>remoteCopyGroupVolumeOperation</u>	Required field	Specifies the action to create a coordinated snapshot.
<code>parameters</code>	object	<u>parameters for snapshots of a single volume</u>	Required field	Specifies parameters for creating a coordinated snapshot.

Table 350: parameters for snapshots of a single volume

Member	JSON type	API type	Ignored values	Description
<code>name</code>	string	name31	None. Required field.	Specifies a snapshot VV name up to 31 characters in length.
<code>comment</code>	string	print511	None	Specifies any additional information up to 511 characters for the volume.
<code>expirationHours</code>	number	igint32	None. Required field.	Specifies the relative time from the current time when volume expires. Positive integer and in the range of 1 - 43,800 hours (1825 days).

Table Continued

Member	JSON type	API type	Ignored values	Description
retentionHours	number	igint32	None. Required field.	Specifies the amount of time, relative to the current time, that the volume is retained. Positive integer in the range of 1 - 43,800 hours (1825 days).
skipBlock	boolean	boolean	None.	Enables (<code>true</code>) or disables (<code>false</code>) whether the storage system blocks host i/o to the parent virtual volume during the creation of a read-only snapshot. Defaults to <code>false</code> .

Table 351: remoteCopyGroupVolumeOperation

Mode	Value	Description
CREATE_COORDINATED_SNAPS HOT	1	Create coordinated snapshots.

Success

A successful creation of the snapshot returns the HTTP response 201 `CREATED`. For Remote Copy Groups in Sync mode, the response body contains an array of links that include a self-URL:

```
{ "links": [ { "href": "https://<server_name>:8080/api/v1/remotecopygroups/
<group_name>/volumes/<volume_name>", "rel": "self" } ] }
```

For Remote Copy Groups in Async and periodic mode, the message body shows the task ID of the coordinated snapshot operation, as well as an array of links that include a self-URL:

```
{ "taskid": 1335, "links": [ { "href": "https://<server_name>:8080/api/v1/
remotecopygroups/<group_name>/volumes/<volume_name>", "rel": "self" } ] }
```

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Querying Remote Copy groups and targets using WSAPI

WSAPI provides a number of processes for querying Remote Copy groups and targets.

Querying overall Remote Copy information

Use the HTTP GET method on the following URI with no message body:

`https://<storage_system>:8080/api/v1/remotecopy`

Success

A successful query for Remote Copy information returns the HTTP code 200 OK.

Unless an internal server error occurs, the response includes a message body specified in the following table.

Table 352: JSON objects for Remote Copy information query response

Member	JSON type	API type	Description
mode	number	rcopySysModeEnum (see, Remote Copy rcopySysModeEnum enumeration)	Remote Copy system mode.
status	number	rcopySysStatusEnum (see, Remote Copy rcopySysStatusEnum enumeration)	Remote Copy system state.
configErrDescription	string	print511	Remote Copy configuration error message. Under normal conditions, this is empty and does not add to the JSON body.
links	array of URL links	array of URL links (see, Response with Remote Copy links)	Links include the following URLs: <ul style="list-style-type: none">• self• remotecopygroup• remotecopytargets• remotecopylinks
asyncEnabled	boolean	boolean	true—Asynchronous streaming replication enabled. false—Asynchronous streaming replication disabled.

Response with Remote Copy links

❗ IMPORTANT: Systems without Remote Copy configured do not return the URL links for groups as part of the JSON body.

The message body returned from the server includes the following links:

```
{
...
  "links": [4]
```

```

0:  {
    "href": " https://<storage_system>:8080/api/v1/remotecopy"
    "rel": "self"
  }
1:  {
    "href": " https://<storage_system>:8080/api/v1/remotecopygroups"
    "rel": "remotecopyGroups"
  }
    2:  {
    "href": " https://:8080/api/v1/remotecopytargets"
    "rel": "remotecopytargets"
  }
    3:  {
    "href": " https://:8080/api/v1/remotecopylinks"
    "rel": "remotecopylinks"
  }
}

```

Table 353: Remote Copy rcopySysModeEnum enumeration

Symbol	Value	Description
NONE	1	Remote copy is not configured.
STARTED	2	Remote copy is configured and started.
STOPPED	3	Remote copy is configured, but it is stopped.

Table 354: Remote Copy rcopySysStatusEnum enumeration

Symbol	Value	Description
NORMAL	1	Remote Copy system is in normal condition.
STARTUP	2	Remote Copy system is starting up.
SHUTDOWN	3	Remote Copy system is shutting down.
ENABLE	4	Remote Copy system is enabled.
DISABLE	5	Remote Copy system is disabled.
INVALID	6	Remote Copy system is in an invalid state.
NODEUP	7	Remote Copy system is in the node-up state.
UPGRADE	8	Remote Copy system is in the upgrade state.

Errors

Table 355: Remote Copy information query error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error.
UNLICENSED_FEATURE	403 Forbidden	The system is not licensed for Remote Copy.

More information

[WSAPI error codes and descriptions](#) on page 34

Querying all Remote Copy targets

Use the HTTP GET method with the following URI and an empty message body:

`https://<storage_system>:8080/api/v1/remotecopytargets`

Success

A successful query for Remote Copy information returns HTTP code 200 OK. The response message body includes JSON objects as described in the following table:

Table 356: Response message body JSON objects for remote copy

Member	JSON type	API type	Description
total	number	int32	Total number of targets.
members	Array of objects	<u>RCTargets objects</u>	Remote Copy targets information.
links	Array of URI links	Array of URI links	Links include the self-URI.

Table 357: RCTargets objects

Member	JSON type	API type	Description
name	string	String32/128	Name of target
id	number	uint16	Id for the target
nodeWWN	string	String64	Target options, with FC targets this includes the target system's node WWN
type	number	<u>linkProtocolType enumeration</u>	The link protocol type.

Table Continued

Member	JSON type	API type	Description
<code>policies</code>	object	<u>remotecopytarget policies</u>	Any policies that are set for the target.
<code>state</code>	number	<u>State enumeration</u>	Target State - Based on the target status.
<code>status</code>	number	<u>Target status enumeration</u>	—
<code>version</code>	number	uint16	—
<code>flags</code>	number	uint8	—
<code>numSockets</code>	number	uint8	Number of sockets to use
<code>bufferSize</code>	number	uint32	Socket buffer size to use
<code>systemName</code>	string	String32/128	Name of the target system
<code>systemId</code>	number	uint32	Id of the target system
<code>remoteName</code>	string	String32/128	Name of the <code>remote</code> to which this target belongs
<code>remoteId</code>	number	uint16	Id of the <code>remote</code> to which this target belongs
<code>quorumIpAddress</code>	string	String32/128	
<code>quorumStatusQual</code>	string	String25	See <i>Quorum status qualifiers</i> in the <i>Remote Copy User Guide</i> for details.
<code>quorumStatus</code>	number	See, <u>Quorum status enumeration</u>)	—
<code>links</code>	Array of URI links	Array of URI links	Self URI: .../ remotecopytargets/ <targetName>

Table 358: linkProtocolType enumeration

Link type	Value	Description
Unknown	0	Unknown or Other Link Type
IP	1	IP Target Type
FC	2	FC Target Type

Table 359: remotecopytarget policies

Member	JSON type	API type	description
mirrorConfig	boolean	boolean	<p>Enables (<code>true</code>) or disables (<code>false</code>) the duplication of all configurations involving the specified target.</p> <p>Defaults to <code>true</code>.</p> <p>Use <code>false</code> to allow recovery from an unusual error condition only, and only after consulting your Hewlett Packard Enterprise representative.</p>

Table 360: Target status enumeration

Status	Value	Description
DISABLED	1	
NEW	2	Target links have yet to come up.
READY	3	Target has connected links.
UNSUPPORTED	4	Target system <code>tpd</code> version is not compatible with this system's version.
FAILING	5	Target links have all failed but its groups have not yet been stopped.
FAILED	6	Target links have all failed and its groups have been stopped.
UNKNOWN	99	Target status is unknown.

Table 361: Quorum status enumeration

Status	Value
UNINITIALIZED	1
INITIALIZING	2
STANDBY	3
ACTIVE	4
FAILSAFE	5
FAILOVER	6

Table Continued

Status	Value
RESTARTING	7
UNKNOWN	99

Errors (query rc targets all)

Table 362: Remote Copy targets query error codes

API error	HTTP code	Description
UNLICENSED_FEATURE	400 Bad Request	This system is not licensed for Remote Copy
NON_EXISTENT_RCOPY_TARGET	404 Not found	The Remote Copy target does not exist
INV_INPUT_PARAM_CONFLICT	400 Bad Request	nodeWWN is not valid for IP type links

Querying a single Remote Copy target

Use the HTTP GET method with the following URI and an empty message body:

`https://<storage_system>:8080/api/v1/remotecopytargets/<targetname>`

Success

A successful query for a Remote Copy returns HTTP code 200 - OK.

The response includes a message body in JSON format, specified in [RCTargets object description](#)).

Errors

See, [Remote Copy targets query error codes](#).

Querying all Remote Copy groups

Use HTTP GET with the following URI:

`https://<storage_server>:8080/v1/remotecopygroups`

Success

A successful query returns the HTTP code 200 OK. Unless an internal server error occurs, the response includes a message body as specified in the following table.

Table 363: Message body JSON object members for querying all Remote Copy groups

Member	JSON type	API type	Description
total	number	int32	Total number of Remote Copy groups.
members	Array of objects	<u>remoteCopyGroup objects</u>	Remote Copy groups.
links	Array of URL links	Array of URL links	Links include the self URL, which is the original request URL including the query at the end

In a 1-to-N, N-to-1, or M-to-N setup, each group has a dedicated target. However, in an SLD setup, each group can have two targets, so the target is represented as an array.

Table 364: remoteCopyGroup objects

Member	JSON type	API type	Description
name	string	name31	Remote Copy group name.
id	number	int32	Remote Copy group ID.
role	number	<u>rcopyGroupRoleEnum enumeration</u>	volume group role. Options are primary or secondary.
domain	string	name31	Domain to which this Remote Copy group belongs.
recoveryPointObjmSeconds	number	int32	Asynchronous RPO (Recovery Point Object) in ms.
remoteGroupName	string	name31	Name of the Remote Copy group in the remote system.
localUsrCPG	string	name31	Name for which the user space is allocated locally.
localSnpcPG	string	name31	Name for which the snapshot space is allocated locally.
volumes	array of volumes objects	<u>volumes objects</u>	Lists all the properties of the volumes that are associated with the Remote Copy group. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Table Continued

Member	JSON type	API type	Description
targets	Array of targets object	<u>targets objects</u>	List of all the properties of the Remote Copy group associated with a given target. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
links	array of URL links	array of URL links	Links include the self URL, which is the original request URL including the query at the end. Required for the Single Instance Query for remoteCopyGroups only.

! **IMPORTANT:** The Remote Copy members objects as defined in WSAPI 1.4.0 and WSAPI 1.4.1 are obsolete. Hewlett Packard Enterprise recommends using WSAPI 1.4.2 or later.

Table 365: volumes objects

Member	JSON type	API type	Description
localVolumeName	string	name31	Volume name. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
localVolumeId	number	int32	Volume ID. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
remoteVolumes	array of objects	<u>remoteVolume s objects</u>	Array of remote volumes associated with each Remote Copy group target. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
links	array of URL links	array of URL links	Links include the self URL, which is the original request URL including the query at the end. Required for the Single Instance Query for volumes only.

Table 366: remoteVolumes objects

Member	JSON type	API type	Description
targetName	string	name31	Target to which the volume group is mirrored. Displays only if the target is present. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
remoteVolumeName	string	name31	volume name on the target system. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
remoteVolumeID	number	int32	volume ID on the target system. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
resyncSnapshotName	string	name31	Snapshot indicating the starting point of the remote volume. The primary array uses this snapshot to determine which changes to synchronize to the secondary volume. The target array uses this snapshot as a recovery point if there is a resynchronization failure. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
syncSnapshotName	string	name31	Snapshot indicating the destination point of the Remote Copy volume on successful completion of resynchronization. Upon completion of a resynchronization, the remote base volume mirrors this synchronization snapshot. This snapshot becomes the resync snapshot when resynchronization completes. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
syncStatus	number	<u>rcopyGroupVVStatus</u> <u>Enum enumeration</u>	Synchronization status of the volume. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Table Continued

Member	JSON type	API type	Description
volumeIteration	string	print256	A correlator used to determine the data consistency point of the volume relative to the remote volume and/or snapshots. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
syncnIteration	string	print256	A correlator used to determine the data consistency point of the synchronization snapshot relative to the remote volume and/or snapshots. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
resyncnIteration	string	print256	A correlator used to determine the data consistency point of the resynchronization snapshot relative to the remote volume and/or snapshots. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
volumeLastSnapTime	string	8601	Time of last coordinated snapshot; Async mode only. (WSAPI 1.5 and later)
volumeLastSnapTimeSec	number	int32	Last successful coordinated snapshot in seconds since epoch; Async mode only. (WSAPI 1.5 and later)
volumeLastSyncTimeSec	number	int32	Last successful synchronization time in seconds since epoch. This field is displayed only if the target is present. (WSAPI 1.5 and later)
volumeLastSyncTime	string	8601	Last successful synchronization time. This field is displayed only if the target is present. (WSAPI 1.5 and later)

Table Continued

Member	JSON type	API type	Description
volumeSyncOffset	number	int64	volume synchronization offset. Relevant only if the <code>syncStatus</code> is <code>SYNCING</code> . (WSAPI 1.5 and later)
volumeSyncLength	number	int64	volume synchronization total length. Relevant only if the <code>syncStatus</code> is <code>SYNCING</code> . (WSAPI 1.5 and later)
asyncOutstanding	number	int32	Total outstanding data to be synchronized in MB. You can calculate backlog data for the Remote Copy Async group by summing up the <code>asyncOutstanding</code> value for all the volumes in the group. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Table 367: targets objects

Member	JSON type	API type	Description
targetName	string	name31	Target to which the volume group is mirrored. This is the same as <code>target</code> . This field is displayed only if the target is present. (WSAPI 1.5 and later)
target	string	name31	Target to which the group is mirrored. The target JSON object will be deprecated in a future release of WSAPI.
roleReversed	number	boolean	Remote Copy group role switched due to a failover. (WSAPI 1.5 and later)
state	number	<u>rcopyGroupStateEnum enumeration</u>	Status of the Remote Copy group for this target. (WSAPI 1.5 and later)

Table Continued

Member	JSON type	API type	Description
mode	number	<u>rcopyGroupModeEnum</u> <u>symbols and descriptions</u>	Remote Copy group mode. (WSAPI 1.5 and later)
syncPeriod	number	int32	Time period in seconds for automatic resynchronization. The value must be at least five minutes and not more than one year. This field applies to periodic and async modes. (WSAPI 1.5 and later)
groupLast SyncTimeSec	number	int32	Last synchronization time in seconds since epoch. This field applies only to the periodic mode. (WSAPI 1.5 and later)
groupLast SyncTime	string	8601	Last synchronization time. This field applies only to the periodic mode. (WSAPI 1.5 and later)
policy	object	<u>policy objects</u>	The policy assigned to the Remote Copy group. (WSAPI 1.5 and later)
remoteSnpcPG	string	name31	Name for which the snapshot space is allocated on the remote target.
remoteUsrCPG	string	name31	Name for which the user space is allocated on the remote target. (WSAPI 1.5 and later)
snapFrequency	number	int32	Specifies the interval in seconds at which Remote Copy takes coordinated snapshots. This field applies only to Async mode.
links	array of URL links	array of URL links	Links include the self URL, which is the original request URL including the query at the end. Required for the Single Instance Query for <code>targets</code> only.

Table 368: rcopyGroupRoleEnum enumeration

Symbol	Value	Description
PRIMARY	1	The Remote Copy group role is primary.
SECONDARY	2	The Remote Copy group role is secondary.

Table 369: rcopyGroupStateEnum enumeration

Symbol	Value	Description
NEW	1	The Remote Copy group role is not yet started. (WSAPI 1.5 and later)
STARTING	2	The Remote Copy group role is in the process of being started. (WSAPI 1.5 and later)
STARTED	3	The Remote Copy group role is started. (WSAPI 1.5 and later)
RESTART	4	The Remote Copy group role is restarted. (WSAPI 1.5 and later)
STOPPED	5	The Remote Copy group role is stopped. (WSAPI 1.5 and later)
BACKUP	6	The target of the group is the nonactive target for a multitarget group. (WSAPI 1.5 and later)
FAILSAFE	7	The primary group cannot reconcile the state of the secondary group. The primary group is held in a failsafe state until the problem is resolved. (WSAPI 1.5 and later)
UNKNOWN	8	The Remote Copy group state is unknown. (WSAPI 1.5 and later)
LOGGING	9	The Remote Copy group is in logging state. (WSAPI 1.5 and later)

Table 370: policy objects

Member	JSON type	API type	Description
<code>autoRecover</code>	boolean	boolean	If the Remote Copy is stopped as a result of the links going down, the group can be automatically restarted after the links come back up. (WSAPI 1.5 and later)
<code>overPeriodAlert</code>	boolean	boolean	If synchronization of a periodic Remote Copy group takes longer to complete than its synchronization period, an alert is generated. (WSAPI 1.5 and later)
<code>autoFailover</code>	boolean	boolean	Automatic failover on a Remote Copy group. (WSAPI 1.5 and later)
<code>pathManagement</code>	boolean	boolean	Path management on a Remote Copy group. (WSAPI 1.5 and later)
<code>multiTargetPeerPersistence</code>	boolean	boolean	Specifies that the group is participating in a multitarget Peer Persistence configuration. The group must have two targets, one of which must be synchronous. The synchronous group target also requires <code>pathManagement</code> and <code>autoFailover</code> policy settings.

Table 371: rcopyGroupVVStatusEnum enumeration

Symbol	Value	Description
NEW	1	Remote copy for the volume is not yet started. (WSAPI 1.5 and later)
SYNCING	2	The secondary volume is being synchronized with the primary volume. (WSAPI 1.5 and later)
SYNCED	3	The primary and secondary volumes are currently in sync (for periodic mode volumes, this state indicates the last synchronization completed). (WSAPI 1.5 and later)

Table Continued

Symbol	Value	Description
UNSYNC	4	The primary and secondary volumes are not in sync with one another. (WSAPI 1.5 and later)
STALE	5	The secondary volume has a valid point-in-time copy of the primary volume; however, the last attempt at synchronization failed. (WSAPI 1.5 and later)
NEWPRESYNCD	6	Remote copy for the volume has not started. When the group is started, the volume will not undergo an initial synchronization. (WSAPI 1.5 and later)
NEWSYNCDFROMSNAP	7	Remote copy for the volume has not started. When started, the volume is synchronized from the snapshot specified when the volume was admitted to the group. (WSAPI 1.5 and later)
STOPPED	8	Remote copy for the volume has been stopped. (WSAPI 1.5 and later)
FAILSAFE	9	The volume is unavailable for export to the attached hosts until the state of the volume on the secondary is reconciled. (WSAPI 1.5 and later)
UNKNOWN	10	The Remote Copy group state is unknown. (WSAPI 1.5 and later)
LOGGING	11	The Remote Copy group volume is in logging state. (WSAPI 1.5 and later)

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Querying a single Remote Copy group

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/remotecpygroups/<group_name>`

Success

A successful query returns the HTTP code 200 OK. Unless an internal server error occurs, the response includes a message body as specified in **Message body JSON object members for querying all remote copy groups**.

Errors

Table 372: Single Remote Copy group query error codes

API Error	HTTP Code	Description
NON_EXISTENT_RCOPY_GROUP	404 Not Found	The Remote Copy group does not exist. (WSAPI 1.5 and later)
UNLICENSED_FEATURE	403 Forbidden	The system does not have 3PAR Remote Copy Software license. (WSAPI 1.5 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Querying Remote Copy groups using filters

Use the `name` filter to query remote copy groups (Remote Copy group name – pattern match; supports the `*` only) .

To query for Remote-Copy Groups using multiple filters, use the HTTP GET method with the OR operator in the query string:

```
https://<storage_server>:8080/v1/remotecopygroups?query="name LIKE  
<rcopy_pattern>
```

For example:

- To query Remote Copy groups for an exact match using a group name, use the following URI:

```
https://<storage_system>:8080/api/v1/remotecopygroups?query="name LIKE  
<rcopy_group_name>"
```
- To query Remote Copy groups for a pattern match using a wildcard (`*`), use the following URI:

```
https://<storage_system>:8080/api/v1/remotecopygroups?query="name LIKE  
<rcopy_pattern*>"
```
- To query Remote Copy groups for multiple pattern matches, use the following URI:

```
https://<storage_system>:8080/api/v1/remotecopygroups?query="name LIKE  
<rcopy_pattern1> OR name LIKE <rcopy_pattern2> OR name LIKE  
<rcopy_pattern3>..."
```
- To query Remote Copy groups for different pattern matches using a wildcard (`*`), use the following URI:

```
https://<storage_system>:8080/api/v1/remotecopygroups?query="name LIKE  
<mycopygroup*>" OR name LIKE <*rctest>
```

Success

A successful query returns HTTP code 200 OK. Unless an error occurs, the response includes a message body JSON object as defined in the following table.

Table 373: Message body JSON object members for Remote Copy group query with filters

Member	JSON type	API type	Description
<code>total</code>	number	int32	Total number of Remote Copy groups returned.
<code>members</code>	array of objects	Array of RemoteCopyGroup objects (see, <u>JSON property object members for array of remoteCopyGroup objects</u>).	Remote Copy group volumes.

Errors

Table 374: Single Remote Copy group query filter error codes

API error	HTTP code	Description
<code>INT_SERV_ERR</code>	500 Internal Server Error	Internal Server Error
<code>UNLICENSED_FEATURE</code>	403 Forbidden	This system is not licensed for Remote Copy

In addition see, **Queries using filters error codes**.

Querying a Remote Copy group target

Use HTTP GET with the following URI:

`https://<storage_server>:8080/v1/remotecopygroups/<groupName>/targets`

Success

A successful query returns `HTTP code 200 OK`. Unless an internal server error occurs, the response to the query includes a message body specified in the following table.

Table 375: Message body JSON objects for Remote Copy group target query

Member	JSON type	API type	Description
total	number	int32	Total number of targets
members	Array of objects	Array of target property objects (see JSON object members for array of targets)	Remote Copy group targets.
links	Array of URL links	Array of URL links	Links include the self-URL.

Errors

See, [WSAPI query error causes](#).

Querying a Remote Copy group volume

Use HTTP GET with the following URI to query all volume information for a Remote Copy group:

`https://<storage_server>:8080/v1/remotecopygroups/<groupName>/volumes`

Success

A successful query returns HTTP code 200 OK. Unless an internal server error occurs, the response to the query includes a message body as described in the following table.

Table 376: Remote Copy group volume query message body

Member	JSON type	API type	Description
total	number	int32	Total number of targets
members	array of objects	Array of volume property objects (see, JSON object members for array of volumes object)	Remote Copy group volumes
links	array of URL links	Array of URL links	Links include the self-URL

[JSON object members for array of targets](#) lists the properties of the target object (this is the same as the target field of the Remote Copy group query).

Errors

Table 377: Remote copy group query error codes

API error	HTTP code	Description
INT_SERV_ERR	500 Internal Server Error	Internal Server Error
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for Remote Copy

Querying a single Remote Copy group target instance

Use HTTP GET with the following URI:

```
https://<storage_server>:8080/v1/remotecopygroups/<groupName>/targets/<target name>
```

Success

A successful query for Remote Copy group information returns HTTP code 200 OK. Unless an error occurs, the response message body includes JSON objects as described in **JSON object members for array of target objects**.

Errors

More information

[Errors](#) on page 371

Querying a single Remote Copy group volume instance

Use the HTTP GET method with the following URI:

```
https://<storage_server>:8080/v1/remotecopygroups/<groupName>/volumes/<volumeName>
```

Success

A successful query for Remote Copy volume information returns HTTP code 200 OK. Unless an error occurs, the response message body includes JSON objects as described in **JSON object members for array of volumes object**.

Errors

Table 378: Single Remote Copy group volume instance query error codes.

API error	HTTP code	Description
INT_SERV_ERR	500 Internal Server Error	Internal Server Error
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for Remote Copy

Table Continued

API error	HTTP code	Description
RCOPY_GROUP_TARGET_NOT_IN_GROUP (for single target query)	404 Not found	The target does not exist in the Remote Copy group
RCOPY_GROUP_VOL_NOT_IN_GROUP (for single volume query)	404 Not found	Volume not in Remote Copy group

Querying Remote Copy links

Use the HTTP GET method with the following URI and no message body:

https://<storage_system>:8080/api/v1/remotecopylinks

Success

A successful query for Remote Copy information returns HTTP code 200 OK. The response includes a message body with JSON objects as described in the following table:

Table 379: Response message body JSON objects for remote copy links

Member	JSON type	API type	Description
total	number	Int32	Total number of targets
members	array of objects	See, RCLinks object description	Remote Copy Links information
links	array of URI links	Array of URI links	Links include the self URI

Table 380: RCLinks object description

Member	JSON type	API type	Description
targetName	String	Name31	Target with which this link is affiliated
name	String	Name31	Name of the Remote Copy Link
id	Number	Int16	ID for this link.
status	Number	See, Link status enumeration table	Status of the link
state	Number	See, State enumeration	Link State - Based on the link status.

Table Continued

Member	JSON type	API type	Description
throughputKByteSec	Number	Int32	Link throughput in KBytes/sec
type	number	See, Link type enumeration table	The link type: IP or RCP.
address	String	Name64/WWN	IP Address or WWN of the RCopy Target for this link, depending if the “type” is IP(1) or FC(2).
IPC	String	Name8	Name given to the link IPC
portPos	object	See, VLUN portPos JSON objects	Location (node, slot and port) of this link. For IP links, if the link was created with just node then the “slot” and “port” positions will be empty.
links	Array of URI links	Array of URI links	Self URI: .../ remotecopylinks/ <linkName>

Table 381: Link type enumeration table

Link type	Value	Description
Unknown	0	Unknown or Other Link Type
IP	1	RCIP Link Type
FC	2	RCFC Link Type

Table 382: Link status enumeration table

Column Head	Column Head	Column Head
LINK_NOTSTARTED	1	Link has not been started.
LINK_STARTING	2	Link is not currently up.
LINK_UP	3	Link is currently up.
LINK_DOWN	4	Link is not currently up.
LINK_EXITED	5	

Table Continued

Column Head	Column Head	Column Head
LINK_DEGRADED	7	
LINK_RTT_WARNING	8	Heartbeat RTT Warning

Errors

See, [WSAPI query error causes](#).

Querying a single Remote Copy link instance

Use the HTTP GET method with the following URI and an empty message body:

`https://<storage_system> :8080/api/v1/remotecopylinks/<linkName>`

The <linkName> variable is the name of the Remote Copy link you are querying.

Success

A successful query for Remote Copy information returns HTTP code 200 OK. The response message body includes JSON objects as described in [RCLinks object description](#) .

Errors

Table 383: Remote copy link single instance query error codes

API error	HTTP code	Description
UNLICENSED_FEATURE	400 Bad Request	This system is not licensed for Remote Copy
NON_EXISTENT_RCOPY_LINK	404 Not found	The Remote Copy link does not exist

System information queries and management

Query system information for the entire storage system or a specific storage system, and query or manage parameters, configuration information, and tasks.

For information about creating, querying, and removing Flash Cache, see [Flash cache operations](#). For information about setting and querying Flash Cache policy for VV sets, see [Setting and querying a VV-set Flash Cache policy](#).

Querying storage system information

WSAPI 1.2 and later supports the storage system information query.

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/system`

Success

A successful query returns the HTTP code 200 OK. Unless an internal server error occurs, the response message body includes JSON objects as defined in the following table.

Table 384: Response message body JSON objects for storage system query response

Member	JSON type	API type	Description
id	number	uint32	System ID.
name	string	name31	System name.
IPv4Addr	string	name31	System IPv4 address.
IPv6Addr	string	print511	System IPv6 address.
model	string	name31	System model.
serialNumber	string	name31	System serial number.
systemVersion	string	name31	Storage system software version number.
patches	string	print511	List of patches provided in comma-separated format.
totalNodes	number	uint32	Total number of nodes in the system.
masterNode	number	uint32	Master node ID.
onlineNodes	array of number	array of uint32	Node IDs online.

Table Continued

Member	JSON type	API type	Description
clusterNodes	array of number	array of uint32	Node IDs in cluster.
chunkletSizeMiB	number	uint32	Chunklet size.
totalCapacityMiB	number	uint32	Total capacity (MiB) in the system.
allocatedCapacityMiB	number	uint32	Allocated capacity (MiB) in the system.
freeCapacityMiB	number	uint32	Free capacity (MiB) in the system.
failedCapacityMiB	number	uint32	Failed capacity (MiB) in the system.
location	string	print511	Location of the system.
owner	string	print511	Owner of the system.
contact	string	print511	Contact of the system.
comment	string	print511	Any comment about the system.
timeZone	string	print511	Time zone where the system is located.
flashCachePolicy	number	<u>flashCacheSysPolicyEnum</u>	(WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
licenseInfo	object	<u>licenseInfo objects</u>	Object containing license information.
parameters	object	<u>systemParameter objects</u>	List all the system parameters.
readOnlyParameters	object	<u>readOnlyParameters objects</u>	Object contains the maximum volume size for different volume types.

Table 385: flashCacheSysPolicyEnum

Symbol	Value	Description
Enable	1	(WSAPI 1.4.2 and later with 3PAR OS 3.2.1 MU2)
Disable	2	(WSAPI 1.4.2 and later with 3PAR OS 3.2.1 MU2)
Cleared	3	(WSAPI 1.4.2 and later with 3PAR OS 3.2.1 MU2)

Table 386: licenseInfo objects

Member	JSON type	API type	Description
issueTimeSec	number	epoch	The time when the license was created, measured in seconds since 12 AM on 01/01/1970.
issueTime8601	string	8601	The time when the license was issued.
diskCount	number	int32	Number of disks for which the system is licensed. (-1 = unspecified, 0 = unlimited, >0 is the diskCount)
WWNBASE	string	WWN	WWN Base (also known as W19) number of the system
licenses	object	<u>license objects</u>	License name and its expiry date
licenseState	object	<u>licenseState objects</u>	Enabled or disabled state of individual license.

Table 387: license objects

Member	JSON type	API type	Description
name	string	Print64	License installed in the system.
expiryTimeSec	number	epoch	The time when the license expires, measured in seconds since 12 AM on 01/01/1970. No value returned means no expiry time set.
expiryTime8601	string	8601	The time when the license expires. No value returned means no expiry time set.

Table 388: licenseState objects

Member	Value	Description
virtualCopy	boolean	Virtual Copy feature is enabled (<code>true</code>) or disabled (<code>false</code>).
remoteCopy	boolean	Remote Copy feature is enabled (<code>true</code>) or disabled (<code>false</code>).
thinProvisioning	boolean	Thin Provisioning feature is enabled (<code>true</code>) or disabled (<code>false</code>). (Formerly <code>thinProvsioing</code> .)
domains	boolean	Domain feature is enabled (<code>true</code>) or disabled (<code>false</code>).
dynamicOptimization	boolean	Dynamic Optimization feature is enabled (<code>true</code>) or disabled (<code>false</code>).
virtualLock	boolean	Virtual Lock feature is enabled (<code>true</code>) or disabled (<code>false</code>).
thinPersistence	boolean	Thin Persistence feature is enabled (<code>true</code>) or disabled (<code>false</code>).
thinConversion	boolean	Thin Conversion feature is enabled (<code>true</code>) or disabled (<code>false</code>).
adaptiveOptimization	boolean	Adaptive Optimization feature is enabled (<code>true</code>) or disabled (<code>false</code>).
peerVirtualization	boolean	Peer Virtualization feature is enabled (<code>true</code>) or disabled (<code>false</code>).
qos	boolean	Quality of Service feature is enabled (<code>true</code>) or disabled (<code>false</code>).
systemReporter	boolean	System Reporter feature is enabled (<code>true</code>) or disabled (<code>false</code>).
darEncryption	boolean	DAR Encryption feature is enabled (<code>true</code>) or disabled (<code>false</code>).
fileServices	boolean	File Services feature is enabled (<code>true</code>) or disabled (<code>false</code>).
storageFederation	boolean	Storage Federation feature is enabled (<code>true</code>) or disabled (<code>false</code>).

Table Continued

Member	Value	Description
onlineImport	boolean	Online Import feature is enabled (<code>true</code>) or disabled (<code>false</code>).
rmcApplicationSuite	boolean	Application Suite feature is enabled (<code>true</code>) or disabled (<code>false</code>).
smartSAN	boolean	Smart SAN feature is enabled (<code>true</code>) or disabled (<code>false</code>).

Table 389: systemParameter objects

Member	JSON type	API type	Description
rawSpaceAlertFC	number	uint32	Space alert threshold (10 GB to 100000 GB) for Fibre Channel type drives.
rawSpaceAlertNL	number	uint32	Space alert threshold (10 GB to 100000 GB) for NearLine type drives.
rawSpaceAlertSSD	number	uint32	Space alert threshold (10 GB to 100000 GB) for Solid-State Drive type drives.
remoteSyslog	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) sending events as syslog messages to a remote system.
remoteSyslogHost	string	string	Hostname, IP address, or (optionally) the port of the remote syslog servers to which events are sent as syslog messages. Multiple servers are comma-separated.
remoteSyslogSecurity Host	string	string	Hostname, IP address, or (optionally) the port of the remote syslog servers to which security events are sent as syslog messages. Multiple servers are comma-separated.
sparingAlgorithm	string	name31	Sparing algorithm. Valid values are: <ul style="list-style-type: none"> • Default (roughly 2.5% with minimums) • Minimal (roughly 2.5% without minimums) • Maximal (one disk's worth in every cage) • Custom (not managed automatically by the system)
eventLogSize	number	uint32	The size of the event log, in Bytes

Table Continued

Member	JSON type	API type	Description
eventLogNum	number	uint32	Number of event log files.
VVRetentionTimeMax	number	uint32	The maximum value in seconds that can be set for the retention time of a volume.
upgradeNote	string	print511	Displays a note when checking whether the upgrade is running.
portFailoverEnabled	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) the automatic failover of target ports to their designated partner ports.
autoExportAfterReboot	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) automatically exporting VLUNs after a reboot.
allowR5OnNLDrives	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) support for RAID-5 on NL drives (creating CPGs on NL drives).
allowR5OnFCDrives	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) support for RAID-5 on FC drives.
allowR0	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) support for RAID-0 (creating RAID-0 CPGs).
thermalShutdown	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) system shutdown when the temperature gets too hot.
failoverMatchedSet	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) the automatic failover of matched-set VLUNs during a persistent port failover. This setting does not affect host-see VLUNs, which are always in failover mode.
sessionTimeout	number	uint32	Specifies the value in seconds that can be set for the idle timeout for a CLI session.
hostDIF	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) host-based T10 Data Integrity Field (DIF) support for all ports.
allowWrtbackSingleNode	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) the system going into write through if a single node state occurs.
allowWrtbackUpgrade	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) the system going into write through if a single node state occurs during an upgrade.

Table Continued

Member	JSON type	API type	Description
<code>disableDedup</code>	boolean	boolean	Enable or disable duplication of new write requests to TDVVs serviced by the system.
<code>disableCompr</code>	boolean	boolean	<p>Indicates the status of compression of all new write requests to the compressed VVs serviced by the system. Either not compressed (<code>true</code>) or compressed (<code>false</code>).</p> <p>Defaults to <code>false</code>.</p> <p>You can use the CLI command <code>setsys DisableCompr</code> to enable or disable this functionality.</p> <p>If you change this setting to <code>true</code>, you cannot change it back to <code>false</code>.</p>
<code>overProvRatioLimit</code>	number	float	The system, device types, and all CPGs are limited to the specified overprovisioning ratio. A ratio of 0 (default) means that no limit is enforced. A ratio of 3 means that the virtually available size is 3 times that of the physical space available. This ratio is different across each CPG and for the system as a whole.
<code>complianceOfficerApproval</code>	boolean	boolean	Indicates the status of compliance officer approval mode as either enabled (<code>true</code>) or disabled (<code>false</code>).
<code>overProvRatioWarning</code>	number	float	If a system, a device type, or a CPG exceeds the <code>overProvRatioLimit</code> , this parameter setting determines whether the system issues a warning alert. A ratio of 0 (default) generates no warning alert. A ratio of 3 means that the virtually available size is 3 times that of the physical space available.
<code>hostDIFTemplate</code>	number	<u>hostDIFTemplateEnum enumeration</u>	Default host-based T10 Data Integrity Field.
<code>disableChunkletInitUNMAP</code>	boolean	boolean	Disable Initialization of any unmapped chunklets.

Table Continued

Member	JSON type	API type	Description
personaProfile	number	personaProfile Enum enumeration	Current personaProfile across the system.
remoteCopyHostThrottling	boolean	boolean	<p>Enable (<code>true</code>) or disable (<code>false</code>) Remote Copy throttling policy for host IO replicated in asynchronous streaming mode.</p> <p>Defaults to <code>false</code>.</p> <p>When the Remote Copy resources reach maximum limits, some or all Remote Copy groups can be suspended until system resources become available.</p> <p>Enabled - Subjects the host IO that is replicated to asynchronous streaming groups to active host IO management. Reduces resource consumption and prevents suspension of some or all groups.</p> <p>Disabled - The host IO that is replicated to asynchronous streaming groups is not subjected to any active host IO management. Can result in some or all Remote Copy groups becoming suspended.</p>

Table 390: personaProfileEnum

Type	Value	Description
BLOCK-ONLY	1	No CPU/MEM for file.
BLOCK-PREFERRED	2	CPU/MEM equally shared by file and block.
UNKNOWN	3	Unknown profile.

Table 391: hostDIFTemplateEnum enumeration

Type	Value	Description
no_host_dif	1	No support for host DIF.
3par_host_dif	2	HPE 3PAR implementation of DIF.
std_host_dif	3	Standard SCSI implementation of DIF (default).
Unknown	99	Unknown profile.

Table 392: readOnlyParameter objects

Member	JSON type	API type	Description
maxVolumeSizeMiB	object	unit64	Maximum size in MiB for a thin provisioned or fully provisioned volume.
maxDedupVolumeSizeMiB	object	unit64	Maximum size in MiB for a de-duplicated volume.
maxCompressedVolumeSizeMiB	object	unit64	Maximum size in MiB for a de-duplicated volume.

Errors

Table 393: Storage-system query error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error. Communication with CLI failed.

More information

[WSAPI error codes and descriptions](#) on page 34

Updating storage system parameters

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/system`

You can set all of the system parameters in one HTTP request, but some updates might fail.

The request message body includes JSON objects as described in the following table.

Table 394: Request message body JSON objects for updating storage system parameters

Member	JSON type	API type	Description
parameters	object	<u>systemParameter objects</u>	<p>You can modify the following system parameters :</p> <ul style="list-style-type: none"> • FailoverMatchedSet • PortFailoverEnabled • RemoteSyslog • RemoteSyslogHost • RemoteSyslogSecurityHost <p>You can also specify multiple RemoteSyslogHost servers.</p>

Table 395: systemParameter objects

Member	JSON type	API type	Description
remoteSyslog	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) sending events to a remote system as <code>syslog</code> messages.
remoteSyslogHost	string	string	<p>IP address of the systems to which events are sent as <code>syslog</code> messages. The value must be a valid IP address. Sets the hostname or IP address, and optionally the port, of the remote <code>syslog</code> servers to which general events are sent as <code>syslog</code> messages. When configuring the destination with both the IPv6 address and port, the IPv6 address must be enclosed in square brackets.</p> <p>Specify multiple servers (up to three) using a comma-separated string.</p> <p>If the port is not configured one of the following default ports is used; 514 for UDP, 601 for TCP, 6514 for TLS.</p>

Table Continued

Member	JSON type	API type	Description
<code>remoteSyslogSecurityHost</code>	string	string	<p>Sets the hostname or IP address, and optionally the port, of the remote syslog servers to which security events are sent as syslog messages.</p> <p>When configuring the destination with both the IPv6 address and port, the IPv6 address must be enclosed in square brackets.</p> <p>Specify up to three servers using a comma-separated string. Security messages are sent over TLS. Uses port 6514 if no other port is configured.</p>
<code>portFailoverEnabled</code>	boolean	boolean	<p>Enable (<code>true</code>) or disable (<code>false</code>) the automatic fail over of target ports to their designated partner ports.</p>
<code>failoverMatchedSet</code>	boolean	boolean	<p>Enable (<code>true</code>) or disable (<code>false</code>) the automatic fail over of matched-set VLUNs during a persistent port fail over. This does not affect host-see VLUNs, which are always failed over.</p>
<code>disableDedup</code>	boolean	boolean	<p>Enable or disable new write requests to TDVVs serviced by the system to be deduplicated.</p> <p><code>true</code> – Disables deduplication</p> <p><code>false</code> – Enables deduplication</p>
<code>disableCompr</code>	boolean	boolean	<p>Indicates the status of compression for all new write requests to the compressed VVs serviced by the system. Either not compressed (<code>true</code>) or compressed (<code>false</code>).</p> <p>Defaults to <code>false</code>.</p> <p>You can use the CLI command <code>setsys DisableCompr</code> to enable or disable this functionality.</p> <p>If you change this setting to <code>true</code>, you cannot change it back to <code>false</code>.</p>

Table Continued

Member	JSON type	API type	Description
overProvRatioLimit	number	float	The system, device types, and all CPGs are limited to the specified overprovisioning ratio. A ratio of 0 (default) means no limit is enforced. A ratio of 3 means that there is 3 times the size virtually available than what is physically available. Note that this will be different across each CPG and for the system as a whole.
overProvRatioWarning	number	float	An overprovisioning ratio, which when exceeded by the system, a device type, or a CPG, results in a warning alert. A ratio of 0 (default) means no warning alert is generated. A ratio of 3 means that there is 3 times the size virtually available than what is physically available.
allowR5OnNLDrives	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) support for RAID-5 on NL drives.
allowR5OnFCDrives	boolean	boolean	Enable (<code>true</code>) or disable (<code>false</code>) support for RAID-5 on FC drives.

Success

A successful update returns the HTTP code 200 OK with no message body. The location portion of the JSON response header indicates the original URI of the storage system.

Errors

Table 396: Storage system parameters update error codes

API error	HTTP code	Description
INV_INPUT	400 Bad Request	Invalid input parameter or value. You can modify the following system parameters only: <ul style="list-style-type: none"> <code>failoverMatchedSet</code> <code>portFailoverEnabled</code> <code>remoteSyslog</code> <code>remoteSyslogHost</code>
PARTIAL_EXECUTION_SUCCESS	400 Bad Request	Partial attributes setting successfully and there may be some errors
ALL_EXECUTION_FAILED	400 Bad Request	All attributes setting failed

Getting version information

A client of WSAPI can query the API server for version information. Use an HTTP GET request with the following URI:

```
https://<storage_system>:8080/api
```

You do not need a session key to make the request.

Success

A successful query for version information returns a JSON object that describes the interface version provided by the API server.

Table 397: JSON objects for version information response

Member	JSON type	Description
major	number	The version major number.
minor	number	The version minor number.
build	number	A build number not meant to be interpreted by clients, but useful for identifying specific builds of versions for defect reports or support requests.

Errors

Table 398: Storage-system version query error codes

API Error	HTTP Code	Description
INT_SERV_ERR	500 Internal Server Error	Internal server error.

Getting WSAPI configuration information

Use the HTTP GET method with the following URI and no message body:

```
https://<storage_system>:8080/api/v1/wsapiconfiguration
```

Success

Unless an error occurs, the response includes a message body with JSON object members as described in the following table.

Table 399: Message body JSON objects for WSAPI configuration query

Member	JSON type	Value Range	Description
httpState	string	name31	<p>HTTP port state. Possible values are:</p> <ul style="list-style-type: none"> Enabled : HTTP port is enabled. Disabled : HTTP port is disabled. <p>(WSAPI 1.3 and later)</p>
httpsState	string	name31	<p>HTTPS port state. Possible values are:</p> <ul style="list-style-type: none"> Enabled : HTTPS port is enabled. Disabled : HTTPS port is disabled. <p>(WSAPI 1.3 and later)</p>
httpPort	number	uint32	<p>HTTP port number on which WSAPI is listening for unsecure connections.</p> <p>Value: 8080</p> <p>(WSAPI 1.3 and later)</p>
httpsPort	number	uint32	<p>HTTPS port number on which WSAPI is listening for secure connections.</p> <p>Value: 8080</p> <p>(WSAPI 1.3 and later)</p>
version	string	name31	<p>The WSAPI server version.</p> <p>(WSAPI 1.3 and later)</p>
sessionsInUse	number	uint32	<p>The number of WSAPI sessions in use in the cluster.</p> <p>(WSAPI 1.3 and later)</p>
systemResourceUsage	number	uint32	<p>The SRU setting on the array. This represents the total number of concurrent sessions that the WSAPI server can handle, theoretically, at any given time.</p> <p>Example: 240</p> <p>(WSAPI 1.3 and later)</p>

Table Continued

Member	JSON type	Value Range	Description
sessionTimeout	number	uint32	The idle session timeout, in minutes, for a WSAPI session, in the range of 3-1440 minutes or (3 minutes to 24 hours). The default timeout value is 15 minutes. (WSAPI 1.4.2, with 3PAR OS 3.1.2 MU2)
eventSessionsInUse	number	uint32	Number of even sessions in use.
maxEventSessions	number	uint32	Maximum number of event sessions allowed.

The `systemResourceUsage` member of `wsapiconfiguration` HTTP GET operation output represents the theoretical maximum number of sessions the WSAPI server can handle at any given time. The `systemResourceUsage` value, which is determined at WSAPI server process start time, depends on the array configuration and memory usage on each node on the cluster.

The response in the following example shows the SRU (`systemResourceUsage`) as 144 concurrent sessions.

systemResourceUsage response

```
Response: {
  httpState: "Enabled"
  httpPort: 8080
  httpsState: "Enabled"
  httpsPort: 8080
  version: "1.3.1"
  sessionsInUse: 0
  "systemResourceUsage":144,
  "sessionTimeout":15}
```

Errors

Table 400: WSAPI configuration query response error codes

API Error	HTTP Code	Description
OTHER	400 Bad Request	Other miscellaneous errors.
INT_SERV_ERR	500 Internal Server Error	Memory allocation failure. Communication with CLI failed.

More information

[WSAPI error codes and descriptions](#) on page 34

Querying the status of all tasks

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system> :8080/api/v1/tasks`

Success

A successful query returns a message body with members as described in the following table. The tasks shown are tasks started within the last 24 hours.

Table 401: Message body JSON objects for all-tasks status query

Member	JSON type	API type	Description
total	number	int32	Number of tasks returned, representing the number of objects in the collection.
members	array of objects	array of task objects	All task information returned as a JSON array of zero or more JSON objects—one for each task.

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Querying the status of a single task

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/tasks/<task_id>`

Success

A successful query of a single task returns a message body with JSON object members as described in the following table.

Table 402: Response message body JSON object members for task object query

Member	JSON type	API type	Description
Id	number	number	Task ID. (WSAPI 1.3 and later)
type	number	<u>taskTypeEnum</u>	Task type. (WSAPI 1.3 and later)
Name	string	string	Task name. (WSAPI 1.3 and later)
Status	number	<u>taskStatusEnum</u>	Task status. (WSAPI 1.3 and later)

Table Continued

Member	JSON type	API type	Description
completedPhases	number	number	For active tasks only; the number of completed phases. (WSAPI 1.3 and later)
totalPhases	number	number	For active tasks only; the total number of phases. (WSAPI 1.3 and later)
completedSteps	number	number	For active tasks only; the number of completed steps. (WSAPI 1.3 and later)
totalSteps	number	number	For active tasks only; the total number of steps. (WSAPI 1.3 and later)
startTime	string	time	Task start time. (WSAPI 1.3 and later)
finishTime	string	time	Task end time. (WSAPI 1.3 and later)
priority	number	<u>taskPriorityEnum</u>	Task priority. (WSAPI 1.3 and later)
user	string	string	The user who initiated the task. (WSAPI 1.3 and later)
detailedStatus	string	string	Shows detailed task status for specified tasks (single Instance only). (WSAPI 1.6 and later.)
dryRunInfo	array of objects	<u>VVSpaceSavings objects</u>	Object containing information for virtual volumes on which one of the following dry run tasks has been executed... 1. Deduplication ratio calculation task 2. Compression ratio calculation task 3. Deduplication & Compression space estimation task NOTE: Applicable only if 'type' is either DEDUP_DRYRUN, COMPR_DRYRUN or DEDUP_COMPR_DRYRUN (This field is returned for single instance only)

Table 403: tasktypeEnum

Symbol	Value	Description
VV_COPY	1	Track the physical copy operations.
PHYS_COPY_RESYNC	2	Track physical copy resynchronization operations.
MOVE_REGIONS	3	Track region move operations.
PROMOTE_SV	4	Track virtual-copy promotions. Requires 3PAR Virtual Copy license.
REMOTE_COPY_SYNC	5	Track Remote Copy group synchronizations. Requires 3PAR Remote Copy license.
REMOTE_COPY_REVERSE	6	Track the reversal of a Remote Copy group.
REMOTE_COPY_FAILOVER	7	Track the change-over of a secondary volume group to a primary volume group.
REMOTE_COPY_RECOVER	8	Track the starting of synchronization after a failover operation from the original secondary cluster to the original primary cluster.
REMOTE_COPY_RESTORE	9	Tracks the restoration process for groups that have already been recovered.
COMPACT_CPG	10	Track space consolidation in CPGs.
COMPACT_IDS	11	Track space consolidation in logical disks.
SNAPSHOT_ACCOUNTING	12	Track progress of snapshot space usage accounting.
CHECK_VV	13	Track the progress of the check-volume operation.
SCHEDULED_TASK	14	Track tasks that have been executed by the system scheduler.
SYSTEM_TASK	15	Track tasks that are periodically run by the storage system.
BACKGROUND_TASK	16	Track commands that have been started via the <code>starttask</code> command.
IMPORT_VV	17	Track tasks that migrate data to the local storage system.
ONLINE_COPY	18	Track physical copy of the volume while online. (<code>createvvcopy -online</code> command)

Table Continued

Symbol	Value	Description
CONVERT_VV	19	Track tasks that are converting a volume from an FPVV to a TPVV and vice-versa.
BACKGROUND_COMMAND	20	Track background command tasks.
CLX_SYNC	21	Track CLX synchronization tasks.
CLX_RECOVERY	22	Track CLX recovery tasks.
TUNE_SD	23	Tune copy space
TUNE_VV	24	Tune virtual volume
TUNE_VV_ROLLBACK	25	Tune virtual volume rollback
TUNE_VV_RESTART	26	Tune virtual volume restart
SYSTEM_TUNING	27	System tuning
NODE_RESCUE	28	Node rescue
REPAIR_SYNC	29	Remote copy repair sync
REMOTE_COPY_SWOVER	30	Remote Copy switchover
DEFRAGMENTATION	31	Defragmentation
ENCRYPTION_CHANGE	32	Encryption change
REMOTE_COPY_FAILSAFE	33	Remote Copy failsafe
TUNE_TPVV	34	Tune thin virtual volume
REMOTE_COPY_CHG_MODE	35	Remote Copy change mode
ASync_CSS	36	Remote Copy async CSS
ONLINE_PROMOTE	37	Online Promote Snap
RELOCATE_PD	38	Relocate PD
PERIODIC_CSS	39	Remote Copy periodic CSS
TUNEVV_LARGE	40	Tune large virtual volume
SD_META_FIXER	41	Compression SD meta fixer
DEDUP_DRYRUN	42	Preview dedup ratio
COMPR_DRYRUN	43	Compression estimation

Table Continued

Symbol	Value	Description
DEDUP_COMPR_DRYRUN	44	Compression and dedup estimation
UNKNOWN	99	Unknown task type

Table 404: VVSpaceSavings objects

Member	JSON type	API type	Description
vvInfo	array of objects	<u>VVInfo objects</u>	Information about the Virtual Volumes on which the dry run task executed.
totalVVSizeMiB	number	uint32	Total virtual volume size.
estimatedVVSizeMiB	number	uint32	Estimated virtual volume size.
estimatedDeduplicationRatio	number	float	Estimated deduplication ratio.
estimatedCompressionRatio	number	float	Estimated compression ratio.
estimatedSavingsRatio	number	float	Estimated space savings ratio.

Table 405: VVInfo objects

Symbol	JSON type	API type	Description
vvId	number	uint32	Virtual volume ID.
vvName	string	name31	Virtual volume name.
vvSizeMiB	number	uint32	Virtual volume size.
compressionRatio	number	float	Compression ratio for the specified virtual volume.
savingsRatio	number	float	Savings ratio for the specified virtual volume savings ratio.

Table 406: taskStatusEnum

Symbol	Value	Description
DONE	1	The task has finished.
ACTIVE	2	The task is in progress.
CANCELLED	3	The task was canceled.
FAILED	4	The task failed.

Errors

Table 407: Task status query error codes

API Error	HTTP Code	Description
INV_INPUT_BELOW_RANGE	400 Bad Request	Task ID must be a positive value. (WSAPI 1.3 and later)
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	Task ID is too large. (WSAPI 1.3 and later)
NON_EXISTENT_TASK	404 Not Found	Task with the specified task ID does not exist. (WSAPI 1.3 and later)
INV_INPUT_WRONG_TYPE	400 Bad Request	Task ID is not an integer. (WSAPI 1.3 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

Canceling a task

Use the HTTP PUT method with the following URI:

`https://<storage_system>:8080/api/v1/tasks/<task_ID>`

Table 408: Request message body JSON object for canceling a task

Member	JSON type	API type	Ignored Values	Description
action	number	<u>taskAction</u> <u>enumeration</u>	Required field.	Specifies the action to be performed on the task

Table 409: taskAction enumeration

Symbol	Value	Description
CANCEL_TASK	1	Cancels the ongoing task. WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)

Example: Cancel a task (task 1)

PUT: `https://<storage_system>:8080/api/v1/tasks/1`

Success

A successful request to cancel a task returns the HTTP code 200 OK.

Errors**Table 410: Task cancellation error codes**

API Error	HTTP Code	Description
NON_ACTIVE_TASK	400 Bad Request	The task is not active at this time. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)
INV_OPERATION_CANNOT_CANCEL_TASK	409 Conflict	Invalid operation: Task cannot be canceled. (WSAPI 1.3.1 and later with 3PAR OS 3.1.3 MU1)

More information

[WSAPI error codes and descriptions](#) on page 34

Setting Flash Cache policy

Use the HTTP PUT method with the following URI and a request message body as described in the following table.

`https://<storage_system>:8080/api/v1/system`

Table 411: Request message body JSON objects for System Flash Cache policy setting

Member	JSON type	API type	Description
flashCachePolicy	number	See, flashCachePolicyEnum enumeration	(WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Success

A successful Flash Cache policy setting returns the HTTP code 200 OK with no message body.

Errors

If an error occurs, the system returns one of the error codes shown in **Flash Cache policy setting error codes**.

More information

WSAPI error codes and descriptions on page 34

Disaster recovery management using HPE 3PAR Cluster Extension software and 3PAR Remote Copy

Disaster recovery regulations vary based on country-specific rules that require multiple data centers to run the business and storage of data across multiple data centers. This methodology ensures that data replication occurs at more than one site. Enabling disaster recovery solutions allows a business to operate with minimal downtime in the event of planned maintenance or disaster recovery.

3PAR Cluster Extension software is a disaster recovery technology that automates and simplifies disaster recovery operations. Using the Remote Copy feature, Cluster Extension builds the recovery workflow dynamically and executes a sequence of operations to meet planned migration and disaster recovery scenarios. For Cluster Extension purposes, storage failover and role reversal are synonymous .

With WSAPI 1.6 on 3PAR OS 3.3.1 and later, Cluster Extension employs the features of Web Services API (WSAPI) to develop either automated or automatic disaster recovery solutions. You can develop these solutions for other disaster management eco systems, such as Microsoft Failover Cluster and RHEL/SUSE Native Clustering solutions. This use of WSAPI is supported for all Remote Copy group replication modes (synchronous, asynchronous periodic, and asynchronous streaming).

CLX supports a two-data-center configuration where Remote Copy is configured between two arrays. With WSAPI 1.6.3 (3PAR OS 3.3.1 MU3 and later), CLX supports failover and failback between the synchronous targets in a 3 data center, Synchronous Long Distance (SLD) configuration.

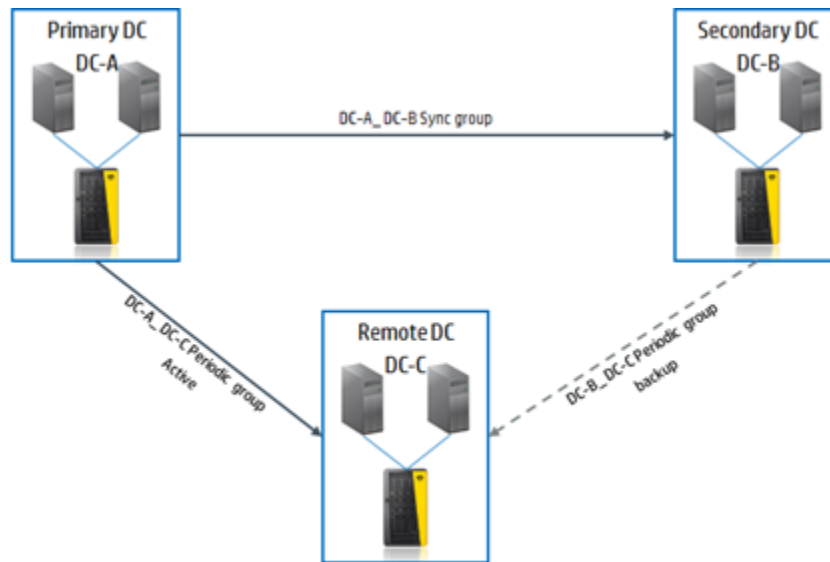
License requirements

Disaster Recovery management using Cluster Extension requires an All-inclusive Multi-system Software license.

Synchronous Long Distance (SLD) three data center support

WSAPI 1.6.3 and later supports the CLX `recovery` operation between synchronous targets in a three data center, Synchronous Long Distance (SLD) configuration. A three data center SLD configuration consists of a Primary data center, a Secondary data center, and a Remote data center.

After completing the appropriate prerequisites, you can run the `recovery` operation on the Primary data center or on the Secondary data center.



More information

[Enabling disaster recovery management on page 399](#)

Enabling disaster recovery management

Prerequisites:

- Stop all application I/Os for the Primary virtual volumes in the Remote Copy volume group to ensure application-consistent and current data.
- To perform a `recovery` operation between synchronous target arrays (SLD configuration), stop the Remote Copy group between the Primary site array and the Remote site array using any available interface (CLI, SSMC, WSAPI).

Procedure:

After completing the prerequisites, use the HTTP POST method with the following URI:

`https://<storage_system>:8080/api/v1/remotecopygroups/<groupname>`

The `<groupname>` parameter specifies the name of the Remote Copy group that requires disaster recovery management. The application uses volumes of this Remote Copy group for data storage.

The request message body is a JSON object with two members as described in the following table.

-
- ❗ **IMPORTANT:** Cluster Extension `sync` and `recovery` operations assume that the array with the Remote Copy group role of Primary-Rev has the most current data. For details about Remote Copy group roles see, [Cluster Extension sync operation](#) and [Cluster Extension recovery operation](#).
-

Table 412: Request message body JSON objects for enabling disaster recovery management

Member	JSON type	API type	Ignored values	Description
action	number	<u>remoteCopyGroupPOSTOperation enumeration</u>	Required field	Identifies the requested action (CLX_DR) and requires a value of 12.
parameters	object	<u>parameters objects</u>	Required field	Contains parameters for performing the disaster recovery operation.

Table 413: parameters objects

Member	JSON type	API type	Ignored values	Description
operation	number	<u>drOperation Enum</u>	Required field	Specifies which operation to perform on the Remote Copy group (<i>sync</i> or <i>recovery</i>). For details about the Remote Copy group role and its effect on the behavior of each operation, see <u>Cluster Extension sync operation</u> and <u>Cluster Extension recovery operation</u> .
targetName	string	name31	None. Optional field for single target groups; required for multitarget groups.	Specifies the target of the operation.
skipFailoveronLinkDown	boolean	boolean	None.	If <i>true</i> , the <i>recovery</i> operation does not perform role reversal and the operation fails. Defaults to <i>false</i> , which performs the role reversal. Applies to the <i>recovery</i> operation only, and used when Remote Copy links are down.

Table Continued

Member	JSON type	API type	Ignored values	Description
<code>forceAsPrimary</code>	boolean	boolean	None	<p>Enables (<code>true</code>) or disables (<code>false</code>), forcing the Remote Copy group role to become primary.</p> <p>If <code>true</code>, forces the Remote Copy group role to become primary, even if that group does not contain the latest data.</p> <p>If <code>false</code>, follows the Cluster Extension disaster recovery process and determines whether to return success or failure.</p> <p>After executing this operation successfully, be sure to execute a <code>recovery</code> operation with <code>forceAsSecondary</code> set to <code>true</code> on the other array.</p> <p>Using this parameter incorrectly can lead to inconsistent data between primary and secondary volumes. Use <code>forceAsPrimary</code> only when the recovery operation fails to change the role of the requested Remote Copy volume group to primary for valid reasons (see, <u>Recovery operation fails</u>).</p> <p>Applies to the <code>recovery</code> operation only.</p> <p>If you use both <code>forceAsPrimary</code> and <code>skipFailoveronLinkDown</code>, the <code>forceAsPrimary</code> parameter takes precedence.</p>

Table Continued

Member	JSON type	API type	Ignored values	Description
<code>forceAsSecondary</code>	boolean	boolean	None	<p>Enables (<code>true</code>) or disables (<code>false</code>), forcing the Remote Copy group role to become Secondary</p> <p>Use this option after successful execution of the <code>recovery</code> operation with the <code>forceAsPrimary</code> option on the other array.</p> <p>If <code>true</code>, forces the Remote Copy group role to become secondary, regardless of its current role.</p> <p>If <code>false</code> (default), follows the Cluster Extension disaster recovery process and determines whether to return success or failure.</p> <p>Applies to the <code>recovery</code> operation only.</p>
<code>skipSyncBeforeRecovery</code>	boolean	boolean	None	<p>Enables (<code>true</code>) or disables (<code>false</code>), skipping data synchronization before performing the role reversal.</p> <p>If <code>true</code>, the recovery operation does not perform the data synchronization from Primary to Secondary volumes before performing the role reversal.</p> <p>Used when the only operation required is role reversal. Manually complete any data synchronization required, and then initiate the <code>recovery</code> operation.</p> <p>Defaults to <code>false</code>, which complete data synchronization of the Remote Copy group before performing the role reversal.</p> <p>Applies to <code>recovery</code> operation, and used when Remote Copy links are up.</p>

Table Continued

Member	JSON type	API type	Ignored values	Description
<code>skipStart</code>	boolean	boolean	None	<p>Enables (<code>true</code>) or disables (<code>false</code>), skipping the start of the recovered Remote Copy group after completing the role reversal.</p> <p>If <code>true</code>, does not start the Remote Copy group after the role reversal, and the Remote Copy group state is stopped.</p> <p>Defaults to <code>false</code>, which starts the Remote Copy group after a successful role reversal. If the Remote Copy group start fails, the <code>recovery</code> operation fails.</p> <p>Applies to <code>recovery</code> operation, and used when Remote Copy links are up.</p>
<code>operationTimeout</code>	number	integer	Nonpositive values	<p>Specifies the time-out value, in seconds, for the disaster recovery operation to complete. Requires a positive integer in the range of 2 to 43200 seconds (12 Hours).</p> <p>Defaults to 43200 seconds.</p>
<code>skipWaitOnSync</code>	boolean	boolean	None	<p>Enables (<code>true</code>) or disables (<code>false</code>), skipping the wait time for synchronizing the primary and secondary Remote Copy group volumes.</p> <p>Defaults to <code>false</code>, which waits for data synchronization to complete before proceeding.</p> <p>Applies to <code>sync</code> operation.</p>
<code>alertMessage</code>	string	name256	None	<p>Optional parameter for a <code>recovery</code> operation only, and compatible with 3PAR OS 3.3.1 MU2 and later.</p> <p>At the end of the <code>recovery</code> operation (either successful or failed), CLX generates an alert on the array using the text you provide with this parameter. With no text specified, CLX generates a default message.</p>

Table 414: drOperationEnum

Symbol	Value	Description
sync	1	<p>Initiates synchronization of the primary and secondary Remote Copy group volumes, regardless of the valid replication roles (Primary/Secondary, Primary-Rev/Secondary-Rev, and Primary/Primary-Rev), modes (synchronous, asynchronous periodic, asynchronous streaming), or group/volume status (New, Started, Stopped, and so on).</p> <p>For more information, see, Cluster Extension sync operation.</p>
recovery	2	<p>Initiates a complete recovery operation for the Remote Copy group in both planned migration and disaster scenarios.</p> <p>Execute this operation on any array for the Remote Copy group volume, regardless of the valid replication roles (Primary/Secondary, Primary-Rev/Secondary-Rev, and Primary/Primary-Rev), modes (synchronous, asynchronous periodic, asynchronous streaming), or group/volume status (New, Started, Stopped, and so on).</p> <p>For more information, see, Cluster Extension recovery operation.</p>

Success

A successful operation returns HTTP code 202 ACCEPTED. The `Location` portion of the response message body contains the URI for the newly created task in the following format:

```
/api/v1/tasks/<task_id>
```

See the `taskId` for more information about the success or failure of the operation.

In an SLD three data center configuration, you must manually restart the Remote Copy group target between the now-Primary data center and the Remote data center. Use any available interface (CLI, SSMC, WSAPI).

Unless an internal server error occurs, the response includes a message body as specified in the following table.

Table 415: Response message body JSON objects for Remote Copy disaster recovery management

Member	JSON type	API type	Description
links	Array of URL links	Array of URL links	URL to the new task ID: <code>https://<storage_system>:8080/api/v1/tasks/<task_id></code> .
taskId	integer	int32	The ID of the task generated for the disaster recovery management operation using Cluster Extension.

Errors

The following table lists the possible errors related to an attempt to enable disaster recovery management. If the requested WSAPI operation returns any of these errors, the Cluster Extension operation itself has failed and did not generate a new 3PAR task ID.

Table 416: Cluster Extension disaster recovery management error codes

API error	API error code	HTTP Code	Description
CLX_ACTIVE_TASK	313	409 Conflict	Active CLX operation is already in progress for the specified Remote Copy group.
CLX_SLD_GRP_NO_TARGET_SPECIFIED	345	501 Not Implemented	Specified Remote Copy Group is part of a Synchronous Long Distance configuration, and the target name is not specified as part of the CLX operation.
CLX_SLD_GRP_MT_PP_NOT_SUPPORTED	346	501 Not Implemented	Specified Remote Copy Group is part of a Synchronous Long Distance configuration with the <code>mt_pp</code> policy and is not supported.
CLX_SLD_GRP_CLX_OPERATION_NOT_BETWEEN_SYNC_TARGETS	347	501 Not Implemented	Not implemented in SLD configuration. The CLX operation is supported between synchronous mode targets only.

More information

[WSAPI error codes and descriptions](#) on page 34

Remote Copy group roles and VV permissions

Role	Permission
Primary	Read and write
Primary-Rev	Read and write
Secondary	Read only
Secondary-Rev	Read only

Cluster Extension sync operation

The `sync` operator performs data synchronization from the primary volume group to the secondary volume group.

You can execute this operation on any array for the Remote Copy group, regardless of its role (Primary/Secondary, Primary-Rev/Secondary-Rev, and Primary/Primary-Rev), modes (synchronous, asynchronous periodic, asynchronous streaming), or group/volume status (New, Started, Stopped, and so on).

Using the `sync` operator requires that the Remote Copy links are up. If Remote Copy links are down, the Cluster Extension `sync` operation fails because data synchronization is not possible.

Valid Remote Copy group roles and the sync operation

- **Remote Copy group role is Primary and Secondary** – The `sync` operation performs data synchronization from the Primary Remote Copy group to the Secondary Remote Copy group. This behavior is same whether you execute this operation from an array where the Remote Copy group role is Primary or Secondary.
- **Remote Copy group role is Primary-Rev and Secondary-Rev** – The `sync` operation performs data synchronization from the Primary-Rev to the Secondary-Rev Remote Copy group. After data synchronization, this operation also converts the existing Primary-Rev and Secondary-Rev roles to Primary and Secondary roles, respectively.

When a `sync` operation successfully synchronizes data but fails to convert the roles, the system considers the `sync` operation successful. This behavior is same whether you execute this operation from the array where the Remote Copy group role is Primary-Rev or Secondary-Rev.

- **Remote Copy group role Primary and Primary-Rev** – The `sync` operation converts the Primary role to Secondary-Rev, and then performs data synchronization from the Primary-Rev to the Secondary-Rev volume group. After data synchronization, the `sync` operation converts the existing Primary-Rev and Secondary-Rev roles to Primary and Secondary, respectively.

When a `sync` operation successfully synchronizes data but fails to convert the roles, the system still considers the `sync` operation successful. This behavior is same whether you execute this operation from the array where the Remote Copy group role is Primary or is Primary-Rev.

If you enable the optional parameter `skipWaitOnSync`, the Cluster Extension `sync` operation does not wait until the operation finishes before determining success. Instead, the operation indicates success after initiating the `sync` operation. The `skipWaitOnSync` parameter defaults to `false`, which means that the Cluster Extension `sync` operation indicates success only after completing the data synchronization.

Cluster Extension recovery operation

The `recovery` operator recovers the specified Remote Copy group.

The operation changes the role of the requested Remote Copy group to Primary (read/write virtual volumes), on whichever array you execute the command. Applications can perform IOs on the new, Primary volumes.

You can execute the `recovery` operation on any array regardless of Remote Copy group role: (Primary/Secondary, Primary-Rev/Secondary-Rev, and Primary/Primary-Rev), modes (synchronous, asynchronous periodic, asynchronous streaming), or group/volume status (New, Stopped, Synched, and so on).

The `recovery` operator behaves differently depending on the Remote Copy group mode, group state, volume state, Remote Copy link state, and any optional parameters passed along with the operation.

The operation generates an alert to indicate either success or failure. The message codes for these alerts are 0x0aa0002 (successful) and 0x0aa0001 (failure).

If you specify the optional `alertMessage` parameter, the alert message uses the text provided in the message string of the alert. If you do not specify an `alertMessage` parameter, the alert message uses default text in the message string of the alert.

For purposes of this discussion, the Local Array is the array to which you send the Cluster Extension WSAPI request. The Remote Array is the array to which you send no WSAPI request.

Valid Remote Copy group roles and the recovery operation

You can use the `recovery` operator when Remote Copy links are up or down. The behavior of the recovery operator is different depending on the link status.

For information on valid request parameters, see, [Request message body JSON objects for enabling disaster recovery management](#)

Remote Copy group roles - local is Secondary, remote is Primary

Remote Copy links up

Action – The `recovery` operation synchronizes data from the Primary volumes to the Secondary volumes, performs role reversal, and then starts the Remote Copy group.

Result – A successful operation results in a Remote Copy group role of Primary on the local array and Secondary on the remote array. The Remote Copy group state is `started`.

The `skipSyncBeforeRecovery` parameter is optional, and can be useful in this scenario (see, [Request message body JSON objects for enabling disaster recovery management](#)).

Remote Copy links down

Action – The `recovery` operation performs role reversal.

❗ **IMPORTANT:** If the optional parameter `skipFailoveronLinkDown` is `true`, the operation does not perform role reversal and results in failure.

Result – A successful operation results in a Remote Copy group role of Primary-Rev on the local array and Primary on the remote array. The Remote Copy group state is `stopped`.

⚠ **CAUTION:** In this scenario, the Remote Copy groups on both the local and remote arrays have read-write access to the virtual volumes, which can result in data loss. Complete the Cluster Extension `sync` operation as soon as the Remote Copy links are up so that the local array becomes Primary, the remote array becomes Secondary, and the operation can initiate data synchronization from the Primary volumes to the Secondary.

Remote Copy group roles - local is Secondary-Rev, remote is Primary-Rev

Remote Copy links up

Action – The `recovery` operation synchronizes data from the Primary-Rev volumes to the Secondary-Rev volumes. After synchronizing data, the role reversal occurs, and then the operation starts the Remote Copy group.

Result – A successful operation results in a Remote Copy group role of Primary on the local array and Secondary on the remote array. The Remote Copy group state is `started`.

The `skipSyncBeforeRecovery` parameter is optional, and can be useful in this scenario (see, [Request message body JSON objects for enabling disaster recovery management](#)).

Remote Copy links down

Action – The `recovery` operation fails.

Result – This operation results in failure.

The failure occurs because the operation recognizes a potential for data loss.

In this case, the Remote Copy group role on the remote array is Primary-Rev, meaning that it contains the latest data. Because the Remote Copy links are down, the operation cannot synchronize the data from Primary-Rev to Secondary-Rev. This means that if role reversal occurs, the Remote Copy group on the local array becomes Primary and the remote array becomes Secondary. Applications begin writing I/Os to the local Remote Copy group, and the latest data on the remote array, accumulated before the planned migration or disaster recovery, is lost.

To avoid the potential data loss, Cluster Extension fails the `recovery` operation.

When this scenario exists and you want to make the `recovery` operation successful, either wait until the Remote Copy links are up, and then perform the `recovery` operation, or proceed with a forced recovery as described in [Recovery operation fails](#).

Remote Copy group roles - local is Primary, remote is Secondary or Primary-Rev

Remote Copy links up

- **Remote array with Secondary role**

Action – Requires no role reversal. The `recovery` operation initiates data synchronization from the Primary volumes to the Secondary volumes.

Result – A successful operation results in a Remote Copy group role of Primary on the local array and Secondary on the remote array. The Remote Copy group status is `started`.

- **Remote array with Primary-Rev role**

Action – The `recovery` operation synchronizes data, completes the role reversal, and then starts the Remote Copy group.

Result – A successful operation results in a Remote Copy group role of Primary on the local array and Secondary on the remote array. The Remote Copy group status is `started`.

Remote Copy links down

Result – The `recovery` operation fails because Cluster Extension cannot determine whether the Remote Copy group role for the remote array is Secondary or Primary-Rev.

When this scenario exists and you want to make the `recovery` operation successful, either wait until the Remote Copy links are up, and then perform the `recovery` operation, or proceed with a forced recovery as described in **Recovery operation fails**.

Remote Copy group roles - local is Primary-Rev, remote is Secondary-Rev or Primary

Remote Copy links up

- **Remote array with Secondary-Rev role**

Action – Requires no role reversal. The `recovery` operation performs data synchronization from the Primary-Rev volumes to the Secondary-Rev volumes, and changes the Remote Copy group roles from Primary-Rev to Primary and Secondary-Rev to Secondary.

Result – The Remote Copy group role is Primary on the local array and Secondary on the remote array. The Remote Copy group status is `started`.

Even if the role change from Primary-Rev and Secondary-Rev to Primary and Secondary fails, the `recovery` operation initiates the data synchronization and reports the `recovery` operation as successful. In this case, the Remote Copy group roles are Primary-Rev on the local array, and Secondary-Rev on the remote array.

- **Remote array with Primary role**

Action – Requires no role reversal. The `recovery` operation converts the Remote Copy group role from Primary to Secondary-Rev. The operation attempts to convert the Primary-Rev and Secondary-Rev roles to Primary and Secondary and starts the data synchronization.

Result – The Remote Copy group role is either Primary on the local array and Secondary on the remote array, or Primary-Rev on the local array and Secondary-Rev on the remote array. The Remote Copy group status is `started`.

Even if the role change from Primary-Rev and Secondary-Rev to Primary and Secondary fails, the `recovery` operation initiates the data synchronization and reports the `recovery` operation as successful. In this case, the Remote Copy group roles are Primary-Rev on the local array, and Secondary-Rev on the remote array.

Remote Copy links down

Remote array with Secondary-Rev or Primary role

Action – Requires no role reversal.

Result – The `recovery` operation completes successfully. Role reversal is not required in this case because the local array is already Primary-Rev, and Cluster Extension always treats the Primary-Rev array as having the most current data

❗ **IMPORTANT:** Hewlett Packard Enterprise recommends completing the Cluster Extension `sync` operation as soon as the Remote Copy links are up so that the Remote Copy group role is Primary on the local array and Secondary on the remote array, and the operation is able to initiate data synchronization from Primary to Secondary volumes.

Troubleshooting

Recovery operation fails

Symptom

The `recovery` operation fails when the Remote Copy links are down.

Cause

Failure can occur in either of the following circumstances:

- When the Remote Copy group role is Secondary-Rev on the local array and Primary-Rev on the remote array, and the Remote Copy links are down.
- When the Remote Copy group role is Primary on the local array, and the Remote Copy links are down.

In either case, failure is the expected behavior. The system is operating as designed.

Action

If your circumstances require a successful `recovery` operation, use the following procedure to force a successful recovery.

⚠ CAUTION: Use of this procedure can lead to inconsistent data between volumes or overwriting current data with old data. Use this operation carefully, and be sure to identify the correct array as Primary.

1. Set `forceAsPrimary` to `true` on the array with the most current data.
2. Execute the `recovery` operation on the same array.
3. Set `forceAsSecondary` to `true` on the array with the least current data.
4. Execute the `recovery` operation on the same array.
5. Verify that the operation completes successfully on each array.
6. As soon as the Remote Copy links are up, execute the `sync` operation on the array where the Remote Copy group role is Primary.

This `sync` operation ensures that the replication occurs from Primary to Secondary volumes.

Using log files for failure analysis

If the successfully initiated disaster recovery operation fails, you can find details about the failure using the `task ID` returned in the response message header. To complete further analysis, use the Cluster Extension logs located on the array.

Procedure

1. Request task information using the `task ID` returned in the response message header (see, **Success**).
2. Look for the `node ID` in the task details (`<NODE ID>:<PROCESS ID>`).
The `NODE ID` identifies the node on which the operation executed.
3. Generate the `inspolar` logs from the array on which you executed the `recovery` operation.
 - a. Go to the `/var/log/tpd/dro` directory on the node you identified.
 - b. Look for the log file with the same name as the Remote Copy group for which you executed the operation.
 - c. Open the log file and search for the `task ID` to begin your detailed analysis of the operation failure.

Flash cache operations

As of WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2, you can use WSAPI to perform the following Flash Cache operations:

- Create and remove a Flash Cache
- Query Flash Cache information

For information about setting and querying Flash Cache policy for VV sets, see [Setting and querying a VV-set Flash Cache policy](#).

For information about setting and querying Flash Cache policy for the entire system, see [Setting Flash Cache policy](#).

Creating a Flash Cache

Use the HTTP POST method with the following URI and a message body as described in the table below.

`https://<storage_system>:8080/api/v1/`

Table 417: Message body JSON objects for Cache creation

Member	JSON type	API type	Description
<code>flashCache</code>	object	flashCacheCreation objects	Contains parameters for creating flash cache.

Table 418: flashCacheCreation objects

Member	JSON type	API type	Description
<code>sizeGiB</code>	number	int32	Specifies the node pair size of the Flash Cache on the system.
<code>mode</code>	number	int32	Simulator: 1 Real: 2 (default)
<code>RAIDType</code>	number	flashCacheRAIDType enumeration	Raid Type of the logical disks for flash cache. When unspecified, storage system chooses the default. (WSAPI 1.6.3 or later.)

Table 419: flashCacheRAIDType enumeration

Symbol	Value	Description
<code>R0</code>	1	Level 0
<code>R1</code>	2	Level 1

Success

A successful cache creation returns the HTTP code 201 `Created`. The message body contains a link to the newly created Flash Cache. The `Location` portion of the header response displays the URI of the Flash Cache.

Errors

Table 420: Flash Cache creation error codes

API Error	HTTP Status Code	Description
NO_SPACE	400 Bad Request	Not enough space is available for the operation. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
INV_INPUT_EXCEEDS_RANGE	400 Bad Request	A JSON input object contains a name-value pair with a numeric value that exceeds the expected range. Flash Cache exceeds the expected range. The HTTP ref member contains the name. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
EXISTENT_FLASH_CACHE	409 Conflict	The Flash Cache already exists. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
FLASH_CACHE_NOT_SUPPORTED	403 Forbidden	Flash Cache is not supported. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
INV_FLASH_CACHE_SIZE	400 Bad Request	Invalid Flash Cache size. The size must be a multiple of 16 G. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Removing a Flash Cache

Use the HTTP DELETE method. Use the following URI, without a message body:

`https://<storage_system>:8080/api/v1/flashcache`

Success

A successful cache removal returns the HTTP code 200 `OK` with no message body.

Errors

Table 421: Flash Cache removal error codes

API Error	HTTP Status Code	Description
FLASH_CACHE_IS_BEING_REMOVED	403 Forbidden	Unable to delete the Flash Cache, the Flash Cache is being removed. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
FLASH_CACHE_NOT_SUPPORTED	403 Forbidden	Flash Cache is not supported on this system. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
NON_EXISTENT_FLASH_CACHE	404 Not Found	The Flash Cache does not exist. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Querying Flash Cache information

Use the HTTP GET method with the following URI, without a message body:

`https://<storage_system>:8080/api/v1/flashcache`

Success

A successful query returns HTTP Code 200 OK. Unless an error occurs, the response message body includes JSON objects as described in the following table:

Table 422: Response message body for Flash Cache query response

Member	JSON type	API type	Description
mode	number	flashCacheModeEnum	flashCacheModeEnum: 1: Simulator 2: Real (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)
sizeGiB	number	int32	The total size of the Flash Cache on the entire system. This might differ from the sizeGiB input in the create Flash Cache request if the system has more than two nodes. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Table Continued

Member	JSON type	API type	Description
state	number	See, <u>State enumeration</u>	—
usedSizeGiB	number	int32	The used size of the Flash Cache. (WSAPI 1.4.2 with 3PAR OS 3.2.1 MU2)

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Available space

Use WSAPI to discover overall available space on the system, or available space based on CPG and LD layout.

Overall system capacity

Use the HTTP GET method with the following URI and no message body:

```
https://<storage_system>:8080/api/v1/capacity
```

Success

Unless an internal server error occurs, the response includes a message body as specified in the following table.

Table 423: JSON objects for overall capacity response

Member	JSON type	API type	Description
allCapacity	object	<u>DeviceCapacity JSON objects</u>	Overall system capacity, which includes a combination of FC, NL, and SSD device types. (WSAPI 1.2 and later)
FCCapacity	object		System capacity from FC devices only. (WSAPI 1.2 and later)
NLCapacity	object		System capacity from NL devices only. (WSAPI 1.2 and later)
SSDCapacity	object		System capacity from SSD devices only. (WSAPI 1.2 and later)

Table 424: DeviceCapacity objects

Member	JSON type	API type	Description
totalMiB	number	uint64	Total system capacity in MiB. (WSAPI 1.2 and later)
allocated	AllocatedCapacity	See <u>allocatedCapacity objects</u>	(WSAPI 1.2 and later)

Table Continued

Member	JSON type	API type	Description
freeMiB	number	uint64	Free capacity. (WSAPI 1.2 and later)
freeInitializedMiB	number	uint64	Free initialized capacity. (WSAPI 1.2 and later)
freeUninitializedMiB	number	uint64	Free uninitialized capacity. (WSAPI 1.2 and later)
failedCapacityMiB	number	uint64	Failed capacity in MiB. (WSAPI 1.2 and later)
unavailableCapacityMiB	number	uint64	Unavailable Capacity. (WSAPI 1.2 and later)
overProvisionedVirtualSizeMiB	number	uint64	System contains an over provisioned Virtual Size MiB.
overprovisionedUsedMiB	number	uint64	System contains an over provisioned used MiB.
overProvisionedAllocatedMiB	number	uint64	System contains an over provisioned allocated MiB.
overProvisionedFreeMiB	number	uint64	System contains an over provisioned free MiB.

Table 425: allocatedCapacity objects

Member	JSON type	API type	Description
totalAllocatedMiB	number	uint64	Total allocated capacity. (WSAPI 1.2 and later)
volumes	object	<u>VolumeCapacity objects</u>	The capacity allocated to volumes. (WSAPI 1.2 and later)
system	object	<u>system objects</u>	The allocated system capacity. (WSAPI 1.2 and later)

Table 426: VolumeCapacity objects

Member	JSON type	Value Range	Description
totalVolumesMiB	number	uint64	Total capacity allocated to volumes. (WSAPI 1.2 and later)
nonCPGsMiB	number	uint64	Raw capacity used for LDs that are not part of a CPG. (WSAPI 1.2 and later)
nonCPGUserMiB	number	uint64	Raw capacity used for user space LDs that are not part of a CPG. (WSAPI 1.2 and later)
nonCPGSnapshotMiB	number	uint64	Raw capacity used for snapshot space LDs that are not part of a CPG. (WSAPI 1.2 and later)
nonCPGAdminMiB	number	uint64	Raw capacity used for admin space LDs that are not part of a CPG. (WSAPI 1.2 and later)
CPGsMiB	number	uint64	Total CPG capacity allocated to user space. (WSAPI 1.2 and later)
CPGUserMiB	number	uint64	User CPG space. (WSAPI 1.2 and later)
CPGUserUsedMiB	number	uint64	Total CPG capacity allocated for User Space that is actually used. This also includes space used by vSphere VVols for User Space (CPGUserUsedBulkVVMiB) (WSAPI 1.2 and later)
CPGUserUsedBulkVVMiB	number	uint64	Total CPG capacity allocated for User Space that is used by vSphere VVols.
CPGUserUnusedMiB	number	uint64	Total capacity allocated to CPG user space that is not in use. (WSAPI 1.2 and later)
CPGSnapshotMiB	number	uint64	Total capacity allocated to CPG snapshot space that is not in use. (WSAPI 1.2 and later)

Table Continued

Member	JSON type	Value Range	Description
CPGSnapshotUsedBulkVVMiB	number	uint64	Total CPG capacity allocated for Snapshot Space that is used by vSphere VVols.
CPGSnapshotUsedMiB	number	uint64	Total CPG capacity allocated for Snapshot Space that is in use. This includes space used by vSphere VVols for Snapshot Space (CPGSnapshotUsedBulkVVMiB) (WSAPI 1.2 and later)
CPGSnapshotUnusedMiB	number	uint64	Total capacity allocated to CPG Snapshot Space that is not in use. (WSAPI 1.2 and later)
CPGAdminMiB	number	uint64	Administrative volume CPG space. (WSAPI 1.2 and later)
CPGAdminUsedMiB	number	uint64	Total CPG capacity allocated for Admin Space that is in use. This also includes space used by vSphere VVols for Admin Space (CPGAdminUsedBulkVVMiB) (WSAPI 1.2 and later)
CPGAdminUsedBulkVVMiB	number	uint64	Total CPG capacity allocated for Admin Space that is used by vSphere VVols.
CPGAdminUnusedMiB	number	uint64	Total capacity allocated to CPG Admin Space that is not in use. (WSAPI 1.2 and later)
unmappedMiB	number	uint64	Space not part of a CPG and not mapped to a Volume. (WSAPI 1.2 and later)
CPGSharedMiB	number	uint64	Total CPG shared space in the system.
CPGPrivateMiB	number	uint64	Total CPG private space in the system.
CPGBasePrivateMiB	number	uint64	Total CPG base volumes private space in the system.
CPGBasePrivateReservedMiB	number	uint64	Total CPG base volumes private reserved space in the system.
CPGBasePrivatevSphereVVMiB	number	uint64	Total CPG base volumes private space used by vSphere VVols.

Table Continued

Member	JSON type	Value Range	Description
CPGSnapshotPrivateMiB	number	uint64	Total CPG snapshots private space in the system.
CPGSnapshotPrivateReservedMiB	number	uint64	Total CPG snapshots private reserved space in the system.
CPGSnapshotPrivateevSphereVVolsMiB	number	uint64	Total CPG snapshots private space used by vSphere VVOs.
CPGFreeMiB	number	uint64	Total CPG free MiB in the system.
capacityEfficiency	object	<u>capacityEfficiency</u> <u>objects</u>	Capacity efficiency attributes. (WSAPI 1.4.1 with 3PAR OS 3.2.1 MU1)

Table 427: systemCapacity objects

Member	JSON type	API type	Description
totalSystemMiB	number	uint64	System space capacity. (WSAPI 1.2 and later)
internalMiB	number	uint64	The system capacity allocated to internal resources. (WSAPI 1.2 and later)
spareMiB	number	uint64	Total spare capacity. (WSAPI 1.2 and later)
spareUsedMiB	number	uint64	The system capacity allocated to spare resources in use. (WSAPI 1.2 and later)
spareUnusedMiB	number	uint64	The system capacity allocated to spare resources that are unused. (WSAPI 1.2 and later)
adminMiB	number	uint64	Allocated admin space. (WSAPI 1.6 and later)

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Available space for a CPG or LDDLayout object

Use the HTTP POST method with the following URI:

https://<storage_system>:8080/api/v1/spacereporter

Table 428: Request message body JSON object for CPG space query

Member	JSON type	API type	Description
cpg	string	name31	CPG name. (WSAPI 1.2 and later)

Table 429: Request message body JSON object for LDLayout

Member	JSON type	API type	Description
LDLayout	object	<u>LDLayout objects</u>	Capacity of a logical disk layout (WSAPI 1.2 and later)

Success

A successful query for available space returns the HTTP code 200 OK with a response message body.

Table 430: Response message body JSON object for space reporter

Member	JSON type	API type	Description
rawFreeMiB	number	uint64	Raw free capacity in MiB. (WSAPI 1.2 and later)
usableFreeMiB	number	uint64	LD free capacity in MiB. (WSAPI 1.2 and later)
overProvisionedVirtualSizeMiB	number	uint64	System contains an over provisioned Virtual Size MiB.
overprovisionedUsedMiB	number	uint64	System contains an over provisioned used MiB.
overProvisionedAllocatedMiB	number	uint64	System contains an over provisioned allocated MiB.
overProvisionedFreeMiB	number	uint64	System contains an over provisioned free MiB.
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes. (WSAPI 1.4.1 with 3PAR OS 3.2.1 MU1)

Table 431: capacityEfficiency objects

Member	JSON type	API type	Description
compaction	number	float	The compaction ratio indicates the overall amount of storage space saved with 3PAR thin technology. (WSAPI 1.4.1 with 3PAR OS MU1)
compression	number	float	Indicates the amount of storage space saved using Compression. (WSAPI 1.6)
dataReduction	number	float	Indicates the amount of storage space saved using deduplication and compression together. (WSAPI 1.6)
overProvisioning	number	float	Overprovisioning ratio. (WSAPI 1.6)
deduplication	number	float	The deduplication ratio indicates the amount of storage space saved with 3PAR thin deduplication. (WSAPI 1.4.1 with 3PAR OS MU1)

Errors

Table 432: Space query API and HTTP error codes

API Error	HTTP Code	Description
INV_SET_SIZE	400 Bad Request	The set size is invalid for the selected RAID type.
INV_INPUT_ONE_REQUIRED	400 Bad Request	Invalid input: one of the parameters is required. (WSAPI 1.2 and later)
INV_INPUT_EXCEEDS_LENGTH	400 Bad Request	Invalid input: string length exceeds limit. (WSAPI 1.2 and later)

Table Continued

API Error	HTTP Code	Description
INV_INPUT_PARAM_CONFLICT	400 Bad Request	Invalid input: parameters cannot be present at the same time.
NO_SPACE	400 Bad Request	Insufficient space for requested operation.
BAD_CPG_PATTERN	400 Bad Request	Bad CPG pattern specified.
NON_EXISTENT_CPG	404 Not Found	CPG does not exist.

More information

[WSAPI error codes and descriptions](#) on page 34

WSAPI user and role information

Use WSAPI query methods to gather information about users and their roles and privileges.

Querying all WSAPI users

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/users`

Success

A successful query for a list of all users returns the HTTP code 200 OK with a message body containing JSON object members as described in the table below. In addition, the message body displays an array of links which, by default, include an href to ("self").

User query link to self

```
{
  links: [ 1 ]
    - 0: {
      href: "https://<server_name>:8080/api/v1/users"
      rel: "self"
    }
}
```

Table 433: Message body JSON objects for all-users query

Member	JSON type	API type	Description
total	number	int32	Number of users returned (total number of objects in the collection).
members	array of objects	array of user property objects (see, <u>JSON object members for the array of user objects</u>).	User properties.

Table 434: JSON object members for the array of user objects

Member	JSON type	API type	Description
username	string	Print64	Name of the user.
privileges	array of privileges object	array of privileges object (see, JSON object members for the array of privileges object).	Array of domains and roles associated with the username.

Table 435: JSON object members for the array of privileges object

Member	JSON type	API type	Description
domain	string	Print64	Name of the domain.
role	string	Print64	Role associated with the user in the domain.

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Querying a single WSAPI user

To query information about a single WSAPI user, use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/users/<user_name>`

Success

A successful query for information about a single user returns the HTTP code 200 OK, with a message body containing JSON object members as described in [Message body JSON objects for all-users query](#) . In addition, the message body displays an array of links which, by default, include an href to ("self").

Errors

Table 436: Single-user query error codes

API Error	HTTP Code	Description
NON_EXISTENT_USER	400 Bad Request	User not found. (WSAPI 1.4 and later)
INV_INPUT_EXCEEDS_LENGTH	413 Request Entity Too Large	The user name is too long. (WSAPI 1.4 and later)
NON_LOCAL_USER	404 Not Found	The user is not a local user. (WSAPI 1.4 and later)

Querying all WSAPI roles

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/roles`

Success

A successful query returns the HTTP code 200 OK with a message body containing JSON object members as described in the following table.

Table 437: Message body JSON objects for roles query

Member	JSON type	API type	Description
total	number	int32	Number of roles returned (number of objects in the collection).
members	array of objects	array of <code>role</code> objects (see, <u>JSON object members for the role objects array</u>).	JSON objects for role information.

Table 438: JSON object members for the role objects array

Member	JSON type	API type	Description
role	string	print64	Name of the role.
comments	string	print64	Comments for the role.
rights	array of rights objects	array of rights objects (see, JSON object members for the rights object array)	Rights associated with the role.

Table 439: JSON object members for the rights object array

Member	JSON type	API type	Description
right	string	print64	Right associated with the role.
rightDescription	string	print256	Description of the right.

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Querying a single WSAPI role

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/api/v1/roles/<role_name>`

Success

A successful query returns the HTTP code 200 OK. The message body is a JSON object with members as described in [Message body JSON objects for roles query](#). In addition, the message body displays an array of links which, by default, include an href to ("self").

Errors

Table 440: Single role query error codes

API Error	HTTP Code	Description
NON_EXISTENT_ROLE	404 Not Found	No role matches the pattern. (WSAPI 1.4 and later)

More information

[WSAPI error codes and descriptions](#) on page 34

AO configuration information

Querying all AO configurations

Use the HTTP GET method with the following URI and no message body:

`https://<storage_server>:8080/api/v1/aoconfigurations`

Success

A successful query returns HTTP Code 200 OK. Unless an internal server error occurs, the response message body includes JSON objects as described in the following table.

Table 441: Response message body JSON objects for the AO configuration query

Member	JSON type	API-type	Description
total	number	int32	Number of AO configurations returned; total number of objects in the collection.
members	array of objects	See, AOConfig objects	AO configuration properties.
links	array of URL links	array of URL links	Links include the self-URL.

Table 442: AOConfig objects

Member	JSON type	API type	Description
id	string	int32	AO configuration ID.
name	string	string	AO configuration name.
t0CPG	object	See, TierCpg objects	AO configuration tier 0 CPG information.
t1CPG	object	See, TierCpg objects	AO configuration tier 1 CPG information.
t2CPG	object	See, TierCpg objects	AO configuration tier 2 CPG information.
mode	number	See, AO configuration mode enumeration	—
domain	string	string	Domain of the AO Config

Table Continued

Member	JSON type	API type	Description
domainId	number	int32	ID of the AO Config domain
links	array of URL links	array of URL links	Links include the self URL, as well as links to: T0cpg, T1cpg, and T2cpg.

Table 443: AO configuration mode enumeration

Symbol	Value	Description
Balanced	1	Balanced between higher performance and lower cost.
Cost	2	Move more regions towards lower-cost tier.
Performance	3	Move more regions towards higher performance tier.

Table 444: TierCpg objects

Member	JSON type	API type	Description
id	string	int32	CPG ID.
name	string	string	CPG name.
minSpaceUtilizationMiB	number	uint64	CPG minimum space utilization.
maxSpaceUtilizationMiB	number	uint64	CPG maximum space utilization.

Errors

See, [WSAPI query error causes](#).

Querying a single AO configuration

Use the HTTP GET method with the following URI and no message body:

`https://<storage_server>:8080/api/v1/aoconfigurations/<aoconfig_name>`

Success

A successful query returns an HTTP code 200 OK. Unless an internal server error occurs, the response includes a message body as described in [Response message body JSON objects for the AO configuration query](#).

Errors

Table 445: Single AO configuration query error codes

API error	HTTP code	Description
NON_EXISTENT_AO	404 Not found	The AO configuration does not exist.

HPE 3PAR System Reporter

Beginning with WSAPI 1.5, WSAPI clients can request reports from HPE 3PAR System Reporter using Versus Time or At Time report queries. System Reporter generates reports for various components in the storage array, including space reports for objects and performance statistics reports for storage array components. For details about using 3PAR System Reporter to analyze system performance, see 3PAR System Reporter Software user's guide.

Versus Time and At Time report requests

- To request a Versus Time report, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/<component>/<report  
identifier>[?<query expression>]
```

- To request an At Time report, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/<component>/<report  
identifier>[?<query expression>]
```

Versus Time and At Time common variable definitions

<component>

Identify the storage array component from which to generate the report. Options include the following:

- cachelmemorystatistics
- cpghspacedata
- cpghstatistics
- cpustatistics
- physicaldiskcapacity
- physicaldiskspacedata
- physicaldiskstatistics
- portstatistics
- qosstatistics
- remotecopystatistics
- remotecopyvolumestatistics
- volumespacedata
- vlunstatistics

<report Identifier>

Provide the report parameters. These parameters include the mandatory <samplefreq> and any optional, component-specific parameters, such as the [*?<query expression>*]. The query string begins with a question mark (?) and uniquely identifies query properties for the identified component.

Mandatory sample frequency parameter

As part of the report identifier, you must specify one `<samplefreq>` parameter. The `<samplefreq>` parameter indicates how often to generate the performance sample data. You may specify only one. Options are:

- hires—based on 5 minutes (high resolution)
- hourly
- daily

The most recent sample data indicates the end time of the report.

Optional parameter names and values

For the specific optional parameters available for each report, see the storage array component information in the following chapters. Except for sample frequency, other parameters use the `<parameter_name>:<parameter_value>` format. You can specify multiple `<parameter_name>` and `<parameter_value>` pairs by separating each with a semi-colon (;). To specify multiple `<parameter_value>` variables, separate each with a comma (,). For example:

- `<parameter_name1>:<parameter_value1>`
- `<parameter_name1>:<parameter_value1>;<parameter_name2>:<parameter_value2>`
- `<parameter_name1>:<parameter_value1>,<parameter_value2>`

Valid characters for `<report identifier>` are:

- 0-9
- a-z
- A-Z
- dash (-)
- underscore (_)
- period (.)
- colon (:) to separate parameter key words and values
- semi-colon (;) to separate multiple-parameters
- comma (,) to separate multiple values

Query expression parameters

Depending on the report type, the `<query expression >` parameter takes multiple query field names and value pairs to filter out system report data. To filter multiple name/value pairs, use an `AND` operator only. System Reporter does not support any other operators.

Query expression parameters for Versus Time reports

System Reporter displays sample data in a time range. The sample data start time depends on the sample frequency:

- High resolution report (every 5 minutes)—12 hours ago
- Hourly report—7 days ago
- Daily report—90 days ago

You can use the `sampleTime` parameter only in the query expression for Versus Time reports. As shown in the following examples, you can request that System Reporter display the data for a specified time range:

- `?query="sampleTime GE <time format> AND sampleTime LE <time format>"`
- `?query="sampleTime GE <time format>"`
- `?query="sampleTime LE <time format>"`

Versus Time sampleTime query

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/<component>/
<samplefreq>?query="sampleTime GE 2015-01-10T12:00:00-08:00 AND sampleTime LE
2015-01-20T20:00:00-08:00"
```

The `sampleTime` parameter supports only GE and LE operators. In addition, the Versus Time system report supports only the `sampleTime` query parameter.

Define the `<time format>` parameter in ISO 8601 format: `YYYY-MM-DDThh:mm:ssZ`

- YYYY—Year
- MM—Month
- DD—Day
- hh—Hour
- mm—Minutes
- ss—Seconds
- Z—Timezone offset. Required. Use 'Z' or '+00:00' for UTC and hour and minute offset from UTC for other timezones.

Example time formats include:

- 2008-02-21T12:00:00z
- 2008-12-01T11:22:33Z
- 2009-01-02T12:34:56-08:00
- 2009-02-02T06:23:17+01:00
- 2008-11-28T08:22:13+00:00

Query expression parameters for At Time reports

The At Time report returns sample data for a particular time based on the parameters associated with a particular component in the system. You can use the `<query expression>` parameter to filter this data based on query filter name/value pairs (`<name > EQ <value >`).

Include multiple query filter name/value pairs and time ranges at the same time using an AND operator. Except for `sampleTime` and its value, query filter name/value pair parameters support the EQ operator only.

Specify multiple query filter values separated by a comma (.). You can include a `<query expression>` using one of the following formats:

- `?query="sampleTime GE <time format> AND sampleTime LE <time format>"`
- `?query="sampleTime GE <time format>"`
- `?query="sampleTime LE <time format>"`
- `?query="<filter name1> EQ <filter value1(s)> AND <filter name2> EQ <filter value2(s)>"`
- `?query="<filter name1> EQ <filter value1(s)> AND <filter name2> EQ <filter value2(s)> AND sampleTime LE <time format>"`
- `?query="<filter name1> EQ <filter value1(s)> AND <filter name2> EQ <filter value2(s)> AND sampleTime GE <time format>"`
- `?query="<filter name1> EQ <filter value1(s)> AND sampleTime LE <time format> AND sampleTime GE <time format>"`

Valid characters for `<query expression>` are:

- 0-9
- a-z
- A-Z
- dash (-)
- underscore (_)
- period (.)
- comma (,) to separate multiple values

Versus Time and At Time groupby requests

For Versus Time reports, when the `<report Identifier>` in a request includes a `groupby` parameter, the response includes corresponding `groupby` fields.

For At Time reports, the response includes all `groupby` fields by default. When you specify a `groupby` parameter in a request, the response includes the corresponding `groupby` field.

Versus Time summary requests

As part of the `<report identifier>` in a Versus Time request, you can specify an optional `summary` parameter to summarize performance data across requested objects. Use the structure `summary:<summaryField>`.

The Versus Time response for a `summary` request returns `groupby` fields only when you specify the `perGroup` keyword and the corresponding `groupby` fields in the request.

The following table lists the mandatory field names for the `summary` request. Provide at least one of the mandatory field names, and use a comma (,) to separate multiple fields.

Table 446: Mandatory summaryField names

summaryField name	Description
min	Display the minimum for each metric.
max	Display the maximum for each metric.
avg	Display the average for each metric.
pct	Displays the percentile for each metric where <code>pct</code> is any floating number from 0 to 100. Separate multiple <code>pct</code> with a comma (,).

The following table lists the optional field names for a `summary` request. Specify these with one or more mandatory `summaryField` names. Use a comma (,) to separate multiple keywords.

Table 447: Optional Versus Time summaryField names

summaryField name	Description
perTime	When requesting data across multiple points in time(<code>vstime</code>) using multiple object groupings (<code>groupby</code>), use the <code>perTime</code> field name to compute summaries. Defaults to one summary computed across all records. Use this with the <code>groupby</code> field only.
perGroup	When requesting data across multiple points in time, (<code>vstime</code>) using multiple object groupings (<code>groupby</code>), use the <code>perGroup</code> field name to compute summaries per object grouping. Defaults to one summary computed across all records.
onlyCompareby	When using the <code>compareby</code> field to request data limited to certain object groupings, use this field name to compute summaries using only that reduced set of object groupings. Defaults to computing summaries from all records and ignores the limitation of the <code>compareby</code> option.

At Time summary requests

As part of the `<report identifier>` in an At Time request, you can specify an optional `summary` parameter to summarize performance data across requested objects. Use the structure `summary:<summaryField>`.

The following table lists the mandatory field names for the `summary` request. Provide at least one of the mandatory field names, and use a comma (,) to separate multiple fields.

Table 448: Mandatory summaryField names

summaryField name	Description
min	Display the minimum for each metric.
max	Display the maximum for each metric.
avg	Display the average for each metric.
pct	Displays the percentile for each metric where pct is any floating number from 0 to 100. Separate multiple pct with a comma (,).

The following table lists the optional field name for an At Time summary request. Specify with one or more mandatory summaryField names.

Table 449: Optional At Time summaryField names

summaryField name	Description
onlyCompareby	When using the compareby field to request data limited to certain object groupings, use this keyword to compute summaries using only that reduced set of object groupings. Defaults to computing summaries from all records and ignores the limitation of the compareby option.

Versus Time and At Time error handling

Table 450: Error messages for system reporter queries

API error	HTTP code	Description
INT_SERV_ERR	500 Internal Server Error	Internal Server Error
UNLICENSED_FEATURE	403 Forbidden	This system is not licensed for system report
INV_REPORT_PARAM	400 Bad Request	Invalid system report parameter
INV_QUERY_STRING	400 Bad Request	Query string is invalid
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Illegal character in input
SYSTEM_REPORTER_DATA_NOT_AVAILABLE	400 Bad request	System reporter data is not available
INV_COMPAREBY_FORMAT	400 Bad request	Invalid compareby format.

Table Continued

API error	HTTP code	Description
INV_INPUT_UNSUPP_COMPAREBY_FIELD	400 Bad request	Unsupported compareby field.
INV_INPUT_PARAM_CONFLICT	400 Bad request	Parameters cannot be present at the same time.
OTHER	400 Bad request	Errors not listed map to OTHER

Query expression error handling

Query URL errors

Use of any invalid query field name or value in the `<reporter identifier>` parameter returns an INV_REPORT_PARAM error.

Use of an invalid character in the `<reporter identifier>` returns an INV_INPUT_ILLEGAL_CHAR error.

Query string errors

Use of any invalid query field name or value in the `<query expression>` parameter returns an array size of zero.

Use of any invalid character in the `<reporter identifier>` parameter returns an INV_INPUT_ILLEGAL_CHAR error.

The query filter name/value pair supports use of the EQ operator only. Using any other operator results in a INV_QUERY_STRING error.

Use of multiple query filter name/value pairs supports the use of the AND operator only. Use of any other operator or a mix of operators returns an INV_QUERY_STRING error.

Use of duplicated query field names returns a INV_QUERY_STRING error.

The `sampleTime` query field name supports LE and GE operators only. Use of any other operator returns an INV_QUERY_STRING error.

The system ignores any invalid query field value in the `<query expression>` parameter.

Cache memory statistical data reports

Request cache memory statistical data using either Versus Time or At Time reports.

Requesting Versus Time cache memory statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/
cachememorystatistics/
<samplefreq>;node:<nodeid>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see, [Mandatory sample frequency parameter](#)), you can use the following, optional parameters:

node

Retrieve cache memory data for the specified node, in the range of 0 to 7. Separate multiple nodes using a comma (.). Use `node:1,3,2`. With no `nodeid` specified, the system calculates cache memory data for all nodes in the system.

groupby

Group the sample data into the `node` category.

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

Table 451: Cache memory compareby

compareby	JSON type	API type	Description
top bottom	string	string	Specifies whether to display the top records or the bottom records. Choose one.
<noOfRecords>	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
<comparebyField>	string	<u>Cache memory comparebyField options</u>	Specifies the fields to compare.

Table 452: Cache memory comparebyField options

Field name	Description
hitIORead	Number of read I/Os per second while data was in cache
hitIOWrite	Number of write I/Os per second while data was in cache
missIORead	Number of read I/Os per second while data was not in cache
missIOWrite	Number of write I/Os per second while data was not in cache
accessIORead	Number of read I/Os per second

Table Continued

Field name	Description
accessIOWrite	Number of write I/Os per second
hitPctRead	Hits divided by accesses in percentage for read I/Os
hitPctWrite	Hits divided by accesses in percentage for write I/Os
totalAccessIO	Number of total read and write I/Os per second
lockBulkIO	Number of pages modified per second by host I/O and written to disk by the flusher
pageStatisticDelayAckPagesNL_7	Delayed acknowledgment pages associated with NL 7
pageStatisticDelayAckPagesFC	Delayed acknowledgment pages associated with FC
pageStatisticDelayAckPagesSSD	Delayed acknowledgment pages associated with SSD
pageStatisticPageStatesFree	Number of cache pages without valid data on them
pageStatisticPageStatesClean	Number of clean cache pages
pageStatisticPageStatesWriteOnce	Number of dirty pages modified exactly 1 time
pageStatisticPageStatesWriteMultiple	Number of dirty pages modified more than 1 time
pageStatisticPageStatesWriteScheduled	Number of pages scheduled to be written to disk
pageStatisticPageStatesWriteing	Number of pages being written to disk
pageStatisticPageStatesDcowpend	Number of pages waiting for delayed copy on write resolution
pageStatisticDirtyPagesNL	Dirty cluster memory pages associated with NL 7
pageStatisticDirtyPagesFC	Dirty cluster memory pages associated with FC
pageStatisticDirtyPagesSSD	Dirty cluster memory pages associated with SSD
pageStatisticMaxDirtyPagesNL_7	Maximum allowed number of dirty cluster memory pages associated with NL 7

Table Continued

Field name	Description
pageStatisticMaxDirtyPagesFC	Maximum allowed number of dirty cluster memory pages associated with FC
pageStatisticMaxDirtyPagesSSD	Maximum allowed number of dirty cluster memory pages associated with SSD

Requesting At Time cache memory statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/
cachememorstistics/
<samplefreq>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?
<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameter:

groupby

Group the sample data into the `node` category.

summary

See, [At Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

See, [Cache memory compareby parameters](#).

Query expression parameters

Cache memory statistics report data queries default to all nodes in the system at a particular time. You can make modifications using the optional `<query expression>` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see, [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter, as well as filtering data based on node.

Usage examples include:

- `?query="sampleTime GE <time1> AND sampleTime LE <time2>"`
- `?query="node EQ 2,3,4"`
- `?query="node EQ 2,3,4 AND sampleTime LE <time format>"`
- `?query="node EQ 1,2 AND sampleTime GE <time format> AND sampleTime LE <time2>"`
- `?query="sampleTime GE <time format> AND sampleTime LE <time format>"`

Success

A successful query returns the HTTP code 200 OK.

Errors

Error messages for system reporter queries lists the error messages possible when querying cache memory statistics.

Versus Time response

The Versus Time cache memory statistical data report contains an array of performance sample data. The response displays each instance of sample data with a time stamp. The following table describes the response message body JSON objects.

Table 453: Response message body JSON objects for Versus Time cache memory statistics

Member	JSON type	API type	Description
total	number	int32	Total sample data.
members	array of objects	<u>Cache memory sample data objects</u>	Cache memory statistics sample data with time stamp.
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 454: Cache memory sample data objects

Member	JSON type	API type	Description
node	number	int32	Node ID.
sampleTime	string	8601	Cache memory statistics sample time.
sampleTimeSec	number	int32	Cache memory statistics sample time in seconds.
hitIO	object	<u>rwAccessCount objects</u>	Number of Read/Write I/Os per second where data is in cache.
missIO	object	<u>rwAccessCount objects</u>	Number of Read/Write I/Os per second where data is not in cache.
accessIO	object	<u>rwAccessCount objects</u>	Number of read/write I/Os per second.

Table Continued

Member	JSON type	API type	Description
hitPct	object	<u>rwAccessCount objects</u>	Hits divided by accesses and displayed in percentage.
totalAccessIO	number	float	Number of total read and write I/Os per second.
lockBulkIO	number	float	Number of pages modified per second by host I/O and written to disk by the flusher.
pageStatistic	object	<u>pageStatistic objects</u>	Page statistic information.

Table 455: rwAccessCount objects

Member	JSON type	API type	Description
read	number	float	Read statistic
write	number	float	Write statistic

Table 456: pageStatistic objects

Member	JSON type	API type	Description
pageStates	object	<u>pageStates objects</u>	Information on page states.
dirtyPages	object	<u>pageInforPerDeviceType objects</u>	Current number of dirty cluster memory pages per device type class in the system.
maxDirtyPages	object	<u>pageInforPerDeviceType objects</u>	Maximum allowed number of dirty cluster memory pages per device type class in the system.
delayAckPages	object	<u>pageInforPerDeviceType objects</u>	Number of delayed acknowledgments (per device type class) to the host in order to throttle the host IO writes due to cache resource constraints.

Table 457: pageStates objects

Member	JSON type	API type	Description
free	number	float	Number of cache pages without valid data on them.
clean	number	float	Number of clean cache pages (valid data on page). A page is clean when data in cache matches data on disk.
writeOnce	number	float	Number of dirty pages modified exactly 1 time. A dirty page is one that is modified in cache but not written to disk.
writeMultiple	number	float	Number of dirty pages that have been modified more than 1 time.
writeScheduled	number	float	Number of pages scheduled to be written to disk.
writing	number	float	Number of pages being written to disk.
dcowpend	number	float	Number of pages waiting for delayed copy on write resolution.

Table 458: pageInforPerDeviceType objects

Members	JSON type	API type	Description
FC_10	number	int32	Page numbers associated with FC 10.
FC_15	number	int32	Page numbers associated with FC 15.
NL_7	number	int32	Page numbers associated with NL 7.
SSD_100	number	int32	Page numbers associated with SSD 100.
SSD_150	number	int32	Page numbers associated with SSD 150.

Versus Time summary response

The Versus Time cache memory summary report is an array of performance sample data.

Table 459: Response message body JSON objects for Versus Time cache memory summary statistics

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.
summary	array of objects	<u>Versus Time cache memory summary objects</u>	Cache memory performance summary data.
links	array of URL links	array of URL links	- 0: { href: "https://:8080/api/v1/<self_link>/" rel: "self" } -1: { href: "https://:8080/api/v1/<detailed_link>" rel: "detailedRecords" } No self-link returned for System Reporter query.

Table 460: Versus Time cache memory summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
sampleTime	string	8601	Cache memory performance statistics sample time (with <code>perTime</code> specified, only).
sampleTimeSec	number	int32	Cache memory performance statistics sample time in seconds (with <code>perTime</code> specified, only).
node	number	int32	Node ID.
hitIO	object	<u>rwAccessCount objects</u>	Number of Read/Write I/Os per second in which data was already in cache.
missIO	object	<u>rwAccessCount objects</u>	Number of Read/Write I/Os per second in which data was not already in cache.
accessIO	object	<u>rwAccessCount objects</u>	Number of read/write I/Os per second.
hitPct	object	<u>rwAccessCount objects</u>	Hits divided accesses displayed in percentage.
totalAccessIO	number	float	Number of total read and write I/Os per second.
lockBulkIO	number	float	Number of pages modified per second by the host I/O and written to disk by the flusher.
pageStatistic	object	<u>pageStatistic objects</u>	Page statistic information.

At Time response

The At Time cache memory statistical data report contains an array of performance sample data for a particular time interval. The report groups each instance of sample data into one or more categories. The following table lists the message body descriptions.

Table 461: Response message body JSON objects for At Time cache memory statistics query

Member	JSON type	API type	Description
sampleTime	string	8601	Cache memory performance statistics time stamp.
sampleTimeSec	number	int32	Cache memory performance statistics time stamp, in seconds.
total	number	int32	Total number of sample data.
members	array of objects	<u>Cache memory sample data objects</u>	Zero or more JSON objects related to cache memory statistics groups in categories.
links	array of URL links	array of URL links	Except for System Reporter query, the links returned include a self URL.

At Time summary response

The At Time summary response for cache memory performance is an array of performance sample data..

Table 462: Response message body JSON objects for At Time cache memory summary

Member	JSON type	API type	Description
sampleTime	string	8601	Cache memory performance statistic time stamp
sampleTimeSec	number	int32	Cache memory performance statistic time stamp, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array of objects	<u>At Time cache summary objects</u>	Cache memory performance sample data.
links	array of URL links	array of URL links	- 0: { href: "https://:8080/api/v1/<self_link>" rel: "self" } -1: { href: "https://:8080/api/v1/<detailed_link>" rel: "detailedRecords" } No self-link returned for System Reporter query.

Table 463: At Time cache memory summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
hitIO	object	<u>rwAccessCount objects</u>	Number of Read/Write I/Os per second in which data was already in cache.
missIO	object	<u>rwAccessCount objects</u>	Number of Read/Write I/Os per second in which data was not already in cache.
accessIO	object	<u>rwAccessCount objects</u>	Number of read/write I/Os per second.
hitPct	object	<u>rwAccessCount objects</u>	Hits divided accesses displayed in percentage.
totalAccessIO	number	float	Number of total read and write I/Os per second.

Table Continued

Member	JSON type	API type	Description
lockBulkIO	number	float	Number of pages being modified per second by host I/O that are being written to disk by the flusher.
pageStatistic	object	<u>pageStatistic objects</u>	Page statistic information.

CPG space data reports

Request CPG space data using either Versus Time or At Time reports.

Requesting Versus Time CPG space data

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/cpgspacedata/
<samplefreq>;name:<cpg_name>;diskType:<disktype>;RAIDType:<raidtype>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see, **Mandatory sample frequency parameter**), you can use the following options:

name

Specify the CPG. With no name specified, the system calculates the CPG space sample data for all CPGs.

diskType

Specify the disk type (see, **CPG diskType enumeration**). With no disk type specified, the system calculates the CPG space sample data for all the disk types in the system. Specify one or more disk types separated by a comma (.). Use the structure, `diskType:1,2,3`.

raidType

Specify the raid types (see **CPG RAIDType enumeration**). With no type specified, the system calculates the CPG space sample data for all the raid types in the system. You can specify one or more raid types separated by a comma (.). Use the structure, `RAIDType:1,2,3`.

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupby` categories using a comma (,) and no spaces. Use the structure, `groupby:domain,id,name,diskType,RAIDType`.

summary

See, **Versus Time summary requests**.

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

Table 464: CPG space data compareby parameters

Name	JSON type	API type	Description
top bottom	string	string	Specify either top or bottom.
<noOfRecords>	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
<comparebyField>	string	CPG space data comparebyField options	Specifies the field to compare.

Table 465: CPG space data comparebyField options

Field name	Description
totalSpaceMiB	Total space in MiB.
freeSpaceMiB	Free space in MiB.
usedSpaceMiB	Used space in MiB
compaction	Compaction ratio.
compression	Compression ratio.
deduplication	Deduplication ratio.
dataReduction	Data reduction ratio.

Requesting At Time CPG space data

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/cpgspacedata/  
<samplefreq>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?  
<query expression>]
```

Report parameters

In addition to the mandatory <samplefreq > parameter (see, [Mandatory sample frequency parameter](#)), you can use the following, optional parameters:

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple groupby categories using a comma (,) and no spaces. Use the structure, groupby:id,diskType,RAIDType.

summary

See, [At Time summary requests](#).

compareby

Use optional parameters in comma-separated format with no spaces, and in the specific order shown. Requires simultaneous use of the `groupby` parameters. See, [CPG space data compareby parameters](#).

Query expression parameters

CPG space data report queries default to all CPGs in the system at a particular time. You can make modifications using the optional `<query expression>` parameter. For Versus Time query expressions, you can use the `sampleTime` parameter only (see, [Query expression error handling](#)).

For At Time query expressions, you can use the `sampleTime` parameter, as well as filtering data based on `diskType` (see [CPG diskType enumeration](#)), `RAIDType` (see [CPG RAIDType enumeration](#)), or `name`. Use the AND operator to combine one or more filters.

Usage examples include:

- `?query="sampleTime GE <time format> AND sampleTime LE <time format>"`
- `?query="diskType EQ <disktype1,disktype2,...> AND RAIDType EQ <raidtype1,raidtype2,...> AND sampleTime LE <time format>"`
- `?query="name EQ <cpg_name>`

Success

A successful query returns the HTTP code 200 OK and an empty message body.

Errors

[Versus Time and At Time error handling](#) lists the error messages possible when querying CPG space data statistics.

Versus Time response

The Versus Time CPG space data report contains an array of space sample data. The response message body displays each instance of sample data with a time stamp.

Table 466: Response message body JSON objects for Versus Time CPG space data query

Member	JSON type	API type	Description
<code>total</code>	number	int32	Total number of sample data.
<code>members</code>	array of objects	CPG space sample data objects	Zero or more JSON objects related to CPG space sample data with time stamp.
<code>links</code>	array of URL links	array of URL links	Links include the self-URL, except when using the query expression.

Table 467: CPG space sample data objects

Member	JSON type	API type	Description
id	number	int32	CPG ID.
domain	string	string	Domain name.
name	string	name31	CPG name.
diskType	enum	<u>diskType enumeration</u>	CPG disk type.
RAIDType	enum	<u>RAIDType enumeration</u>	CPG RAID type.
sampleTimeSec	number	int32	CPG space data sample time in seconds.
sampleTime	string	8601	CPG space data sample time.
usedSpace	object	<u>CPG space data objects</u>	Used CPG space data.
freeSpace	object	<u>CPG space data objects</u>	Free CPG space data.
totalSpace	object	<u>CPG space data objects</u>	Total CPG space data.
growthMiB	number	float	CPG space increase in MiB.
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes.
privateSpaceMiB	object	<u>CPG space data privateSpaceMiB objects</u>	Private CPG space in MiB.
sharedSpaceMiB	number	float	Shared CPG space in MiB.
freeSpaceMiB	number	float	Free CPG space in MiB.
totalSpaceMiB	number	float	Total CPG space in MiB.
deduplicationGcKBPS	number	float	Deduplication Garbage Collector in KBPS.

Table 468: CPG space data objects

Member	JSON type	API type	Description
adminMiB	number	float	Admin CPG space MiB
snapMiB	number	float	Snap CPG space MiB
userMiB	number	float	User CPG space in MiB
totalMiB	number	float	Total CPG space in MiB

Table 469: CPG space data privateSpaceMiB objects

Member	JSON type	API type	Description
base	number	float	Base space in MiB
snapshot	number	float	Snapshot space in MiB

Versus Time summary response

Table 470: Response message body JSON objects for Versus Time summary

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array of objects	<u>CPG space sample data summary objects</u>	CPG space summary sample data.
links	array of URL links	array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> No self-link returned for System Reporter query.

Table 471: CPG space sample data summary objects

Member	JSON type	API type	Description
id	number	int32	CPG ID.
domain	string	string	Domain name.
name	string	name31	CPG name.
diskType	enum	<u>diskType enumeration</u>	CPG disk type.
RAIDType	enum	<u>RAIDType enumeration</u>	CPG RAID type.
usedSpace	object	<u>CPG space data objects</u>	Used CPG space data.
freeSpace	object	<u>CPG space data objects</u>	Free CPG space data.
totalSpace	object	<u>CPG space data objects</u>	Total CPG space data.
growthMiB	number	float	CPG space increase in MiB.
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes.
privateSpaceMiB	object	<u>CPG space data privateSpaceMiB objects</u>	Private CPG space in MiB.
sharedSpaceMiB	number	float	Shared CPG space in MiB.

Table Continued

Member	JSON type	API type	Description
freeSpaceMiB	number	float	Free CPG space in MiB.
totalSpaceMiB	number	float	Total CPG space in MiB.
deduplicationGcKBPS	number	float	Deduplication Garbage Collector in KBPS.
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
sampleTime	string	8601	CPG space sample time (with <code>perTime</code> specified, only).
sampleTimeSec	number	int32	CPG space sample time in seconds (with <code>perTime</code> specified, only).

At Time response

The CPG space data response report contains an array of CPG space sample data for a particular time interval. The report groups each instance of sample data into one or more categories.

Table 472: Response message body for At Time CPG space data

Member	JSON type	API type	Description
sampleTime	string	8601	CPG space data time stamp.
sampleTimeSec	number	int32	CPG space data time stamp in seconds.
total	number	int32	Total number of sample data.
members	Array of objects	See, <u>At Time CPG space data members</u>	CPG space data groups in categories. Returns a JSON array of zero or more JSON objects.
links	Array of URL links	Array of URL links	Except for System Reporter query, the links returned include the self URL.

Table 473: At Time CPG space data members

Member	JSON type	API type	Description
id	number	int32	CPG ID
domain	string	Print64	Domain name
name	string	name31	CPG name
diskType	number	See, <u>CPG diskType enumeration values</u>	CPG disk type enumeration
RAIDType	number	See, <u>CPG RAIDType enumeration</u>	CPG RAID type enumeration
usedSpace	object	<u>CPG space data objects</u>	Used CPG space data
freeSpace	object	<u>CPG space data objects</u>	Free CPG space data
totalSpace	object	<u>CPG space data objects</u>	Total CPG space data
growthMiB	number	float	Growth CPG space in MiB
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes
privateSpaceMiB	object	<u>CPG space data objects</u>	Private CPG space in MiB
sharedSpaceMiB	number	float	Shared CPG space in MiB
freeSpaceMiB	number	float	Free CPG space in MiB
totalSpaceMiB	number	float	Total CPG space in MiB
deduplicationGcKBPS	number	float	Deduplication Garbage Collector in KBPS

At Time summary response

Table 474: Response message body JSON objects for At Time CPG space data summary

Member	JSON type	API type	Description
sampleTime	string	8601	CPG space data time stamp.
sampleTimeSec	number	int32	CPG space data time stamp in seconds.
summary	array of objects	<u>At Time CPG space data summary objects</u>	CPG space summary sample data.
links	array of URL links	array of URL links	- 0: { href: "https://:8080/api/v1/<self_link>" rel: "self" } -1: { href: "https://:8080/api/v1/<detailed_link>" rel: "detailedRecords" } No self-link returned for System Reporter query.

Table 475: At Time CPG space data summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
usedSpace	object	<u>CPG space data objects</u>	Used cpg space data, including Admin_Used, Snap_Used, User_Used, and Total_Used space.

Table Continued

Member	JSON type	API type	Description
freeSpace	object	<u>CPG space data objects</u>	Used cpg space data which includes Admin_Free, Snap_Free, User_Free, and Total_Free space.
totalSpace	object	<u>CPG space data objects</u>	Total CPG space data including Admin, Snap, User, and Total space.
growthMiB	number	float	Growth CPG space in MiB
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes.
privateSpaceMiB	object	<u>CPG space data objects</u>	Private CPG space in MiB
sharedSpaceMiB	number	float	Shared CPG space in MiB
freeSpaceMiB	number	float	Free CPG space in MiB
totalSpaceMiB	number	float	Total CPG space in MiB
deduplicationGcKBPS	number	float	Deduplication Garbage Collector in KBPS

CPG statistical data reports

Request CPG statistical data using either Versus Time or At Time reports.

Requesting Versus Time CPG statistical data

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/cpgstatistics/
<samplefreq>;name:<cpgName>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory <samplefreq> parameter (see, **Mandatory sample frequency parameter**), you can use the following, optional parameters:

name

Specify the CPGs to query for the sample data request. For example, specify `name:cpg1,cpg2,cpg3`. With no name specified, the system calculates CPG statistics sample data for all CPGs in the system.

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupBy` categories using a comma (,) and no spaces. Use the structure, `groupBy:name, domain`.

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom], <noOfRecords>, <comparebyField>`

Table 476: CPG statistical data compareby parameters

Parameter	JSON type	API type	Description
top bottom	string	string	Specifies whether to display the top records or the bottom records.
<noOfRecords>	number	string	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
<comparebyField>	string	CPG statistical data comparebyField options	Specifies the fields to compare.

Table 477: CPG statistical data comparebyField options

Field name	Description
totalIOPs	Total number of IOPs

Requesting At Time CPG statistical data

To request an At Time CPG statistical data report, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/cpgstatistics/  
<samplefreq>;groupBy:<groupBy>;compareby:<compareby>;summary:<summaryField>[?  
<query expression>]
```

Report parameters

the mandatory `<samplefreq>` parameter (see, [Mandatory sample frequency parameter](#)), you can use the following, optional parameter:

groupBy

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupBy` categories using a comma (,) and no spaces. Use the structure, `groupBy:name, domain`.

summary

See, [At Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby: [top | bottom], <noOfRecords>, <comparebyField>`

See, [CPG statistical data compareby parameters](#).

Query expression parameters

CPG statistical data queries default to all CPGs in the system at a particular time. You can make modifications using the optional `<query expression>` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see, [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter, as well as filtering data based on CPG name. Use the AND operator to combine filters.

Query input

```
query="name EQ <cpgl> AND sampletime LE <time format>"
```

```
query="name EQ <cpgl> AND sampletime LE <time format>"
```

Success

A successful query returns the HTTP code 200 OK.

Errors

[Versus Time and At Time error handling](#) lists the error messages possible when querying CPG statistical data.

Versus Time response

The Versus Time CPG statistical data report contains an array of CPG statistical data. The response displays each instance of sample data with a time stamp.

Table 478: Response message body for Versus Time CPG statistical data

Member	JSON type	API type	Description
total	number	int32	Total number of sample data.
members	Array of objects	Versus Time CPG statistical data JSON object members	CPG statistical data with time stamp.
links	Array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 479: Versus Time CPG statistical data JSON object members

Member	JSON type	API type	Description
name	string	string	CPG name.
domain	string	string	Domain name.
sampleTime	string	8601	CPG statistical data sample time
sampleTimeSec	number	int32	CPG statistical data sample time in seconds
IO	object	<u>rwAccessCount objects</u>	Number of IO per second, which includes read, write, and total.
Kbytes	object	<u>rwAccessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>rwAccessCount objects</u>	Service time in ms, which includes read, write, and total.
IOSizeKB	object	<u>rwAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
queueLength	number	float	Queue length
busyPct	number	float	Busy percentage

Versus Time summary response

Table 480: Response message body for Versus Time CPG statistical summary data

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array of objects	<u>CPG statistical data summary objects</u>	CPG statistical performance sample data.
links	Array of URL links	Array of URL links	<pre> - 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" } </pre> <p>System Reporter queries do not return a self-link.</p>

Table 481: CPG statistical data summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
sampleTime	string	8601	CPG statistic sample time (displays only with perTime specified).
sampleTimeSec	number	<u>rwAccessCount objects</u>	CPG statistical data sample time in seconds (displays only with perTime specified).
name	string	string	Name of the CPG.
domain	string	string	Domain name of the CPG.
IO	object	<u>rwAccessCount objects</u>	Number of IO per second, which includes read, write, and total.

Table Continued

Member	JSON type	API type	Description
Kbytes	object	<u>rwtAccessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in ms, which includes read, write, and total.
IOsizeKB	object	<u>rwtAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
queueLength	number	float	Queue length
busyPct	number	float	Busy percentage

At Time response

The CPG statistical data response report contains an array of sample data for a particular time interval. The report groups each instance of sample data into one or more categories.

Table 482: Response message body for At Time CPG statistical data

Member	JSON type	API type	Description
sampleTime	string	8601	Data time stamp
sampleTimeSec	number	int32	Data time stamp in seconds
total	number	int32	Total number of sample data records
members	Array of objects	<u>At Time CPG statistical data members</u>	CPG data sample groups in categories
links	Array of URL links	Array of URL links	Except for System Reporter query, the links returned include the self URL

Table 483: At Time CPG statistical data members

Member	JSON type	API type	Description
name	string	string	Name of the CPG
domain	string	string	Domain name of the CPG

Table Continued

Member	JSON type	API type	Description
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second, which includes read, write, and total
Kbytes	object	<u>rwtAccessCount objects</u>	Number of Kilobytes per second, which includes read, write, and total
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in millisecond statistic data, which includes read, write, and total
IOSizeKB	object	<u>rwtAccessCount objects</u>	Object IO size in kilobytes statistic data, which includes read, write, and total
queueLength	number	float	Queue length
busyPct	number	float	Busy percentage

At Time summary response

Table 484: Response message body for At Time CPG statistical data summary

Member	JSON type	API type	Description
sampleTime	string	8601	CPG statistical data time stamp.
sampleTimeSec	number	int32	CPG statistical data time stamp in seconds.
summary	array of objects	<u>At Time CPG statistical data summary objects</u>	CPG statistical summary sample data.
links	array of URL links	array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> No self-link returned for System Reporter query.

Table 485: At Time CPG statistical data summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
IO	object	<u>rwAccessCount objects</u>	Number of IO per second which includes read, write, and total.
KBytes	object	<u>rwAccessCount objects</u>	Number of Kilobytes per second which includes read, write, and total.
serviceTimeMS	object	<u>rwAccessCount objects</u>	Service time in millisecond statistic data which includes read, write, and total.
IOSizeKB	object	<u>rwAccessCount objects</u>	object IO size in kilobytes statistic data which includes read, write, and total.
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage

CPU statistical data reports

Request CPU statical data using either Versus Time or At Time reports.

Requesting Versus Time CPU statistical data

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/cpustatistics/
<samplefreq>;node:<nodeID>;groupby:<groupby>;compareby:<compareby>;summary:<summary_keywords>[?<query expression>]
```

Report parameters

the mandatory <samplefreq> parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameters:

node

Specify the node. The valid range of node IDs is 0 - 7. With no node ID specified, the system calculates CPU statistics sample data for all nodes in the system. Use node:1,3,2.

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupBy` categories using a comma (,) and no spaces. Use the structure, `groupBy:cpu,node`.

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

Table 486: CPU statistical data compareby parameters

Parameter	JSON type	API type	Description
top bottom	string	string	Specifies whether to display the top records or the bottom records.
noOfRecords	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
comparebyField	string	CPU statistical data comparebyField options	Specifies the fields to compare.

Table 487: CPU statistical data comparebyField options

Fieldname	Description
userPct	Percent of CPU time in user-mode
systemPct	Percent of CPU time in system-mode
idlePct	Percent of CPU time in idle
interruptsPerSec	Number of interrupts per second
contextSwitchesPerSec	Number of context switches per second

Requesting At Time CPU statistical data report

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/cpustatistics/  
<samplefreq>;groupBy:<groupBy>;compareby:<compareby>;summary:<summary_keywords>[  
?<query expression>]
```


Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameters:

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupBy` categories using a comma (,) and no spaces. Use the structure, `groupBy:cpu,node`.

summary

See, [Versus Time summary requests](#).

compareby

Use optional parameters in comma-separated format with no spaces, and in the specific order shown. Requires simultaneous use of the `groupBy` parameters. See, [CPU statistical data compareby parameters](#).

Query expression parameters

CPU statistical data queries default to all CPUs in the system at a particular time. You can make modifications using the optional `<query expression >` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see [Mandatory sample frequency parameter](#)).

For At Time query expressions, you can use the `sampleTime` parameter, as well as filtering data based on `nodeSpecifier`. Use the AND operator to combine filters.

Usage examples include:

```
?query="sampleTime LE <time format>"
```

```
?query="node EQ 0,5"
```

```
?query="node EQ 0,1,2 AND sampleTime LE <time format>"
```

Success

A successful query returns the HTTP code 200 OK.

Errors

[Error messages for system reporter queries](#) lists the error messages possible when querying CPU statistical data.

Versus Time response

The Versus Time CPU statistical data report contains an array of CPU statistical data. The response displays each instance of sample data with a time stamp.

Table 488: Response message body Versus Time CPU statistical data

Member	JSON type	API type	Description
total	number	int32	Total number of sample data
members	Array of objects	<u>cpuVsSampleData JSON object members</u>	cpuVsSampleData with time stamp, returned as an array of zero or more JSON objects.
links	Array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 489: cpuVsSampleData JSON objects

Member	JSON type	API type	Description
node	number	int32	Node number.
cpu	number	int32	CPU number.
sampleTime	string	8601	CPU statistics sample time.
sampleTimeSec	number	int32	CPU statistics sample time in seconds.
userPct	number	float	Percent of CPU time in user-mode.
systemPct	number	float	Percent of CPU time in system-mode.
idlePct	number	float	Percent of CPU time in idle.
interruptsPerSec	number	float	Number of interrupts per second.
contextSwitchesPerSec	number	float	Number of context switches per second.

Versus Time summary response

Table 490: Response message body for Versus Time CPU statistical summary data

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	ing32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.
summary	array	<u>CPU statistical data summary objects</u>	CPU statistical performance summary data.
links	Array of URL links	Array of URL links	<pre> - 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 491: CPU statistical data summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
sampleTime	string	8601	CPU statistic sample time (requires perTime specification).

Table Continued

Member	JSON type	API type	Description
sampleTimeSec	number	int32	CPU statistical data sample time in seconds (requires <code>perTime</code> specification).
node	number	int32	Node number
cpu	number	int32	CPU number
userPct	number	float	Percent of CPU time in user-mode
systemPct	number	float	Percent of CPU time in system mode
idlePct	number	float	Percent of CPU time in idle
interruptsPerSec	number	float	Number of interrupts per second
contextSwitchesPerSec	number	float	Number of context switches per second

At Time response

The CPU statistical data response report contains an array of `cpuAtSampleData` for a particular time interval. The report groups each instance of sample data into one or more categories.

Table 492: Response message body for At Time CPU statical data

Member	JSON type	API type	Description
sampleTime	string	8601	Data time stamp.
sampleTimeSec	number	int32	Data time stamp in seconds.
total	number	int32	Total number of sample data records.
members	Array of objects	<u>cpuAtSampleData</u>	A JSON array of zero or more JSON objects.
links	Array of URL links	Array of URL links	Except for System Reporter query, the links returned include the self URL.

Table 493: cpuAtSampleData

Member	JSON type	API type	Description
cpu	number	int32	CPU number
node	number	int32	Node number
userPct	number	float	Percent of CPU time in user-mode
systemPct	number	float	Percent of CPU time in system mode
idlePct	number	float	Percent of CPU time in idle
interruptsPerSec	number	float	Number of interrupts per second
contextSwitchesPerSec	number	float	Number of context switches per second

At Time summary response

Table 494: Response message body JSON objects for At Time CPU statistical data summary

Member	JSON type	API type	Description
sampleTime	string	8601	CPU statistical data time stamp.
sampleTimeSec	number	int32	CPU statistical data time stamp in seconds.
summary	array of objects	<u>At Time CPU statistical data summary objects</u>	CPU statistical summary sample data.
links	array of URL links	array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> No self-link returned for System Reporter query.

Table 495: At Time CPU statistical data summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
userPct	number	float	Percent of CPU time in user-mode
systemPct	number	float	Percent of CPU time in system mode
idlePct	number	float	Percent of CPU time in idle
interruptsPerSec	number	float	Number of interrupts per second
contextSwitchesPerSec	number	float	Number of context switches per second

Physical disk capacity reports

Request physical disk capacity data using either Versus Time or At Time reports.

Requesting Versus Time physical disk capacity

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/
physicaldiskcapacity/
<samplefreq>;id:<id>;type:<disktype>;RPM:<speed>;groupby:<groupby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see, [Mandatory sample frequency parameter](#)), you can use the options:

id

Request disk statistics for the specified disks only. With no `id` specified, the system calculates physical disk statistics for all disks in the system. Use the structure, `id:1,3,2`.

type

Specify the disk types to query for physical disk statistics sample data (see, [CPG diskType enumeration](#)). With no `disktype` specified, the system calculates physical disk statistics for all disk types in the system. To specify one or more disk types, separate them with a comma (,). Use the structure, `diskType:1,2,3`

RPM

Specify the RPM speed to query for physical disk statistics. With no speed indicated, the system calculates physical disk statistics for all speeds in the system. Specify one or more disk RPM speeds by separating them with a comma (.). Use the structure, `RPM: 7, 15, 150`. Valid RPM values are: 7, 10, 15, 100, 150.

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupBy` categories using a comma (,) and no spaces. Use the structure, `groupBy: id, cageID, cageSide, mag, diskPos, type, RPM`.

summary

See, [Versus Time summary requests](#).

Requesting At Time physical disk capacity

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/  
physicaldiskcapacity/<samplefreq>;groupBy:<groupBy>;summary:<summaryField>[?  
<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameters:

groupBy

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupBy` categories using a comma (,) and no spaces. Use the structure, `groupBy: id, cageID, cageSide, mag, diskPos, type, RPM`.

summary

See, [At Time summary requests](#).

Query expression parameters

Physical disk capacity data queries default to all physical disks in the system at a particular time. You can make modifications using the optional `<query expression >` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter, as well as filtering data based on `type` (see [CPG diskType enumeration](#)), `id`, or `RPM`. Use the AND operator to combine filters.

Combined filters input example

```
query="type EQ 1,2,3 AND id EQ 2,3,5 AND sampleTime LE <time format>"
```

Success

A successful query returns the HTTP code 200 OK.

Errors

Error messages for system reporter queries lists the error messages possible when querying physical disk capacity.

Versus Time response

The Versus Time physical disk capacity report contains an array of sample data. The response displays each instance of sample data with a time stamp.

Table 496: Response message body for Versus Time physical disk capacity

Members	JSON type	API type	Description
total	number	int32	Total number of sample data
members	Array of objects	<u>Versus Time physical disk capacity data objects</u>	Physical disk capacity sample data with time stamp
links	Array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 497: Versus Time physical disk capacity data objects

Members	JSON type	API type	Description
id	number	int32	Physical disk ID.
cageID	number	int32	Cage ID
cageSide	number	int32	Cage side.
mag	number	int32	Disk magazine within the cage.
diskPos	number	int32	Position of disk within the magazine.
type	number	<u>diskType enumeration</u>	Type of disk.
RPM	number	int32	RPM of the physical disk.
sampleTime	string	8601	Physical disk capacity performance statistic sample time
sampleTimeSec	number	int32	Physical disk capacity performance statistic sample time in seconds

Table Continued

Members	JSON type	API type	Description
allocatedMiB	number	float	Allocated physical disk capacity in the system.
freeMiB	number	float	Free physical disk capacity in the system.
failedMiB	number	float	Failed physical disk capacity in the system.
totalMiB	number	float	Total physical disk capacity in the system.

Versus Time summary response

Table 498: Response message body for Versus Time Physical disk capacity summary

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.
summary	array	<u>Versus Time physical disk capacity summary objects</u>	Physical disk capacity sample data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 499: Versus Time physical disk capacity summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
sampleTime	string	8601	Physical disk capacity sample time (requires <code>perTime</code> specification).
sampleTimeSec	number	int32	Physical disk capacity sample time in seconds (requires <code>perTime</code> specification).
id	number	int32	Physical disk ID
cageID	number	int32	Cage ID.
cageSide	number	int32	Cage Side.
mag	number	int32	Disk Magazine within the cage.
diskPos	number	int32	Disk position within the magazine.
type	number	<u>diskType enumeration</u>	Disk type.
RPM	number	int32	RPM of the physical disk
allocatedMiB	number	float	Allocated physical disk capacity in the system
freeMiB	number	float	Free physical disk capacity in the system.
failedMiB	number	float	Failed physical disk capacity in the system.
totalMiB	number	float	Total physical disk capacity in the system.

At Time response

The physical disk capacity response report contains an array of sample data for a particular time interval. The report groups each instance of sample data into one or more categories.

Table 500: Response message body for At Time physical disk capacity

Member	JSON type	API type	Description
sampleTime	string	8601	Physical disk capacity time stamp.
sampleTimeSec	number	int32	Physical disk capacity time stamp in seconds.
total	number	int32	Total number of sample data.
members	Array of objects	<u>At Time Physical disk capacity sample data</u>	Physical disk capacity groups in categories. A JSON array of zero or more JSON objects.
links	Array of URL links	Array of URL links	Except for System Reporter query, links include the self URL, which is the original request URL including the query at the end.

Table 501: At Time Physical disk capacity sample data

Member	JSON type	API type	Description
id	number	int32	Physical disk ID.
cageID	number	int32	Cage ID.
cageSide	number	int32	Cage Side.
mag	number	int32	Disk Magazine within the cage.
diskPos	number	int32	Disk position within the magazine.
type	number	<u>diskType enumeration</u>	Disk type.
RPM	number	int32	RPM of the physical disk.
allocatedMiB	number	float	Allocated physical disk capacity in the system.
freeMiB	number	float	Free physical disk capacity in the sytem.

Table Continued

Member	JSON type	API type	Description
failedMiB	number	float	Failed physical disk capacity in the system.
totalMiB	number	float	Total physical disk capacity in the system.

At Time summary response

Table 502: Response message body JSON objects for At Time physical disk capacity summary

Member	JSON type	API type	Description
sampleTime	string	8601	Physical disk capacity time stamp.
sampleTimeSec	number	int32	Physical disk capacity time stamp in seconds.
summary	array of objects	<u>At Time physical disk capacity summary objects</u>	Physical disk capacity summary sample data.
links	array of URL links	array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>No self-link returned for System Reporter query.</p>

Table 503: At Time physical disk capacity summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
allocatedMiB	number	float	Allocated physical disk capacity in the system
freeMiB	number	float	Free physical disk capacity in the system
failedMiB	number	float	Failed physical disk capacity in the system
totalMiB	number	float	Total physical disk capacity in the system

Physical disk statistical data reports

Request physical disk statistical data reports using either Versus Time or At Time reports.

Requesting Versus Time physical disk statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/
physicaldiskstatistics/
<samplefreq>;id:<pdid>;type:<disktype>;RPM:<speed>;groupby:<groupby>;compareby:<
compareby>;summary:<summaryField>[?<query expression>]
```

Versus Time physical disk statistics report parameters

In addition to the mandatory <samplefreq> parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameters:

id

Request disk capacity data for the specified disks only. With no id specified, the system calculates physical disk capacity for all disks in the system. Use the structure, id:1,3,2.

type

Specify the disk types to query for physical disk capacity sample data (see, [CPG diskType enumeration](#)). With no type specified, the system calculates physical disk capacity for all disk types in the system. To specify one or more disk types, separate them with a comma (.). Use the structure, type:1,2,3

RPM

Specify the RPM speed to query for physical disk capacity data. With no speed indicated, the system calculates physical disk capacity data for all speeds in the system. Specify one or more disk RPM speeds

by separating them with a comma (.). Use the structure, RPM: 7, 15, 150. Valid RPM values are: 7, 10, 15, 100, 150.

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple groupby categories using a comma (,) and no spaces. Use the structure, groupby:id,node,slot,cardPort,type,RPM.

summary

See, [Versus Time summary requests](#).

compareby

Table 504: Physical disk statistical data compareby parameters

Name	JSON type	API type	Description
top bottom	string	string	Specify either top or bottom.
noOfRecords	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
comparebyField	string	Physical disk statistical data comparebyField options	Specifies the field to compare.

Table 505: Physical disk statistical data comparebyField options

Field name	Description
totalIOPs	Total IOPs.

Requesting At Time physical disk statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/  
physicaldiskstatistics/  
<samplefreq>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?  
<query expression>]
```

At Time physical disk statistics report parameters

In addition to the mandatory <samplefreq> parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameter:

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupBy` categories using a comma (,) and no spaces. Use the structure, `groupBy:id,node,slot,cardPort,type,RPM`.

summary

See, [At Time summary requests](#).

compareby

See, [Physical disk statistical data compareby parameters](#).

Query expression parameters

Physical disk statistics queries default to all disks in the system at a particular time. You can make modifications using the options `<query expression >` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter, and filter data based on `type` (see [CPG diskType enumeration](#)), `id` (`pdid`), or `RPM`. Use the `AND` operator to combine filters.

Usage examples include:

- `?query="sampleTime GE <time1> AND sampleTime LE <time2>"`
- `?query="type EQ 1,2,3"`
- `?query="id EQ 2,3,4"`
- `?query="type EQ 1,2 AND id EQ 2,3,4"`
- `?query="type EQ 1,2 AND id EQ 2,3,4 AND sampleTime LE <time format>"`
- `?query="type EQ 1,2 AND sampleTime GE <time format> AND sampleTime LE <time2>"`
- `?query="id EQ 2,3,4 AND sampleTime LE <time format>"`

Success

A successful query returns the HTTP code 200 OK.

Errors

[Error messages for system reporter queries](#) lists the error messages possible when querying physical disk statistics.

Versus Time response

The response for a physical disk statistics report is an array of performance sample data. Each sample data is displayed with a time stamp. The message body is specified in the following table.

Table 506: Response message body for Versus Time physical disk statistics

Member	JSON type	API type	Description
total	number	int32	Total number of sample data
members	array of objects	<u>Versus Time physical disk performance objects</u>	Physical disk performance sample data with time stamp
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 507: Versus Time physical disk performance objects

Member	JSON type	API type	Description
sampleTime	string	8601	Physical disk statistic sample time.
sampleTimeSec	number	int32	Physical disk statistic sample time in seconds.
id	number	int32	Physical disk ID.
type	number	<u>diskType enumeration</u>	Disk type
RPM	number	int32	Physical disk speed.
node	number	int32	Physical disk primary port node number.
slot	number	int32	PCI slot number for the physical disk primary port.
cardPort	number	int32	Port number for the physical disk primary port.
IO	object	See, <u>rwtAccessCount objects</u>	Number of IO per second.
KBytes	object	See, <u>rwtAccessCount objects</u>	Number of kilobytes per second.
serviceTimeMS	object	See, <u>rwtAccessCount objects</u>	Service time in millisecond.

Table Continued

Member	JSON type	API type	Description
IOSizeKB	object	See, <u>rwtAccessCount objects</u>	IO size in kilobytes statistic data.
queueLength	number	float	Queue length
busyPct	number	float	Busy percentage

Table 508: rwtAccessCount objects

Member	JSON type	API type	Description
read	number	float	Read statistic
write	number	float	Write statistic
total	number	float	Total of read and write statistic

Versus Time summary response

Table 509: Response message body for Versus Time physical disk statistics summary

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array	<u>Versus Time physical disk statistics summary objects</u>	Physical disk statistics sample data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 510: Versus Time physical disk statistics summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
sampleTime	string	8601	Physical disk statistics sample time (requires perTime specification).
sampleTimeSec	number	int32	Physical disk statistics sample time in seconds (requires perTime specification).
id	number	int32	Physical disk ID
type	number	<u>diskType enumeration</u>	Disk type
RPM	number	int32	Speed of the physical disk
node	number	int32	Node number for primary port for the physical disk

Table Continued

Member	JSON type	API type	Description
slot	number	int32	PCI slot number for the primary port for the physical disk
cardPort	number	int32	Port number for the primary port for the physical disk
IO	object	<u>rwAccessCount objects</u>	Number of IO per second, which includes read, write, and total.
Kbytes	object	<u>rwAccessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>rwAccessCount objects</u>	Service time in ms, which includes read, write, and total.
IOsizeKB	object	<u>rwAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage.

At Time response

The response for physical disk statistics report is an array of performance sample data at a particular time interval, and groups each data sample into one or more categories.

Table 511: Response message body for At Time physical disk statistics

Member	JSON type	API type	Description
sampleTime	string	8601	Physical disk performance statistic time stamp.
sampleTimeSec	number	int32	Physical disk performance statistic time stamp in seconds.
total	number	int32	Total number of sample data.

Table Continued

Member	JSON type	API type	Description
members	array of objects	<u>At Time physical disk statistics objects</u>	Physical disk performance sample data with time stamp. A JSON array of zero or more JSON objects.
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 512: At Time physical disk statistics objects

Member	JSON type	API type	Description
id	number	int32	Physical disk ID.
type	number	<u>diskType enumeration</u>	Disk type.
RPM	number	int32	Speed of the physical disk.
node	number	int32	Node number for primary port of the physical disk.
slot	number	int32	PCI slot number for the primary port of the physical disk.
cardPort	number	Int32	Port number for the primary port of the physical disk.
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second.
KBytes	object	<u>rwtAccessCount objects</u>	Number of kilobytes per second.
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in millisecond statistic data.
IOSizeKB	object	<u>rwtAccessCount objects</u>	IO size in kilobytes statistic data.
queueLength	number	float	Queue length
busyPct	number	float	Busy percentage

At Time summary response

Table 513: Response message body for At Time physical disk statistics summary data

Member	JSON type	API type	Description
sampleTime	string	8601	Physical disk performance statistic time stamp.
sampleTimeSec	number	int32	Physical disk performance statistic time stamp, in seconds.
summary	array	<u>At Time physical disk statistics summary objects</u>	Physical disk statistics sample data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 514: At Time physical disk statistics summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second, which includes read, write, and total.

Table Continued

Member	JSON type	API type	Description
Kbytes	object	<u>rwtAccessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in ms, which includes read, write, and total.
IOsizeKB	object	<u>rwtAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage.

Physical disk space data reports

Request physical disk space data reports using either Versus Time or At Time reports.

Requesting Versus Time physical disk space data

To request a Versus Time physical disk space data report, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/
physicaldiskspacedata/
<samplefreq>;id:<id>;type<disktype>;RPM:<speed>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see, [Mandatory sample frequency parameter](#)), you can use the following, optional parameters:

id

Request disk capacity data for the specified disks only. With no `id` specified, the system calculates physical disk capacity for all disks in the system. Use the structure, `id:1,3,2`.

type

Specify the disk types to query for physical disk capacity sample data (see, [CPG diskType enumeration](#)). With no `type` specified, the system calculates physical disk capacity for all disk types in the system. To specify one or more disk types, separate them with a comma (.). Use the structure, `type:1,2,3`.

RPM

Specify the RPM speed to query for physical disk capacity data. With no speed indicated, the system calculates physical disk capacity data for all speeds in the system. Specify one or more disk RPM speeds by separating them with a comma (.). Use the structure, `RPM:7,15,150`. Valid RPM values are: 7,10,15,100,150.

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupby` categories using a comma (,) and no spaces. Use the structure, `groupby:id,cageID,cageSide,mag,diskPos,type,RPM`.

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`.

Table 515: Physical disk space compareby parameters

Parameter	JSON type	API type	Description
top bottom	string	string	Specifies whether to display the top records or the bottom records.
noOfRecords	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
comparebyField	string	<u>Physical disk' space comparebyField parameters</u>	Specifies the fields to compare.

Table 516: Physical disk space comparebyField parameters

Field name	Description
totalIOPs	Total number of IOPs
normalChunkletsUsedOK	Normal used good chunklets
normalChunkletsUsedFailed	Normal used failed chunklets
normalChunkletsAvailClean	Normal available clean chunklets
normalChunkletsAvailDirty	Normal available dirty chunklets
normalChunkletsAvailFailed	Normal available failed chunklets
spareChunkletsUsedOK	Spare used good chunklets
spareChunkletsUsedFailed	Spare used failed chunklets
spareChunkletsAvailClean	Spare available clean chunklets
spareChunkletsAvailDirty	Spare available dirty chunklets
spareChunkletsAvailFailed	Spare available failed chunklets

Table Continued

Field name	Description
lifeLeftPct	Percentage of life left
temperatureC	Temperature in Celsius

Requesting At Time physical disk space data

To request an At Time physical disk performance data report, use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/
physicaldiskspacedata/
<samplefreq>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?
<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameter:

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupby` categories using a comma (,) and no spaces. Use the structure, `groupby:id,cageID,cageSide,mag,diskPos,type,RPM`.

summary

See, [At Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`.

See, [Physical disk space compareby parameters](#).

Query expression parameters

Physical disk space data queries default to all disks in the system at a particular time. You can make modifications using the options `<query expression>` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter, and filter data based category. For type enumerations see, [diskType enumeration](#), RPM, id. Use the AND operator to combine filters.

Usage examples include:

```
query="type EQ 1,2,3 AND id EQ 2,3,8 AND sampletime LE <time format>"
```

Success

A successful query returns the HTTP code 200 OK.

Errors

[Error messages for system reporter queries](#) lists the error messages possible when querying physical disk space data.

Versus Time response

The response for a physical disk space data report is an array of space sample data. Each sample displays with a time stamp. The following table the message body response definitions.

Table 517: Response message body for Versus Time physical disk space data

Member	JSON type	API type	Description
total	number	int32	Total number of sample data.
members	array of objects	<u>Versus Time physical disk space data objects</u>	Physical disk space sample data with time stamp.
links	array of URL links	Array of URL links	Links include the self URL, which includes the original request URL and the query at the end.

Table 518: Versus Time physical disk space data objects

Member	JSON type	API type	Description
id	number	int32	Physical disk ID.
cageId	number	int32	Cage ID.
cageSide	number	int32	Cage side.
mag	number	int32	Disk magazine within the cage.
diskPos	number	int32	Position of disk within the magazine.
type	number	<u>diskType enumeration</u>	Type of disk.
RPM	number	int32	RPM of the physical disk.
sampleTime	string	8601	Physical disk space data statistic sample time.
sampleTimeSec	number	int32	Physical disk space data statistic sample time in seconds.
normalChunklets	object	<u>chunklets data objects</u>	Normal chunklets data.
spareChunklets	object	<u>chunklets data objects</u>	Spare chunklets data.

Table Continued

Member	JSON type	API type	Description
lifeLeftPct	number	float	Percentage of life left.
temperatureC	number	float	Temperature in Celsius.

Table 519: chunklets data objects

Member	JSON type	API type	Description
usedOK	number	float	Used good chunklets
usedFailed	number	float	Used failed chunklets
availClean	number	float	Available clean chunklets
availDirty	number	float	Available dirty chunklets
availFailed	number	float	Available failed chunklets

Versus Time summary response

Table 520: Response message body for Versus Time Physical disk summary data

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array	<u>physical disk summary objects</u>	Physical disk performance sample data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 521: physical disk summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
sampleTime	string	8601	Physical disk statistic sample time (requires perTime specification).
sampleTimeSec	number	int32	Physical disk space data sample time in seconds (requires perTime specification).
id	number	int32	Physical disk ID
cageID	number	int32	Cage ID.
cageSide	number	int32	Cage Side.
mag	number	int32	Disk Magazine within the cage.

Table Continued

Member	JSON type	API type	Description
diskPos	number	int32	Disk position within the magazine.
type	number	<u>diskType enumeration</u>	Type of disk.
RPM	number	int32	RPM of the physical disk
normalChunklets	object	<u>chunklets data objects</u>	Normal chunklets data.
spareChunklets	object	<u>chunklets data objects</u>	Spare chunklets data.
lifeLeftPct	number	float	Life left in percentage.
temperatureC	number	float	Temperature in Celcius.

At Time response

The response for a physical disk space data report is an array of space sample data. Each sample displays with a time stamp.

Table 522: Response message body for At Time physical disk space data

Members	JSON type	API type	Description
sampleTime	string	8601	Physical disk space data time stamp
sampleTimeSec	number	Int32	Physical disk space data time stamp in seconds
total	number	int32	Total number of sample data
members	array of objects	<u>At Time physical disk space data objects</u>	Physical disk space sample data with time stamp
links	array of URL links	Array of URL links	Links include the self URL, which includes the original request URL and the query at the end

Table 523: At Time physical disk space data objects

Member	JSON type	API type	Description
id	string	8601	Physical disk ID
cageID	number	int32	Cage ID

Table Continued

Member	JSON type	API type	Description
cageSide	number	int32	Cage Side
mag	number	int32	Disk magazine within the cage
diskPos	number	int32	Disk position within the magazine
type	number	<u>diskType enumeration</u>	Disk type
RPM	number	int32	Physical disk RPM
normalChunklets	object	<u>chunklets data objects</u>	Normal chunklets data
spareChunklets	object	<u>chunklets data objects</u>	Spare chunklets data
lifeLeftPct	number	float	Percentage of life left
temperatureC	number	float	Temperature in Celcius

At Time summary response

Table 524: Response message body for At Time physical disk space data summary

Member	JSON type	API type	Description
sampleTime	string	8601	Physical disk space data time stamp.
sampleTimeSec	number	int32	Physical disk space data time stamp in seconds.
summary	array of objects	<u>physical disk summary objects</u>	Physical disk space summary sample data.
links	array of URL links	array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" } No self-link returned for System Reporter query.</pre>

Table 525: At Time physical disk space data summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
normalChunklets	object	<u>chunklets data objects</u>	Normal chunklets data.
spareChunklets	object	<u>chunklets data objects</u>	Spare chunklets data.
lifeLeftPct	number	float	Life left in percentage.
temperatureC	number	float	Temperature in Celcius.

Port statistical data reports

Request port statistics reports using either Versus Time or At Time reports.

Requesting Versus Time port statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/portstatistics/
<samplefreq>;portPos:<n:s:p>;type:<porttype>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see, **Mandatory sample frequency parameter**), you can use the following options:

portPos

Request port statistics for the specified ports only. With no `portPos` specified, the system calculates physical disk capacity for all ports in the system. Use the structure, `portPos:1:0:1,2:1:3,6:2:1`.

type

Specify the port types to query for port statistical sample data (see, **portConnType enumeration**). With no `type` specified, the system calculates port statistical data for all port types in the system. To specify one or more port types, separate them with a comma (,). Use the structure, `type:1,2,3`

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupby` categories using a comma (,) and no spaces. Use the structure, `groupby:node,slot,cardPort,type,speed`.

summary

See, **Versus Time summary requests**.

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

Table 526: Port statistical data compareby parameters

Name	JSON type	API type	Description
top bottom	string	string	Specify either top or bottom.
noOfRecords	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
comparebyField	string	Port statistical data comparebyField options	Specifies the field to compare.

Table 527: Port statistical data comparebyField options

Field name	Description
totalIOPs	Total IOPs.

Requesting At Time port statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/portstatistics/  
<samplefreq>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?  
<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameter:

groupby

Group the sample data into categories. With no category specified, the system groups data into all categories. Separate multiple `groupby` categories using a comma (,) and no spaces. Use the structure, `groupby:node,slot,cardPort,type,speed`.

summary

See, [At Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

See, [Port statistical data compareby parameters](#).

Query expression parameters

Port statistics queries default to all ports in the system at a particular time. You can make modifications using the optional `<query expression>` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter, and filter data based on category. For `type` enumerations see, [portConnType enumeration](#). Use the `AND` operator to combine filters.

Usage examples include:

- `?query="sampleTime GE 2017-02-07T23:00:00-08:00 AND sampleTime LE 2017-02-08T23:00:00-08:00"`
- `?query="type EQ 1,2,3,7"`
- `?query="node EQ 1 AND slot EQ 0 AND cardPort EQ 1"`
- `?query="type EQ 2 AND node EQ 1 AND slot EQ 0 AND cardPort EQ 1"`
- `?query="type EQ 2 AND node EQ 1 AND slot EQ 0 AND cardPort EQ 1 AND sampleTime LE 2017-02-09T00:00:00-08:00"`
- `?query="type EQ 3 AND sampleTime GE 2017-02-07T23:00:00-08:00 AND sampleTime LE 2017-02-09T00:00:00-08:00"`
- `?query="type EQ 3,5,8 AND sampleTime GE <time format> AND sampleTime LE <time2>"`
- `?query="type EQ 2 AND node EQ 1,0 AND slot EQ 0 AND cardPort EQ 1 AND sampleTime LE 2017-02-09T00:00:00-08:00"`
- `?query="type EQ 2 AND node EQ 1,0 AND slot EQ 0 AND cardPort EQ 1 AND sampleTime LE 2017-02-09T00:00:00-08:00"`

Success

A successful query returns the HTTP code 200 OK.

Errors

[Error messages for system reporter queries](#) lists the error messages possible when querying port statistics.

Versus Time response

The Versus Time port statistics report contains an array of performance sample data. The response displays each instance of sample data with a time stamp.

Table 528: Response message body for Versus Time port statistics

Member	JSON type	API type	Description
total	number	int32	Total number of sample data
members	array of objects	<u>Versus Time port statistics sample data</u>	Port statistics sample data with time stamp
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 529: Versus Time port statistics sample data

Member	JSON type	API type	Description
sampleTime	string	8601	Port performance statistic sample time.
sampleTimeSec	number	int32	Port performance statistic sample time in seconds.
node	number	int32	Node number of the port.
slot	number	int32	Slot number of the port.
cardPort	number	int32	Port number.
type	number	<u>portConnType enumeration</u>	Port type.
speed	number	int32	Port speed.
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second.
KBytes	object	<u>rwtAccessCount objects</u>	Number of kilobytes per second.
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in millisecond statistic data.
IOSizeKB	object	<u>rwtAccessCount objects</u>	IO size in kilobytes statistic data.
queueLength	number	float	Queue length
busyPct	number	float	Busy percentage

Versus Time summary response

Table 530: Response message body for Versus Time port statistics summary

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.
summary	array	<u>Versus Time port statistics summary objects</u>	Port statistics sample data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 531: Versus Time port statistics summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
sampleTime	string	8601	Port statistics sample time (requires perTime specification).

Table Continued

Member	JSON type	API type	Description
sampleTimeSec	number	int32	Port statistics space data sample time in seconds (requires <code>perTime</code> specification).
type	number	<u>portConnType enumeration</u>	Port type.
RPM	number	int32	Speed of the port
node	number	int32	Node number for primary port for the physical disk
slot	number	int32	PCI slot number for the primary port
cardPort	number	int32	Port number for the primary port
IO	object	<u>rwAccessCount objects</u>	Number of IO per second, which includes read, write, and total.
Kbytes	object	<u>rwAccessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>rwAccessCount objects</u>	Service time in ms, which includes read, write, and total.
IOsizeKB	object	<u>rwAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage.

At Time response

The port statistics response contains an array of performance sample data for a particular time interval. The report groups each instance of sample data into one or more categories.

Table 532: Response message body for At Time port statistics

Member	JSON type	API type	Description
sampleTime	string	8601	Port statistics time stamp
sampleTimeSec	number	int32	Port statistics time stamp in seconds
total	number	int32	Total number of sample data
members	array of objects	<u>Port statistics objects</u>	Port statistics sample groups in categories
links	array of URL links	Array of URL links	Except for System Reporter query, links include the self URL, which is the original request URL including the query at the end

Table 533: Port statistics objects

Member	JSON type	API type	Description
node	number	int32	Node number of the port.
slot	number	int32	PCI slot number of the port.
cardPort	number	int32	Port number.
type	number	<u>portConnType enumeration</u>	Port type.
speed	number	int32	Port speed.
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second.
KBytes	object	<u>rwtAccessCount objects</u>	Number of kilobytes per second.
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in millisecond statistic data.
IOSizeKB	object	<u>rwtAccessCount objects</u>	IO size in kilobytes statistic data.

Table Continued

Member	JSON type	API type	Description
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage.

At Time summary response

Table 534: Response message body for At Time port statistics summary

Member	JSON type	API type	Description
sampleTime	string	8601	Port statistic time stamp.
sampleTimeSec	number	int32	Port statistic time stamp, in seconds.
summary	array	<u>At Time port statistics summary objects</u>	Port statistics sample data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 535: At Time port statistics summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second, which includes read, write, and total.

Table Continued

Member	JSON type	API type	Description
Kbytes	object	<u>rwtAccessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in ms, which includes read, write, and total.
IOsizeKB	object	<u>rwtAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage.

QoS statistical data reports

Request Quality of Service (QoS) statistical data using either Versus Time or At Time reports.

Requesting Versus Time QoS statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/qosstatistics/
<samplefreq>;vvset:<vvset_name>;domain:<domain_name>;sys:all_others;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following, optional parameters:

vvset

Retrieve QoS statistics for the specified vvset. Specify multiple vvsets using

```
vvset:<vvset_name1>,vvset:<vvset_name2>...
```

domain

Retrieve QoS statistics for the specified domain. Use the structure, `domain:<domain_name>`, or specify multiple domains using `domain:<domain_name1>,domain:<domain_name2>...`

sys

Specify all host I/Os not regulated by any active QoS rule. Use the structure, `sys:all_others`

groupby

Group QoS statistical data into categories. With no `groupby` parameter specified, the system groups the data into all categories. You can specify one or more `groupby` categories by separating them with a comma. Use the structure, `groupby:domain,type,name,ioLimit`.

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby: [top | bottom], <noOfRecords>, <comparebyField>`

Table 536: QoS statistical data compareby parameters

Parameter	JSON type	API type	Description
top bottom	string	string	Specifies either the top records or the bottom records.
noOfRecords	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
comparebyField	string	<u>QoS statistical data comparebyField options</u>	Specifies the field to compare.

Table 537: QoS statistical data comparebyField options

Option	Description
readIOPS	Read input/output operations per second.
writeIOPS	Write input/output operations per second.
totalIOPS	Total input/output operations per second.
readKBytes	Read kilobytes.
writeKBytes	Write kilobytes.
totalKBytes	Total kilobytes.
readServiceTimeMS	Read service time in milliseconds.
writeServiceTimeMS	Write service time in milliseconds.
totalServiceTimeMS	Total service time in milliseconds.
readIOSizeKB	Read input/output size in kilobytes
writeIOSizeKB	Write input/output size in kilobytes
totalIOSizeKB	Total input/output size in kilobytes
readWaitTimeMS	Read wait time in milliseconds.

Table Continued

Option	Description
writeWaitTimeMS	Write wait time in milliseconds.
totalWaitTimeMS	Total wait time in milliseconds.
IOLimit	IO limit.
BWLimit	Bandwidth limit.
IOGuarantee	Input/output guarantee.
BWGuarantee	Bandwidth guarantee.
busyPct	Busy Percentage.
queueLength	Total queue length.
waitQueueLength	Total wait queue length.
IORejection	Total input/output rejection.
latencyMS	Latency in milliseconds.
latencyTargetMS	Latency target in milliseconds.

Requesting At Time QoS statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vattime/qosstatistics/
<samplefreq>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?
<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following options:

groupby

Group QoS statistical data into categories. With no `groupby` parameter specified, the system groups the data into all categories. You can specify one or more `groupby` categories by separating them with a comma. Use the structure, `groupby:domain,type,name,ioLimit`.

summary

See, [At Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

See, [QOS statistical data compareby parameters](#).

Query expression parameters

QoS statistics queries default to the QoS rules in place on the system at the time. You can make modifications using the optional `<query expression>` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see, [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter and filter data based on the following parameters. Use the `AND` operator to combine filters:

- `vvset`
- `domain`
- `sys`

Usage examples include:

- `?query="sampleTime GE <time format> AND sampleTime LE <time format>"`
- `?query="vvset EQ <vvset_name1>"`
- `?query="vvset EQ <vvset_name1>,<vvset_name2> AND domain EQ <domain_name1> AND sys EQ <all_others> AND sample EQ Time LE <time format>"`

Success

A successful query returns the HTTP code 200 OK.

Errors

[Error messages for system reporter queries](#) lists the error messages possible when querying QoS statistics.

Versus Time response

The Versus Time QoS statistics report contains an array of sample data. The response displays each instance of sample data with a time stamp.

Table 538: Response message body for Versus Time QoS statistics

Member	JSON type	API type	Description
<code>total</code>	number	int32	Total number of sample data
<code>members</code>	array of objects	Versus Time QoS statistical data objects	QoS statistics sample data with time stamp, returned as a JSON array of zero or more JSON objects.
<code>links</code>	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 539: Versus Time QoS statistical data objects

Member	JSON type	API type	Description
sampleTime	string	8601	QoS statistics sample time.
sampleTimeSec	number	int32	QoS statistics sample time, in seconds.
domain	string	string	Domain name of the QoS.
type	string	string	QoS type
name	string	string	QoS type name
ioLimit	number	int32	Input/output per second limit for the QoS rule.
bwLimit	number	int32	Kilobytes per second bandwidth limit.
IO	object	<u>QoS accessCount objects</u>	Number of IO per second, which includes read, write, and total.
Kbytes	object	<u>QoS accessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>QoS serviceCount objects</u>	Service time in milliseconds, which includes read, write, and total.
waitTimeMS	object	<u>rwtAccessCount objects</u>	Wait time in milliseconds, which includes read, write, and total.
IOsizeKB	object	<u>rwtAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
totalRejection	number	float	Total IO rejections.
queueLength	number	float	Queue length.
waitQueueLength	number	float	Wait queue length.

Table 540: QoS accessCount objects

Member	JSON type	API type	Description
min	number	float	Minimum limit.
max	number	float	Maximum limit.
read	number	float	Read statistics.
write	number	float	Write statistics.
total	number	float	Total read and write statistics.

Table 541: QoS serviceCount objects

Member	JSON type	API type	Description
goal	number	float	Service goal.
latency	number	float	Service latency.
read	number	float	Read statistics.
write	number	float	Write statistics.
total	number	float	Total read and write statistics.

Versus Time summary response

Table 542: Response message body JSON objects for Versus Time QoS summary

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array of objects	<u>Versus Time QoS statistical summary data</u>	Cache memory performance sample data.
links	array of URL links	array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>No self-link returned for System Reporter query.</p>

Table 543: Versus Time QoS statistical summary data

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
domain	string	string	Domain name of the QoS.
type	string	string	QoS type
name	string	string	QoS type name
ioLimit	number	int32	Input/output per second limit for the QoS rule.
bwLimit	number	int32	Kilobytes per second bandwidth limit.
IO	object	<u>QoS accessCount objects</u>	Number of IO per second, which includes read, write, and total.

Table Continued

Member	JSON type	API type	Description
Kbytes	object	<u>QoS accessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>QoS serviceCount objects</u>	Service time in milliseconds, which includes read, write, and total.
waitTimeMS	object	<u>rwAccessCount objects</u>	Wait time in milliseconds, which includes read, write, and total.
IOsizeKB	object	<u>rwAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
totalRejection	number	float	Total IO rejections.
queueLength	number	float	Queue length.
waitQueueLength	number	float	Wait queue length.

At Time response

The At Time QoS statistics report contains an array of sample data. The response displays each instance of sample data with a time stamp.

Table 544: Response message body for At Time QoS statistics

Members	JSON type	API type	Description
sampleTime	string	8601	QoS statistics time stamp
sampleTimeSec	number	int32	QoS statistics time stamp, in seconds
total	number	int32	Total number of sample data
members	array of objects	<u>At Time QoS statistical objects</u>	QoS statistics sample groups in categories. Response includes a JSON array of zero or more JSON objects
links	array of URL links	Array of URL links	Except for System Reporter query, the links returned include the self URL

Table 545: At Time QoS statistical objects

Member	JSON type	API type	Description
domain	string	string	Domain name of the QoS.
type	string	string	QoS type
name	string	string	QoS type name
ioLimit	number	int32	Input/output per second limit for the QoS rule.
bwLimit	number	<u>rwAccessCount objects</u>	Kilobytes per second bandwidth limit.
IO	object	<u>QoS accessCount objects</u>	Number of IO per second, which includes read, write, and total.
Kbytes	object	<u>QoS accessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>QoS serviceCount objects</u>	Service time in milliseconds, which includes read, write, and total.
waitTimeMS	object	<u>rwAccessCount objects</u>	Wait time in milliseconds, which includes read, write, and total.
IOsizeKB	object	<u>rwAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
totalRejection	number	float	Total IO rejections.
queueLength	number	float	Queue length.
waitQueueLength	number	float	Wait queue length.

At Time summary response

Table 546: Response message body for At Time QoS statistics summary

Member	JSON type	API type	Description
sampleTime	string	8601	VLUN statistic time stamp.
sampleTimeSec	number	int32	VLUN statistic time stamp, in seconds.
summary	array	<u>At Time QOS statistical summary objects</u>	VLUN statistics summary data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 547: At Time QOS statistical summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
domain	string	string	Domain name of the QoS.
type	string	string	QoS type
name	string	string	QOS type name
ioLimit	number	int32	Input/output per second limit for the QoS rule.

Table Continued

Member	JSON type	API type	Description
bwLimit	number	int32	Kilobytes per second bandwidth limit.
IO	object	<u>QoS accessCount objects</u>	Number of IO per second, which includes read, write, and total.
Kbytes	object	<u>QoS accessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>QoS serviceCount objects</u>	Service time in milliseconds, which includes read, write, and total.
waitTimeMS	object	<u>rwtAccessCount objects</u>	Wait time in milliseconds, which includes read, write, and total.
IOsizeKB	object	<u>rwtAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
totalRejection	number	float	Total IO rejections.
queueLength	number	float	Queue length.
waitQueueLength	number	float	Wait queue length.

Remote Copy statistical data reports

Request Remote Copy statistical data using either Versus Time or At Time reports.

Requesting Versus Time Remote Copy statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/remotecopystatistics/
<samplefreq>;targetName:<target_name>;portPos:<n:s:p>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following options:

targetName

Specify the target from which to gather Remote Copy statistics. Separate multiple target names using a comma (,). With no target specified, the request calculates Remote Copy statistics for all targets in the system. Use the structure, `targetName:<target1>,<target2> . . .`

portPos

Specify the port from which to gather Remote Copy statistics. Separate multiple port positions with a comma (,) Use the structure, `portPos:<n:s:p>, <n:s:p> . . .` With no port specified, the request calculates Remote Copy statistics for all ports in the system.

groupby

Group Remote Copy statistical data into categories. With no `groupBy` parameter specified, the system groups the data into all categories. Separate multiple groups with a comma (,). Use the structure, `groupBy:targetName,linkId,linkAddr,node,slotPort,cardPort`.

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom], <noOfRecords>, <comparebyField>`

Table 548: Remote Copy statistical data compareby parameters

Parameter	JSON type	API type	Description
<code>top bottom</code>	string	string	Specifies either the top records or the bottom records.
<code>noOfRecords</code>	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
<code>comparebyField</code>	string	<u>Remote Copy statistical data comparebyField options</u>	Specifies the field to compare.

Table 549: Remote Copy statistical data comparebyField options

Option	Description
<code>kbs</code>	Kilobytes.
<code>kbps</code>	Kilobytes per second.
<code>hbrttms</code>	Round trip time for a heartbeat message on the link.
<code>targetName</code>	Name of the Remote Copy target created with <code>creatercopytarget</code> .
<code>linkId</code>	ID of the Remote Copy target created with <code>creatercopytarget</code> .

Table Continued

Option	Description
linkAddr	Address (IP or FC) of the Remote Copy target created with <code>creatercopytarget</code> .
node	Node number for the port used by a Remote Copy link.
slotPort	PCI slot number for the port used by a Remote Copy link.
cardPort	Port number for the port used by a Remote Copy link.

Requesting At Time Remote Copy statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/remotecopystatistics/
<samplefreq>groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?
<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following options:

groupby

Group Remote Copy statistical data into categories. With no `groupby` parameter specified, the system groups the data into all categories. Separate multiple groups with a comma (.). Use the structure, `groupby:targetName,linkId,linkAddr,node,slotPort,cardPort`.

summary

See, [At Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

See, [Remote Copy statistical data compareby parameters](#).

Query expression parameters

Remote Copy statistics queries default to the Remote Copy rules in place on the system at the time. You can make modifications using the optional `<query expression>` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see, [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter and filter data based on the following parameters. Use the `AND` operator to combine filters:

- `targetName`
- `portPos`

Usage examples include:

- `?query="sampleTime GE <time format>"`
- `?query="targetName EQ <targetName1>, <targetName2>"`
- `?query="portPos EQ 0:1:2,1:2:3 AND sampleTime LE <time format>"`

Success

A successful query returns the HTTP code 200 OK.

Errors

Error messages for system reporter queries lists the error messages possible when querying Remote Copy statistics.

Versus Time response

The Versus Time Remote Copy statistics report contains an array of sample data. The response displays each instance of sample data with a time stamp.

Table 550: Response message body for Versus Time Remote Copy statistics

Member	JSON type	API type	Description
total	number	int32	Total number of sample data
members	array of objects	<u>remotecopyVsSampleData objects</u>	Remote COpy statistics sample data with time stamp.
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 551: remotecopyVsSampleData objects

Member	JSON type	API type	Description
sampleTime	string	8601	Remote Copy statistics sample time
sampleTimeSec	number	int32	Remote Copy statistics sample time, in seconds.
totalKbytes	number	float	Total traffic sent across the link since it first connected.
throughputKByteSec	number	float	Throughput on the link since the last iteration.

Table Continued

Member	JSON type	API type	Description
heartbeatRTTMS	number	float	Heart Beat Round Trip Time in Milli Seconds
averageThroughputKByteSec	number	float	Average throughput on the link since statrcopy started.
writeSameZeroKByteSec	number	float	

Versus Time summary response

Table 552: Response message body JSON objects for Versus Time Remote Copy summary

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.
summary	array of objects	<u>Versus Time Remote Copy statistical summary data</u>	Remote Copy statistics summary.
links	array of URL links	array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>No self-link returned for System Reporter query.</p>

Table 553: Versus Time Remote Copy statistical summary data

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
sampleTime	string	8601	Remote Copy sample time (requires <code>perTime</code> specification).
sampleTimeSec	number	int32	Remote COpY sample time in seconds (requires <code>perTime</code> specification).
targetName	string	string	Name of the Remote Copy target created with <code>creatercopytarget</code> .
linkId	number	int	ID of the Remote Copy target created with <code>creatercopytarget</code> .
linkAddr	string	string	Address (IP or FC) of the Remote Copy target created with <code>creatercopytarget</code> .
node	number	int	Node number for the port used by a Remote Copy link.
slotPort	number	int	PCI slot number for the port used by a Remote Copy link.
cardPort	number	int	Port number for the port used by a Remote Copy link.
totalKbytes	number	float	Total traffic sent across the link since it first connected.
throughputKByteSec	number	float	Throughput on the link since the last iteration.

Table Continued

Member	JSON type	API type	Description
heartbeatRTTMS	number	float	Heart Beat Round Trip Time in Milli Seconds
averageThroughputKB yteSec	number	float	Average throughput on the link since statrcopy started.
writeSameZeroKByteS ec	number	float	

At Time response

The At Time Remote Copy statistics report contains an array of sample data. The response displays each instance of sample data with a time stamp.

Table 554: Response message body for At Time Remote Copy statistics

Member	JSON type	API type	Description
sampleTime	string	8601	Remote Copy statistics sample time
sampleTimeSec	number	int32	Remote Copy statistics sample time, in seconds.
total	number	int32	Total number of sample data
members	array of objects	<u>remotecopyatSampleData objects</u>	Remote Copy statistics sample data with time stamp.
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 555: remotecopyatSampleData objects

Member	JSON type	API type	Description
targetName	string	string	Name of the Remote Copy target created with creatercopytarget.
linkId	number	int	ID of the Remote Copy target created with creatercopytarget.

Table Continued

Member	JSON type	API type	Description
linkAddr	string	string	Address (IP or FC) of the Remote Copy target created with <code>creatercopytarget</code> .
node	number	int	Node number for the port used by a Remote Copy link.
slotPort	number	int	PCI slot number for the port used by a Remote Copy link.
cardPort	number	int	Port number for the port used by a Remote Copy link.
totalKbytes	number	float	Total traffic sent across the link since it first connected.
throughputKByteSec	number	float	Throughput on the link since the last iteration.
heartbeatRTTMS	number	float	Heart beat round trip time in milliseconds
averageThroughputKByteSec	number	float	Average throughput on the link since <code>startcopy</code> began.
writeSameZeroKByteSec	number	float	

At Time summary response

Table 556: Response message body for At Time Remote Copy statistics summary data

Member	JSON type	API type	Description
sampleTime	string	8601	Remote Copy statistic time stamp.
sampleTimeSec	number	int32	Remote Copy statistic time stamp, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array	<u>At Time Remote Copy statistical summary data</u>	Remote Copy statistics summary data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 557: At Time Remote Copy statistical summary data

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
targetName	string	string	Name of the Remote Copy target created with creatercopytarget.
linkId	number	int	ID of the Remote Copy target created with creatercopytarget.
linkAddr	string	string	Address (IP or FC) of the Remote Copy target created with creatercopytarget.
node	number	int	Node number for the port used by a Remote Copy link.

Table Continued

Member	JSON type	API type	Description
slotPort	number	int	PCI slot number for the port used by a Remote Copy link.
cardPort	number	int	Port number for the port used by a Remote Copy link.
totalKbytes	number	float	Total traffic sent across the link since it first connected.
throughputKByteSec	number	float	Throughput on the link since the last iteration.
heartbeatRTMS	number	float	Heart Beat Round Trip Time in Milli Seconds
averageThroughputKByteSec	number	float	Average throughput on the link since statrcopy started.
writeSameZeroKByteSec	number	float	

Remote Copy volumes statistical data reports

Request statistical data related to Remote Copy volumes using either Versus Time or At Time reports.

Requesting Versus Time Remote Copy volume statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/
remotecopyvolumestatistics/
<samplefreq>;volumeName:<vvName>;targetName:<target_name>;mode:<target_mode>;remoteCopyGroup:<rc_group_name>;groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following options:

volumeName

Specify the name of the volume from which to gather Remote Copy volume statistics. Separate multiple names with a comma (,). Use `volumeName:<vvname1>,<vvname2> . . .` To specify the name of a set of volumes, use `set:<vvsetname>`.

targetName

Specify the target from which to gather Remote Copy volume statistics. Separate multiple target names using a comma (,). With no target specified, the request calculates Remote Copy volume statistics for all targets in the system.

mode

Specify the mode of the target from which to gather Remote Copy volume statistics. See, [rcopyGroupModeEnum](#).

remoteCopyGroup

Specify the remote copy group from which to gather Remote Copy volume statistics. Separate multiple group names using a comma (.). With no remote copy group specified, the request calculates remote copy volume statistics for all remote copy groups in the system.

groupby

Group the Remote Copy volume statistical data into categories. With no `groupBy` parameter specified, the system groups the data into all categories. Separate multiple groups with a comma (.). Use the structure,
`groupBy: volumeName, volumeSetName, domain, targetName, mode, remoteCopyGroup, remoteCopyGroupRole, node, slot, cardPort, portType.`

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby: [top | bottom], <noOfRecords>, <comparebyField>`

Table 558: Remote Copy volume statistics compareby parameters

Parameter	JSON type	API type	Description
<code>top bottom</code>	string	string	Specifies either the top records or the bottom records.
<code>noOfRecords</code>	number	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
<code>comparebyField</code>	string	<u>Remote Copy volume statistics comparebyField options</u>	Specifies the field to compare.

Table 559: Remote Copy volume statistics comparebyField options

Option	Description
<code>readIOLocal</code>	Local read input/output operations per second.
<code>writeIOLocal</code>	Local write input/output operations per second.
<code>IOLocal</code>	Local total input/output operations per second.

Table Continued

Option	Description
readKBytesLocal	Local read kilobytes.
writeKBytesLocal	Local write kilobytes.
KBytesLocal	Local total kilobytes.
readServiceTimeMSLocal	Local read service time in milliseconds.
writeServiceTimeMSLocal	Local write service time in milliseconds.
ServiceTimeMSLocal	Local total service time in milliseconds.
readIOSizeKBLocal	Local read IO size in kilobytes.
writeIOSizeKBLocal	Local write IO size in kilobytes.
IOSizeKBLocal	Local total IO size in kilobytes.
busyPctLocal	Local busy Percentage.
queueLengthLocal	Local queue length.
readIORemote	Remote read input/output operations per second.
wirteIORemote	Remote write input/output operations per second.
IORemote	Remote total input/output operations per second.
readKBytesRemote	Remote read kilobytes.
writeKBytesRemote	Remote write kilobytes.
KBytesRemote	Remote total kilobytes.
readServiceTimeMSRemote	Remote read service time in milliseconds.
writeServiceTimeMSRemote	Remote write service time in milliseconds.
ServiceTimeMSRemote	Remote total service time in milliseconds.
readIOSizeKBRemote	Remote read IO size in kilobytes.
writeIOSizeKBRemote	Remote write IO size in kilobytes.
IOSizeKBRemote	Remote total IO size in kilobytes.
busyPctRemote	Remote busy Percentage.

Table Continued

Option	Description
queueLengthRemote	Remote queue length.
RPO	Recovery point objective.

Requesting At Time Remote Copy volume statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/attime/
remotecopyvolumestatistics/
<samplefreq>groupby:<groupby>;compareby:<compareby>;summary:<summaryField>[?
<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the following options:

groupby

Group the Remote Copy volume statistical data into categories. With no `groupby` parameter specified, the system groups the data into all categories. Separate multiple groups with a comma (.). Use the structure,

```
groupby:volumeName,volumeSetName,domain,targetName,mode,remoteCopyGroup,remote
CopyGroupRole,node,slot,cardPort,portType.
```

summary

See, [At Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

See, [Remote Copy volume statistics compareby parameters](#).

Query expression parameters

Remote Copy volume statistics queries default to the Remote Copy rules in place on the system at the time. You can make modifications using the optional `<query expression>` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see, [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter and filter data based on the following parameters. Use the AND operator to combine filters:

- volumeName
- targetName
- mode
- remoteCopyGroup

Usage examples include:

- `?query="sampleTime LE <time format>"`
- `?query="targetName EQ <targetName1>,<targetName2>"`
- `?query="volumeName EQ <volumeName> AND sampleTime LE <time format>"`

Success

A successful query returns the HTTP code 200 OK.

Errors

Error messages for system reporter queries lists the error messages possible when querying Remote Copy statistics.

Versus Time response

The Versus Time Remote Copy volume statistics report contains an array of sample data. The response displays each instance of sample data with a time stamp.

Table 560: Response message body for Versus Time Remote Copy volume statistics

Member	JSON type	API type	Description
total	number	int32	Total number of sample data
members	array of objects	<u>Versus Time Remote Copy volume statistical data</u>	Remote Copy volume statistics sample data with time stamp.
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 561: Versus Time Remote Copy volume statistical data

Member	JSON type	API type	Description
sampleTime	string	8601	Remote Copy volume sample time (requires <code>perTime</code> specification).
sampleTimeSec	number	int32	Remote Copy volume sample time in seconds (requires <code>perTime</code> specification).
targetName	string	string	Remote Copy target name.

Table Continued

Member	JSON type	API type	Description
volumeName	string	string	Remote Copy volume name.
volumeSetName	string	string	Volume set name of the Remote Copy volume.
mode	number	<u>rcopyGroupModeEnum</u>	Target mode.
remoteCopyGroup	string	string	The Remote Copy group name.
remoteCopyGroupRole	number	<u>rcopyGroupRoleEnum</u>	The Remote Copy group role.
domain	string	string	Domain name for a Remote Copy group.
node	number	int	Node number for the port used by a Remote Copy link.
slotPort	number	int	PCI slot number for the port used by a Remote Copy link.
cardPort	number	int	Port number for the port used by a Remote Copy link.
portType	number	<u>linkProtocolType enumeration</u>	Port type for the port used by a Remote Copy link
readIO	object	<u>rcAccessCount objects</u>	Number of reads per second.
writeIO	object	<u>rcAccessCount objects</u>	Number of writes per second.
IO	object	<u>rcAccessCount objects</u>	Number of input/output per second.
readKBytes	object	<u>rcAccessCount objects</u>	Number of kilobytes read, per second.
writeKBytes	object	<u>rcAccessCount objects</u>	Number of kilobytes written, per second.
KBytes	object	<u>rcAccessCount objects</u>	Total umber of kilobytes.

Table Continued

Member	JSON type	API type	Description
serviceReadTimeMS	object	<u>rcAccessCount objects</u>	Service read time in milliseconds.
serviceWriteTimeMS	object	<u>rcAccessCount objects</u>	Service write time in milliseconds.
serviceTimeMS	object	<u>rcAccessCount objects</u>	Service time in milliseconds.
readIOSizeKB	object	<u>rcAccessCount objects</u>	Read IO size in kilobytes.
writeIOSizeKB	object	<u>rcAccessCount objects</u>	Write IO size in kilobytes.
IOSizeKB	object	<u>rcAccessCount objects</u>	Total IO size in kilobytes.
busyPct	object	<u>rcAccessCount objects</u>	Busy percentage.
queueLength	object	<u>rcAccessCount objects</u>	Queue length.
RPO	string	8601	Recovery point objective.

Table 562: rcAccessCount objects

Member	JSON type	API type	Description
local	number	number	Value for local volume.
remote	number	number	Value for remote volume.

Versus Time summary response

Table 563: Response message body JSON objects for Versus Time Remote Copy volume summary

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array of objects	<u>Versus Time Remote Copy volume statistical summary data</u>	Remote Copy volume statistics summary.
links	array of URL links	array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>No self-link returned for System Reporter query.</p>

Table 564: Versus Time Remote Copy volume statistical summary data

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
sampleTime	string	8601	Remote Copy volume sample time (requires perTime specification).
sampleTimeSec	number	int32	Remote Copy volume sample time in seconds (requires perTime specification).
targetName	string	string	Remote Copy target name.
volumeName	string	string	Remote Copy volume name.
volumeSetName	string	string	Volume set name of the Remote Copy volume.
mode	number	<u>rcopyGroupModeEnum</u>	Target mode.

Table Continued

Member	JSON type	API type	Description
remoteCopyGroup	string	string	The Remote Copy group name.
remoteCopyGroupRole	number	<u>rcopyGroupRoleEnum</u>	The Remote Copy group role.
domain	string	string	Domain name for a Remote Copy group.
node	number	int	Node number for the port used by a Remote Copy link.
slotPort	number	int	PCI slot number for the port used by a Remote Copy link.
cardPort	number	int	Port number for the port used by a Remote Copy link.
portType	number	<u>linkProtocolType enumeration</u>	Port type for the port used by a Remote Copy link
readIO	object	<u>rcAccessCount objects</u>	Number of reads per second.
writeIO	object	<u>rcAccessCount objects</u>	Number of writes per second.
IO	object	<u>rcAccessCount objects</u>	Number of input/output per second.
readKBytes	object	<u>rcAccessCount objects</u>	Number of kilobytes read, per second.
writeKBytes	object	<u>rcAccessCount objects</u>	Number of kilobytes written, per second.

At Time response

The At Time Remote Copy volume statistics report contains an array of sample data. The response displays each instance of sample data with a time stamp.

Table 565: Response message body for At Time Remote Copy volume statistics

Member	JSON type	API type	Description
sampleTime	string	8601	Remote Copy volume statistics sample time.
sampleTimeSec	number	int32	Remote Copy volume statistics sample time, in seconds.
total	number	int32	Total number of sample data.
members	array of objects	<u>At Time Remote Copy volume statistics sample data</u>	Remote Copy volume statistics sample data with time stamp.
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 566: At Time Remote Copy volume statistics sample data

Member	JSON type	API type	Description
targetName	string	string	Remote Copy volume target name.
volumeName	string	string	Remote Copy volume name.
volumeSetName	string	string	Volume set name of the Remote Copy volume.
mode	number	<u>rcopyGroupModeEnum</u>	Target mode.
remoteCopyGroup	string	string	Remote Copy group name.
remoteCopyGroupRole	number	<u>rcopyGroupRoleEnum</u>	The Remote Copy group role.
domain	string	string	Domain name for a Remote Copy group.
node	number	int	Node number for the port used by a Remote Copy link.

Table Continued

Member	JSON type	API type	Description
slotPort	number	int	PCI slot number for the port used by a Remote Copy link.
cardPort	number	int	Port number for the port used by a Remote Copy link.
portType	number	<u>linkProtocolType enumeration</u>	Port type for the port used by a Remote Copy link
readIO	object	<u>rcAccessCount objects</u>	Number of reads per second.
writeIO	object	<u>rcAccessCount objects</u>	Number of writes per second.
IO	object	<u>rcAccessCount objects</u>	Number of input/output per second.
readKBytes	object	<u>rcAccessCount objects</u>	Number of kilobytes read, per second.
writeKBytes	object	<u>rcAccessCount objects</u>	Number of kilobytes written, per second.
KBytes	object	<u>rcAccessCount objects</u>	Total umber of kilobytes.
serviceReadTimeMS	object	<u>rcAccessCount objects</u>	Service read time in milliseconds.
serviceWriteTimeMS	object	<u>rcAccessCount objects</u>	Service write time in milliseconds.
serviceTimeMS	object	<u>rcAccessCount objects</u>	Service time in milliseconds.
readIOSizeKB	object	<u>rcAccessCount objects</u>	Read IO size in kilobytes.
writeIOSizeKB	object	<u>rcAccessCount objects</u>	Write IO size in kilobytes.
IOSizeKB	object	<u>rcAccessCount objects</u>	Total IO size in kilobytes.
busyPct	object	<u>rcAccessCount objects</u>	Busy percentage.
queueLength	object	<u>rcAccessCount objects</u>	Queue length.
RPO	string	8601	Recovery point objective.

At Time summary response

Table 567: Response message body for At Time Remote Copy volume statistics summary

Member	JSON type	API type	Description
sampleTime	string	8601	Remote Copy volume statistic time stamp.
sampleTimeSec	number	int32	Remote Copy volume statistic time stamp, in seconds.
summary	array	<u>At Time Remote Copy volume statistical summary data</u>	Remote Copy volume statistics summary data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter filter queries do not return a self-link.</p>

Table 568: At Time Remote Copy volume statistical summary data

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
sampleTime	string	8601	Remote Copy volume sample time (requires perTime specification).

Table Continued

Member	JSON type	API type	Description
sampleTimeSec	number	int32	Remote Copy volume sample time in seconds (requires <code>perTime</code> specification).
targetName	string	string	Remote Copy target name.
volumeName	string	string	Remote Copy volume name.
volumeSetName	string	string	Volume set name of the Remote Copy volume.
mode	number	<u>rcopyGroupModeEnum</u>	Target mode.
remoteCopyGroup	string	string	The Remote Copy group name.
remoteCopyGroupRole	number	<u>rcopyGroupRoleEnum</u>	The Remote Copy group role.
domain	string	string	Domain name for a Remote Copy group.
node	number	int	Node number for the port used by a Remote Copy link.
slotPort	number	int	PCI slot number for the port used by a Remote Copy link.
cardPort	number	int	Port number for the port used by a Remote Copy link.
portType	number	<u>linkProtocolType enumeration</u>	Port type for the port used by a Remote Copy link
readIO	object	<u>rcAccessCount objects</u>	Number of reads per second.
writeIO	object	<u>rcAccessCount objects</u>	Number of writes per second.
IO	object	<u>rcAccessCount objects</u>	Number of input/output per second.

Table Continued

Member	JSON type	API type	Description
readKBytes	object	<u>rcAccessCount objects</u>	Number of kilobytes read, per second.
writeKBytes	object	<u>rcAccessCount objects</u>	Number of kilobytes written, per second.

VLUN statistical data reports

Request VLUN statistical data using either Versus Time or At Time reports.

Requesting Versus Time VLUN statistics

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/vlunstatistics/
<samplefreq>;lun:<vlunid>;vlun:<vlun_expression>;volumeName:<vv_name>;hostname:<
host_name>;volumeName:set:<vvset_name>;hostname:set:<hostset_name>;portPos:<n:s:
p...>;groupby:<groupby>;compareby:<compareby>;summary<summaryField>[?<query
expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the options:

lun

Requests data for the specified VLUNs only. For example, specify `lun:1,2,4`. With no `lun` specified, the system calculates performance data for all VLUNs in the system.

vlun

Requests data for the specified VLUNs matching the specified combination of host, volume, lun, and port. The host and volume can specify a corresponding object set using the prefix `set:`. The host can specify a WWN using the prefix `wwn:`. The `lun` and `port` are optional. With neither `lun` nor `port` specified, data is filtered to any matching combination of `host` and virtual volume. Do not combine this parameter with `hostname`, `volumename`, `lun`, or `portPos`

volumeName

Retrieves data for the specified volume or `volumeset` only. Specify the `volumeset` as `volumeName:set:<vvset_name>`. With no `volumeName` specified, the system calculates VLUN performance data for all the VLUNs in the system.

hostname

Retrieves data for the specified `host` or `hostset` only. Specify the `hostset` as `hostname:set:<hostset_name>`. With no `hostname` specified, the system calculates VLUN performance data for all the hosts in the system.

portPos

Retrieves data for the specified ports. For example, specify `portPos:1:0:1,2:1:3,6:2:1`. With no `portPos` specified, the system calculates VLUN performance data for all ports in the system.

groupby

Groups the data into categories. With no `groupby` specified, the system groups data into all categories. Separate multiple categories with a comma (,). Use the structure,

groupby:domain,volumeName,hostname,lun,hostWWN,node,slot,cardPort,vvsetName,hostsetName.

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

See, [compareby parameter values](#).

Examples include:

- `https://<storage_system>:8080/api/v1/systemreporter/vstime/vlunstatistics/<samplefreq>;vlun:<host1:volume1>`
- `https://<storage_system>:8080/api/v1/systemreporter/vstime/vlunstatistics/<samplefreq>;vlun:set<hostset1:volume1>`
- `https://<storage_system>:8080/api/v1/systemreporter/vstime/vlunstatistics/<samplefreq>;vlun:set<hostset1>:set:<volumeset1>`
- `https://<storage_system>:8080/api/v1/systemreporter/vstime/vlunstatistics/<samplefreq>;vlun:wwn<hostwwn1>:set:<volumeset1>`
- `https://<storage_system>:8080/api/v1/systemreporter/vstime/vlunstatistics/<samplefreq>;vlun:<host1:volume1>:100:3:2:1`
- `https://<storage_system>:8080/api/v1/systemreporter/vstime/vlunstatistics/<samplefreq>;vlun:set<hostset1>:set:<volumeset1>:200:3:2:0`
- `https://<storage_system>:8080/api/v1/systemreporter/vstime/vlunstatistics/<samplefreq>;vlun:wwn<hostwwn1>:set:<volumeset1>:300`

Requesting At Time VLUN statistics

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/systemreporter/attime/vlunstatistics/<samplefreq>;groupBy:<groupBy>;compareby:<compareby>;summary<summaryField>[?<query expression>]`

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see, [Mandatory sample frequency parameter](#)), you can use the following options:

groupBy

Groups the data into categories. With no `groupBy` specified, the system groups data into all categories. Separate multiple categories with a comma (.). Use the structure, `groupBy:domain,volumeName,hostname,lun,hostWWN,node,slot,cardPort,vvsetName,hostsetName`.

summary

See, [At Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom],<noOfRecords>,<comparebyField>`

See, [compareby parameter values](#).

Query expression parameters

VLUN statistics queries default to all VLUNs in the system at a particular time. You can make modifications using the optional `<query expression >` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter, and filter data based on the following parameters. Use the `AND` operator to combine filters:

- `lun`
- `volumeName`
- `vvsetName`
- `hostname`
- `hostsetName`
- `node`
- `slot`
- `cardPort`

Usage examples include:

- `?query="sampleTime GE <time format> AND sampleTime LE <time format>"`
- `?query="lun EQ 1,2,3"`
- `?query="volumeName EQ vvname1 AND lun EQ 1"`
- `?query="hostname EQ host1 AND volumeName EQ vvname1,vvname2"`
- `?query="vvsetName EQ vvsetname1 AND hostsetName EQ hostsetname1"`
- `?query="node EQ 2 AND slot EQ 2"`
- `?query="node EQ 1,2 AND cardPort EQ 2"`
- `?query="lun EQ 1,2,3 AND hostname EQ <name1,name2,.. > AND sampleTime LE <time format>"`

Success

A successful query returns the HTTP code 200 OK.

Errors

[Error messages for system reporter queries](#) lists the error messages possible when querying VLUN statistics.

Versus Time response

The Versus Time VLUN statistics report contains an array of sample data. The response displays each instance of sample data with a time stamp.

Table 569: Versus Time VLUN statistics response message body

Member	JSON type	API type	Description
total	number	int32	Total number of sample data
members	array of objects	<u>Versus Time VLUN statistics sample data</u>	VLUN statistics sample data with time stamp, returned as a JSON array of zero or more JSON objects.
links	array of URL links	Array of URL links	Links include the self-URL, except when using the query expression.

Table 570: Versus Time VLUN statistics sample data

Member	JSON type	API type	Description
lun	number	int32	VLUN ID.
domain	string	print64	VLUN domain.
volumeName	string	name31	VLUN name.
hostname	string	name31	VLUN host name
node	number	int32	Node port number for the VLUN.
slot	number	int32	PCI slot number for the VLUN.
cardPort	number	int32	VLUN port number.
vvsetName	string	name31	VLUN virtual volume set name.
hostsetName	string	name31	VLUN host set name.
sampleTime	string	8601	VLUN statistics sample time.
sampleTimeSec	number	int32	VLUN statistics sample time in second.

Table Continued

Member	JSON type	API type	Description
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second.
KBytes	object	<u>rwtAccessCount objects</u>	Number of kilobytes per second .
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in millisecond statistic data.
IOSizeKB	object	<u>rwtAccessCount objects</u>	IO size in kilobytes statistic data.
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage.

Versus Time summary response

Table 571: Response message body for Versus Time VLUN statistical summary data

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.

Table Continued

Member	JSON type	API type	Description
summary	array	<u>Versus Time VLUN statistical summary objects</u>	CPG statistical performance sample data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 572: Versus Time VLUN statistical summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
sampleTime	string	8601	VLUN statistic sample time (requires perTime specification).
sampleTimeSec	number	int32	VLUN statistical data sample time in seconds (requires perTime specification).
domain	string	string	Domain name of the VLUN.
lun	number	int32	Vlun ID
domain	string	print64	Domain name
volumeName	string	name31	Vlun volume name
hostname	string	name31	Vlun hostname

Table Continued

Member	JSON type	API type	Description
node	number	int32	Node port number for the vlun
slot	number	int32	PCI slot number for the vlun
cardPort	number	int32	Port number for the vlun
vvsetName	string	name31	Vlun volume set name
hostsetName	string	name31	Vlun host set name
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second, which includes read, write, and total.
Kbytes	object	<u>rwtAccessCount objects</u>	Number of kilobytes per second, which includes read, write, and total.
serviceTimeMS	object	<u>rwtAccessCount objects</u>	Service time in ms, which includes read, write, and total.
IOsizeKB	object	<u>rwtAccessCount objects</u>	Object IO size in kilobytes, which includes read, write, and total.
queueLength	number	float	Queue length
busyPct	number	float	Busy percentage

At Time response

The VLUN statistics response report contains an array of performance sample data for a particular time interval. The report groups each instance of sample data into one or more categories.

Table 573: Response message body for At Time VLUN statistics

Members	JSON type	API type	Description
sampleTime	string	8601	VLUN statistics time stamp
sampleTimeSec	number	int32	VLUN statistics time stamp in seconds
total	number	int32	Total number of sample data

Table Continued

Members	JSON type	API type	Description
members	array of objects	<u>At Time VLUN statistics sample data</u>	VLUN statistics sample groups in categories. Response includes a JSON array of zero or more JSON objects
links	array of URL links	Array of URL links	Except for System Reporter query, the links returned include the self URL

Table 574: At Time VLUN statistics sample data

Members	JSON type	API type	Description
lun	number	int32	VLUN ID
domain	string	Print64	Domain name.
volumeName	string	name31	VLUN volume name.
hostname	string	name31	VLUN hostname.
node	number	int32	Node port number for the VLUN.
slot	number	int32	PCI slot number for the VLUN.
cardPort	number	int32	Port number for the VLUN.
vvsetName	string	name31	VLUN volume set name.
hostsetName	string	name31	VLUN host set name.
IO	object	<u>rwAccessCount objects</u>	Number of IO per second .
KBytes	object	<u>rwAccessCount objects</u>	Number of kilobytes per second.
serviceTimeMS	object	<u>rwAccessCount objects</u>	Service time in millisecond statistic data.
IOSizeKB	object	<u>rwAccessCount objects</u>	IO size in kilobytes statistic data.

Table Continued

Members	JSON type	API type	Description
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage.

At Time summary response

Table 575: Response message body for At Time port statistics summary

Member	JSON type	API type	Description
sampleTime	string	8601	VLUN statistic time stamp.
sampleTimeSec	number	int32	VLUN statistic time stamp, in seconds.
summary	array	<u>At Time VLUN statistics summary objects</u>	VLUN statistics summary data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 576: At Time VLUN statistics summary objects

Members	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include avg, min, max or <pct> where <pct> is the percentage value. Applies only when using summary in the request.
IO	object	<u>rwtAccessCount objects</u>	Number of IO per second .

Table Continued

Members	JSON type	API type	Description
KBytes	object	See, rwtAccessCount objects	Number of kilobytes per second.
serviceTimeMS	object	rwtAccessCount objects	Service time in millisecond statistic data.
IOSizeKB	object	rwtAccessCount objects	IO size in kilobytes statistic data.
queueLength	number	float	Queue length.
busyPct	number	float	Busy percentage.

Volume space data reports

Request volume space data using either Versus Time or At Time reports.

Requesting Versus Time volume space data

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/vstime/volumespacedata/
<samplefreq>;name:<vv_name>;name:set<vvset_name>;userCPG:<usercpg_name>;snapCPG:
<snapcpg_name>;provisioningType:<prov_type>;groupby:<groupby>;compareby:<compare
by>;summary<summaryField>[?<query expression>]
```

Report parameters

In addition to the mandatory `<samplefreq>` parameter (see [Mandatory sample frequency parameter](#)), you can use the options:

name

Requests volume space sample data for the specified volume (`vv_name`) or volume set (`vvset_name`) only. Specify `vvset` as `name:set:<vvset_name>`. With no `name` specified, the system calculates volume space data for all volumes in the system.

userCPG

Retrieves volume space data for the specified `userCPG` volumes only. With no `userCPG` specified, the system calculates space data for all volumes in the system.

snapCPG

Retrieves space data for the specified `snapCPG` volumes only. With no `snapCPG` specified, the system calculates space data for all volumes in the system.

provisioningType

Retrieves space data for volumes that match the specified . With no `provisioningType` specified, the system calculates space data for all volumes in the system.

groupby

Groups the volume space data into categories. With no `groupby` variable specified, the system groups data into all categories. Specify multiple categories separated by a comma (,). Use the structure, `groupby:domain,id,name,baseId,wwn,snapCPG,userCPG,provisioningType,copyType,vvsetName,compressionState`.

summary

See, [Versus Time summary requests](#).

compareby

Specify the `compareby` fields using the following structure: `compareby:[top | bottom], <noOfRecords>, <comparebyField>`

Table 577: compareby parameter values

Name	API type	Description
top bottom	string	Specify either top or bottom.
noOfRecords	number	Specifies the number of records to return in the range of 1 to 32 (Versus Time) and 1 to 128 (At Time).
comparebyField	string	Specifies the field to compare (see, Compareby fields for volume space data) .

Table 578: Compareby fields for volume space data

Field name	Description
totalSpaceUsedMiB	Total used space in MiB.
userSpaceUsedMiB	Used user space in MiB.
snapshotSpaceUsedMiB	Used snapshot space in MiB
userSpaceFreeMiB	Free user space in MiB.
snapshotSpaceFreeMiB	Free snapshot space in MiB.
compaction	Compaction ratio.
compression	Compression ratio.

Requesting At Time volume space data

Use the HTTP GET method with the following URI:

```
https://<storage_system>:8080/api/v1/systemreporter/atime/volumespacedata/  
<samplefreq>;groupby:<groupby>;compareby:<compareby>;summary<summaryField>[?  
<query expression>]
```

At Time volume space data parameters

In addition to the [Mandatory sample frequency parameter](#)), you can use the following, optional parameter:

groupby

Groups the volume space data into categories. With no `groupBy` variable specified, the system groups data into all categories. Specify multiple categories separated by a comma (,). Use the structure, `groupBy:domain,id,name,baseId,wwn,snapCPG,userCPG,provisioningType,copyType,vvsetName,compressionState`.

summary

See, [At Time summary requests](#).

compareby

See, [Versus Time report parameters](#).

Query expression parameters

Volume space data queries default to all volumes in the system at a particular time. You can make modifications using the optional `<query expression >` parameter.

For Versus Time query expressions, you can use the `sampleTime` parameter only (see [Query expression parameters for Versus Time reports](#)).

For At Time query expressions, you can use the `sampleTime` parameter, and filter data based on the following:

- `provisioningType`
- `name`
- `vvsetName`
- `userCPG`
- `snapCPG`

Usage examples include:

- `?query="sampleTime GE <time format> AND sampleTime LE <time format>"`
- `?query="provisioningType EQ <type1, type2...> AND snapCPG EQ <cpg1, cpg2...> AND userCPG EQ <cpg1, cpg2,.. > AND name EQ <vvname1, vvname2...> AND vvsetName EQ <vvset1, vvset2...> AND sampleTime LE <time format>"`
- `?query="provisioningType EQ <type1, type2...> AND sampleTime GE <time format> AND sampleTime LE <time format>"`

Success

A successful query returns the HTTP code 200 OK.

Errors

[Error messages for system reporter queries](#) lists the error messages possible when querying volume space data.

Versus Time response

The volume space response contains an array of volume space data. Each instance of sample data displays with a time stamp.

Table 579: Versus Time volume space response message body

Member	JSON type	API type	Description
total	number	int32	Total number of sample data.
members	array of objects	<u>Versus Time volume space data objects</u>	Volume space data with time stamp.
links	array of URL links	array of URL links	Links include the self URL, which is the original request URL including the query at the end.

Table 580: Versus Time volume space data objects

Member	JSON type	API type	Description
sampleTime	string	8601	Volume space data sample time.
sampleTimeSec	number	int32	Volume space data sample time in seconds.
rawReserved	object	<u>Versus Time rawReservedSpace objects</u>	Raw reserved space data.
userSpace	object	<u>Versus Time userSpaceData objects</u>	User space data.
snapSpace	object	<u>Versus Time snapAdminData objects</u>	Snap space data.
adminSpace	object	<u>Versus Time snapAdminData objects</u>	Admin space data.
totalSpace	object	<u>Versus Time totalSpaceData objects</u>	Total space data.
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes.
compressionGckBPS	number	uint32	Compression garbage collector in KBPS.

Table 581: Versus Time rawReservedSpace objects

Member	JSON type	API type	Description
userMiB	number	float	Raw reserved user space in MiB
snapMiB	number	float	Raw reserved snap space in MiB
adminMiB	number	float	Raw reserved admin space in MiB
totalMiB	number	float	Raw reserved total space in MiB

Table 582: Versus Time userSpaceData objects

Member	JSON type	API type	Descriptio
usedMiB	number	float	Used user space in MiB
freeMiB	number	float	Free user space in MiB
reservedMiB	number	float	Reserved user space in MiB

Table 583: Versus Time snapAdminData objects

Member	JSON type	API type	Description
usedMiB	number	float	Used snapshot space in MiB
freeMiB	number	float	Free snapshot space in MiB
reservedMiB	number	float	Reserved snapshot space in MiB
vcopyMiB	number	float	Snapshot virtual copy space in MiB

Table 584: Versus Time totalSpaceData objects

Member	JSON type	API type	Description
usedMiB	number	float	Total used space in MiB
virtualSizeMiB	number	float	Total virtualSize in MiB

Table Continued

Member	JSON type	API type	Description
reservedMiB	number	float	Total reserved space in MiB
vcopyMiB	number	float	Total virtual copy size in MiB
hostWriteMiB	number	float	Space write to the host in MiB

Versus Time summary response

The volume space response contains an array of volume space data. Each instance of sample data displays with a time stamp.

Table 585: Response message body for Versus Time volume space summary

Member	JSON type	API type	Description
startTime	string	8601	Start time for calculating the summary.
startTimeSec	number	int32	Start time for calculating the summary, in seconds.
endTime	string	8601	End time for calculating the summary.
endTimeSec	number	int32	End time for calculating the summary, in seconds.
summary	array	<u>Versus Time volume space data summary objects</u>	Volume space sample data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 586: Versus Time volume space data summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
sampleTime	string	8601	Volume space data sample time (requires <code>perTime</code> specification).
sampleTimeSec	number	int32	Volume space data sample time in seconds (requires <code>perTime</code> specification).
domain	string	print64	Domain name of the volume.
id	number	uint32	Volume ID
name	string	name31	Domain name
baseID	number	uint32	ID of the base volume
wwn	string	wwn	Volume WWN
snapCPG	string	name31	Snapshot CPG name
userCPG	string	name31	User CPG name
provisioningType	number	<u>Volume provisioningType enumeration values</u>	Volume provisioning type.
copyType	number	<u>Volume CopyType enumeration values</u>	Volume type.
vvsetName	string	name31	VV set name, if the volume belongs to a vv set
rawReserved	object	<u>Versus Time rawReservedSpace objects</u>	Raw reserved space data that includes User, Snap, Admin, and Total.

Table Continued

Member	JSON type	API type	Description
userSpace	object	<u>Versus Time userSpaceData objects</u>	User space data which includes Used, Reserve, and Free.
snapSpace	object	<u>Versus Time snapAdminData objects</u>	Snap space data that includes Used, Reserved, Free, and Vcopy.
adminSpace	object	<u>Versus Time snapAdminData objects</u>	Admin space data that includes Used, Reserved, Free, and Vcopy.
totalSpace	object	<u>Versus Time totalSpaceData objects</u>	Total space data that includes Used, Rsvd, VirtualSize, and Vcopy.
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes.

At Time response

The At Time volume space response contains an array of performance sample data for a particular time interval. The report groups each instance of sample data into one or more categories.

Table 587: Response message body JSON objects for At Time volume space

Members	JSON type	API type	Description
sampleTime	string	8601	Volume space data sample time
sampleTimeSec	number	int32	Volume space data sample time in seconds
total	number	int32	The total number of sample data.
members	Array of objects	<u>At Time volume space data sample objects</u>	Volume space data sample groups in categories, returned as a JSON array of zero or more JSON objects.
links	Array of URL links	Array of URL links	Links include the self URL, which is the original request URL including the query at the end

Table 588: At Time volume space data sample objects

Members	JSON type	API type	Description
domain	string	print64	Domain name.
id	number	uint32	Volume ID.
name	string	name31	Volume name.
baseId	number	uint32	Base volume ID.
wwn	string	WWN	Volume WWN.
snapCPG	string	name31	Snapshot CPG.
userCPG	string	name31	User CPG.
provisioningType	number	<u>Volume provisioningType enumeration values</u>	Volume provisioning type.
copyType	number	<u>Volume CopyType enumeration values</u>	Volume type.
compressionState	number	<u>compressionState enumeration</u>	Compression state.
vvsetName	string	name31	VVSet name (if volume belongs to a vvset).
rawReserved	object	<u>Versus Time rawReservedSpace objects</u>	Raw reserved space data.
userSpace	object	<u>Versus Time userSpaceData objects</u>	User space data.
snapSpace	object	<u>Versus Time snapAdminData objects</u>	Snap space data.
adminSpace	object	<u>Versus Time snapAdminData objects</u>	Admin space data.
totalSpace	object	<u>Versus Time totalSpaceData objects</u>	Total space data.
capacityEfficiency	object	<u>capacityEfficiency objects</u>	Capacity efficiency attributes.
compressionGcKBPS	number	float	Compression garbage collector in KBPS.

At Time summary response

Table 589: Response message body for At Time volume space summary

Member	JSON type	API type	Description
sampleTime	string	8601	Volume space data sample time stamp.
sampleTimeSec	number	int32	Volume space data sample time stamp, in seconds.
summary	array	<u>At Time volume space data summary objects</u>	Volume space summary data.
links	Array of URL links	Array of URL links	<pre>- 0: { href: "https://: 8080/api/v1/ <self_link>/" rel: "self" } -1: { href: "https://: 8080/api/v1/ <detailed_link>" rel: "detailedRecords" }</pre> <p>System Reporter queries do not return a self-link.</p>

Table 590: At Time volume space data summary objects

Member	JSON type	API type	Description
summaryType	string	string	Summary type for this particular record. Values include <code>avg</code> , <code>min</code> , <code>max</code> or <code><pct></code> where <code><pct></code> is the percentage value. Applies only when using <code>summary</code> in the request.
rawReserved	object	<u>Versus Time rawReservedSpace objects</u>	Raw reserved space data that includes User, Snap, Admin, and Total.
userSpace	object	<u>Versus Time userSpaceData objects</u>	User space data which includes Used, Reserve, and Free.

Table Continued

Member	JSON type	API type	Description
snapSpace	object	<u>Versus Time</u> <u>snapAdminData objects</u>	Snap space data that includes Used, Reserved, Free, and Vcopy.
adminSpace	object	<u>Versus Time</u> <u>snapAdminData objects</u>	Admin space data that includes Used, Reserved, Free, and Vcopy.
totalSpace	object	<u>Versus Time</u> <u>totalSpaceData objects</u>	Total space data that includes Used, Rsvd, VirtualSize, and Vcopy.
capacityEfficiency	object	<u>capacityEfficiency</u> <u>objects</u>	Capacity efficiency attributes.

WSAPI support for HPE 3PAR priority optimization

HPE 3PAR Priority Optimization software uses Quality-of-Service (QoS) rules to manage and control the I/O capacity of 3PAR StoreServ Storage system across multiple workloads. Application of the rules enables co-location of the data from workloads of different types (such as sequential, random, and transactional, among others), with different I/O packet sizes on a single 3PAR storage system.

Creating QoS rules

Use the HTTP POST method with the following URI, including a message body with members as described in **Message body JSON object members for QoS rule creation**. Specify the `name` and `type`, as well as at least one other JSON object.

`https://<storage_system>:8080/api/v1/qos`

Table 591: Message body JSON object members for QoS rule creation

Member	JSON type	API type	Ignored Values	Description
<code>name</code>	string	<code>name31</code>	None. Required field.	The name of the target object on which the new QoS rules will be created. (WSAPI 1.3 and later)
<code>type</code>	number	<code>targetType Enum</code> (see, QoS targetType enumeration)	Zero and negative values. Required field.	Type of QoS target. (WSAPI 1.3 and later)
<code>priority</code>	number	<code>priority Enum</code> (see, QoS priority enumeration)	Zero and negative values.	QoS priority. (WSAPI 1.3 and later)
<code>bwMinGoalKB</code>	number	<code>uint64</code>	Zero and negative values.	Bandwidth rate minimum goal in kilobytes per second. (WSAPI 1.3 and later)
<code>bwMaxLimitKB</code>	number	<code>uint64</code>	Zero and negative values.	Bandwidth rate maximum limit in kilobytes per second. (WSAPI 1.3 and later)
<code>ioMinGoal</code>	number	<code>uint32</code>	Zero and negative values.	I/O-per-second minimum goal. (WSAPI 1.3 and later)

Table Continued

Member	JSON type	API type	Ignored Values	Description
ioMaxLimit	number	uint32	Zero and negative values.	I/O-per-second maximum limit. (WSAPI 1.3 and later)
bwMinGoalOP	number	ZeroNoneOperation Enum (see, <u>ZeroNoneOperation enumeration for QoS rule creation or modification</u>)	Zero and negative values.	When set to 1, the bandwidth minimum goal is 0. When set to 2, the bandwidth minimum goal is none (NoLimit) (WSAPI 1.3 and later)
bwMaxLimitOP	number	ZeroNoneOperation Enum (see, <u>ZeroNoneOperation enumeration for QoS rule creation or modification</u>)	Zero and negative values.	When set to 1, the bandwidth maximum limit is 0. When set to 2, the bandwidth maximum limit is none (NoLimit) (WSAPI 1.3 and later)
ioMinGoalOP	number	ZeroNoneOperation Enum (see, <u>ZeroNoneOperation enumeration for QoS rule creation or modification</u>)	Zero and negative values.	When set to 1, the I/O minimum goal is 0. When set to 2, the I/O minimum goal is none (NoLimit) (WSAPI 1.3 and later)
ioMaxLimitOP	number	ZeroNoneOperation Enum (see, <u>ZeroNoneOperation enumeration for QoS rule creation or modification</u>)	Zero and negative values.	When set to 1, the I/O maximum limit is 0. When set to 2, the I/O maximum limit is none (NoLimit) (WSAPI 1.3 and later)
latencyGoal	number	uint32	Zero and negative values	Latency goal in milliseconds. Do not use with latencyGoaluSecs. (WSAPI 1.3 and later)

Table Continued

Member	JSON type	API type	Ignored Values	Description
defaultLatency	boolean	boolean		<p>If <code>true</code>, set <code>latencyGoal</code> to the default value.</p> <p>If <code>false</code> and the <code>latencyGoal</code> value is positive, then set the value. Default is <code>false</code>.</p> <p>(WSAPI 1.3 and later)</p>
enable	boolean	boolean		<p>If <code>true</code>, enable the QoS rule for the target object.</p> <p>If <code>false</code>, disable the QoS rule for the target object.</p> <p>(WSAPI 1.3 and later)</p>
latencyGoaluSecs	number	uint32	Zero and Negative values.	<p>Latency goal in microseconds.</p> <p>Do not use with <code>latencyGoal</code>.</p> <p>(WSAPI 1.5.2 and later)</p>

Table 592: ZeroNoneOperation enumeration for QoS rule creation or modification

Symbol	Value	Description
ZERO	1	<p>The minimum goal or maximum limit is set to zero.</p> <p>(WSAPI 1.3 and later)</p>
NOLIMIT	2	<p>The minimum goal or maximum limit is set to none (<code>NoLimit</code>).</p> <p>(WSAPI 1.3 and later)</p>

QOS rule requirements

QoS rules

- The QoS rule can be applied to VV sets. By using `sys:all_others`, you can apply the rule to all volumes in the system for which no QoS rule has been defined.
- `ioMinGoal` and `ioMaxLimit` must be used together to set I/O limits. Similarly, `bwMinGoalKB` and `bwMaxLimitKB` must be used together.
- If `ioMaxLimitOP` is set to 2 (no limit), `ioMinGoalOP` must also be set to 2, and vice versa. They cannot be set to "no limit" individually. Similarly, if `bwMaxLimitOP` is set to 2 (no limit), then `bwMinGoalOP` must also be set to 2.

- If `ioMaxLimitOP` is set to 1 (zero), `ioMinGoalOP` must also be set to 1, and vice versa. Similarly, if `bwMaxLimitOP` is set to 1 (zero), then `bwMinGoalOP` must also be set to 1.
- The `ioMinGoalOP` and `ioMaxLimitOP` fields take precedence over the `ioMinGoal` and `ioMaxLimit` fields unless they contain ignored values (see, [Message body JSON object members for QoS rule creation](#)).
- The `bwMinGoalOP` and `bwMaxLimitOP` fields take precedence over the `bwMinGoalKB` and `bwMaxLimitKB` fields unless they contain ignored values (see, [Message body JSON object members for QoS rule creation](#)).

Success

A successful creation of a QoS rule returns the HTTP code 201 `Created` with no message body.

Errors

Table 593: QoS rule creation and modification error codes

API Code	HTTP Code	Description
<code>INV_INPUT_EXCEEDS_RANGE</code>	400 Bad Request	Invalid input: number exceeds expected range. (WSAPI 1.3 and later)
<code>NON_EXISTENT_QOS_RULE</code>	404 Not Found	QoS rule does not exist. (WSAPI 1.3 and later)
<code>INV_INPUT_ILLEGAL_CHAR</code>	400 Bad Request	Illegal character in the input.
<code>EXISTENT_QOS_RULE</code>	400 Bad Request	QoS rule already exists. (WSAPI 1.3 and later)
<code>INV_INPUT_IO_MIN_GOAL_GRT_MAX_LIMIT</code>	400 Bad Request	The I/O-per-second maximum limit should be greater than the minimum goal. (WSAPI 1.3 and later)
<code>INV_INPUT_BW_MIN_GOAL_GRT_MAX_LIMIT</code>	400 Bad Request	The bandwidth maximum limit should be greater than the minimum goal. (WSAPI 1.3 and later)
<code>INV_INPUT_BELOW_RANGE</code>	400 Bad Request	I/O-per-second limit is below range. Bandwidth limit is below range. (WSAPI 1.3 and later)
<code>UNLICENSED_FEATURE</code>	403 Forbidden	This system is not licensed for QoS.

More information

[WSAPI error codes and descriptions](#) on page 34

Modifying QoS rules

Use the HTTP PUT method with the following URI and request message body objects as described in the following table.

https://<storage_system>:8080/api/v1/qos/<targetType>:<targetName>

- <targetType> — vvset, domain, or sys.
- <targetName> — Name of the target. When <targetType> is sys, <targetName> must be sys:all_others.

See, [QOS rule creation requirements](#) for details about creating and modifying a QOS rule.

Table 594: Request message body JSON object members for QoS rule modification

Member	JSON type	API type	Ignored Values	Description
priority	number	<u>QoS priority enumeration</u>	Zero and negative values.	QoS priority. (WSAPI 1.3 and later)
bwMinGoalKB	number	uint64	Zero and negative values.	Bandwidth rate minimum goal in kilobytes per second. (WSAPI 1.3 and later)
bwMaxLimitKB	number	uint64	Zero and negative values.	Bandwidth rate maximum limit in kilobytes per second. (WSAPI 1.3 and later)
ioMinGoal	number	uint32	Zero and negative values.	I/O-per-second minimum goal. (WSAPI 1.3 and later)
ioMaxLimit	number	uint32	Zero and negative values.	I/O-per-second maximum limit. (WSAPI 1.3 and later)
bwMinGoalOP	number	<u>ZeroNoneOperation enumeration</u>	Zero and negative values.	When set to 1, the bandwidth minimum goal is 0. When set to 2, the bandwidth minimum goal is none (NoLimit) (WSAPI 1.3 and later)

Table Continued

Member	JSON type	API type	Ignored Values	Description
bwMaxLimitOP	number	<u>ZeroNoneOperation enumeration</u>	Zero and negative values.	When set to 1, the bandwidth maximum limit is 0. When set to 2, the bandwidth maximum limit is none (NoLimit) (WSAPI 1.3 and later)
ioMinGoalOP	number	<u>ZeroNoneOperation enumeration</u>	Zero and negative values.	When set to 1, the I/O minimum goal is 0. When set to 2, the I/O minimum goal is none (NoLimit) (WSAPI 1.3 and later)
ioMaxLimitOP	number	<u>ZeroNoneOperation enumeration</u>	Zero and negative values.	When set to 1, the I/O maximum limit is 0. When set to 2, the I/O maximum limit is none (NoLimit) (WSAPI 1.3 and later)
latencyGoal	number	uint32	Zero and negative values	Latency goal in milliseconds. (WSAPI 1.3 and later)
defaultLatency	boolean	boolean		true — set latencyGoal to the default value. false — and the latencyGoal value is positive, then set the value. Defaults to false. Do not use with latencyGoaluSecs. (WSAPI 1.3 and later)
enable	boolean	boolean		If true, enable the QoS rule for the target object. If false, disable the QoS rule for the target object. (WSAPI 1.3 and later)
latencyGoaluSecs	number	uint32	Zero and Negative values.	Latency goal in microseconds. Do not use with latencyGoal. (WSAPI 1.5.2 and later)

Success

A successful modification of a QoS rule returns the HTTP code 200 OK with no message body.

Errors

Possible error codes for QoS rule modification are shown in [QoS rule creation and modification error codes](#).

More information

[WSAPI error codes and descriptions](#) on page 34

Deleting QoS rules

Use the HTTP DELETE method with the following URI:

`https://<storage_system>:8080/api/v1/qos/<targetType>:<targetName>`

- `<targetType>` — `vvset` or `sys`.
- `<targetName>` — Name of the target. When `<targetType>` is `sys`, `<targetName>` must be `sys:all_others`.

Success

A successful deletion of a QoS rule returns the HTTP code 200 OK with no message body.

Errors

Table 595: QoS rules deletion error codes

API Code	HTTP Code	Description
NON_EXISTENT_QOS_RULE	404 Not Found	QoS rule does not exist. (WSAPI 1.3 and later)
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Illegal character in the input.

More information

[WSAPI error codes and descriptions](#) on page 34

Querying QoS rules

Querying all QoS rules

Use the HTTP GET method with the following URI and no message body:

`https://<storage_system>:8080/v1/qos`

Success

Unless an internal server error occurs, the response for a successful query for QoS rule information includes a message body with members as specified in the following table.

Table 596: Message body JSON objects for All-QoS rule query

Member	JSON type	API type	Description
total	number	int32	Number of QoS target objects returned. (WSAPI 1.3 and later)
members	array of objects	<u>JSON object members for QoSProperty objects</u>	QoS rule properties, including a JSON array of zero or more JSON objects, one for each QoS target on the system. (WSAPI 1.3 and later)

Table 597: JSON object members for QoSProperty objects

Member	JSON type	API type	Description
id	number	uint32	ID of the QoS target. (WSAPI 1.3 and later)
type	number	<u>QoS targetType enumeration</u>	Type of QoS target. (WSAPI 1.3 and later)
name	string	name27	Name of the target. (WSAPI 1.3 and later)
domain	string	name31	Name of the domain. (WSAPI 1.3 and later)
enabled	boolean	boolean	QoS state of the target. (WSAPI 1.3 and later)
priority	number	<u>QoS priority enumeration</u>	QoS priority. (WSAPI 1.3 and later)
bwMinGoalKB	number	uint64	Bandwidth minimum goal in kilobytes per second. (WSAPI 1.3 and later)
bwMaxLimitKB	number	uint64	Bandwidth maximum limit in kilobytes per second. (WSAPI 1.3 and later)
ioMinGoal	number	uint32	I/O-per-second minimum goal. (WSAPI 1.3 and later)

Table Continued

Member	JSON type	API type	Description
<code>ioMaxLimit</code>	number	uint32	I/O-per-second maximum limit. (WSAPI 1.3 and later)
<code>latencyGoal</code>	number	uint32	Latency goal in milliseconds. (WSAPI 1.3 and later)
<code>latencyGoaluSecs</code>	number	uint32	Latency goal in microseconds (WSAPI 1.5 and later)

Table 598: QoS targetType enumeration

Symbol	Value	Description
VVSET	1	Sets the QoS target type to VV set. Applies to all volumes in the system that do not have any QoS rule set.
SYS	2	Sets the QoS target type to SYS. Applies to all volumes in the system that do not have any QoS rule set.
DOMAIN	4	Sets the QoS target type to DOMAIN. Applies to all volumes in the system that do not have any QoS rule set. (WSAPI 1.6.3 and later)

Table 599: QoS priority enumeration

Symbol	Value	Description
LOW	1	The QoS priority is low.
NORMAL	2	The QoS priority is normal.
HIGH	3	The QoS priority is high.

Errors

More information

[WSAPI error codes and descriptions](#) on page 34

Querying a single QoS rule

Use the HTTP GET method with the following URI:

`https://<storage_system>:8080/api/v1/qos/<targetType>:<targetName>`

- `<targetType>` — `vvset`, `domain`, or `sys`.
- `<targetName>` — Name of the target. When `<targetType>` is `sys`, `<targetName>` must be `sys:all_others`.

Success

A successful single QoS-rule query returns the HTTP code 200 OK and a response body as described in **Message body JSON objects for All-QoS rule query**

! **IMPORTANT:** You can assign one QoS rule only to a QoS target object, so a single-instance query always returns a single object.

Errors

Table 600: QoS rule query error codes

API Code	HTTP Code	Description
NON_EXISTENT_QOS_RULE	404 Not Found	QoS rule does not exist. (WSAPI 1.3 and later)
INV_INPUT_ILLEGAL_CHAR	400 Bad Request	Illegal character in the input.

More information

[WSAPI error codes and descriptions](#) on page 34

Support and other resources

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
<http://www.hpe.com/assistance>
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
<http://www.hpe.com/support/hpesc>

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:
Hewlett Packard Enterprise Support Center
www.hpe.com/support/hpesc
Hewlett Packard Enterprise Support Center: Software downloads
www.hpe.com/support/downloads
Software Depot
www.hpe.com/support/softwaredepot
- To subscribe to eNewsletters and alerts:
www.hpe.com/support/e-updates
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:
www.hpe.com/support/AccessToSupportMaterials

! **IMPORTANT:** Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

<http://www.hpe.com/support/selfrepair>

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information

HPE Get Connected

www.hpe.com/services/getconnected

HPE Proactive Care services

www.hpe.com/services/proactivecare

HPE Proactive Care service: Supported products list

www.hpe.com/services/proactivecaresupportedproducts

HPE Proactive Care advanced service: Supported products list

www.hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information

Proactive Care central

www.hpe.com/services/proactivecarecentral

Proactive Care service activation

www.hpe.com/services/proactivecarecentralgetstarted

Warranty information

To view the warranty for your product or to view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* reference document, go to the Enterprise Safety and Compliance website:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional warranty information

HPE ProLiant and x86 Servers and Options

www.hpe.com/support/ProLiantServers-Warranties

HPE Enterprise Servers

www.hpe.com/support/EnterpriseServers-Warranties

HPE Storage Products

www.hpe.com/support/Storage-Warranties

HPE Networking Products

www.hpe.com/support/Networking-Warranties

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hpe.com). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.