

Dell PowerMax 10.2.0

REST API Changelog

Revision: 01

October 2024

Revision History

Version	Date	Description
01	October 2024	Initial release of document

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1 Design Overview

This document describes the changes in the 10.2 release of the public Unisphere for PowerMax REST (Representational State Transfer) API. This overview gives a concise description of the changes. Details for each of the changes are provided in the relevant resource sections. For common REST API behavior, see the [Appendix](#). In this document “symmetrix” and “Symmetrix” is a synonym for storage array.

1.1 Overall

- Update the Error Messages received when incorrectly formatted values are supplied in the Request body

1.2 Performance

- Remove cloudprovider category from help and return 400 and message saying cloud operations no longer supported for both keys and metrics cloudprovider endpoints

1.3 SLO Provisioning

- Add Get NVMe/TCP Authentication statistics for all director ports or single director port
- Add provision, modify, and delete host authentication secret
- Add disk_group_total_capacity_gb attribute to Symmetrix GET
- Add Configure CHAP param modify_initiator_chap_authentication_param to Initiator PUT and new chap_set, chap_enabled attributes to GET Initiator details

1.4 Replication

- Add property for SRDF/A Autorecovery Enable/Disable
- Add property for SRDF/A Autorecovery Active/Inactive
- Add performance_impact_validation_option enum to test performance impact of storage group SRDF protection creation
- Add performance_impact_validation_option enum to test performance impact of Metro DR environment creation
- Remove Cloud Attributes from Snapshot and Policy Resources

1.5 Mainframe

- Update delete CU Image endpoint. Remove request body to query param.

1.6 VVOL

- Remove Create PE Masking View endpoint.

1.7 WLP

- Add performance and capacity load index values to headroom API
- Add processing status information

1.8 System

- Remove Cloud functionality
- Add LDAP authority get and enable endpoints

- Add new return property to symmetrix GET endpoint for compression hardware
- Add new return properties chap_set, chap_enabled to Director Port Get and add new modify_port_chap_authentication_param to Director Port PUT to allow CHAP configuration

1.9 CloudIQ

- Update directors endpoint to return missing information.

2 Design Details

2.1 Overall

2.2 Performance

2.2.1 cloudprovider

2.2.1.1 keys

Resource	cloudprovider						
Request Type:	POST						
New Endpoint Description:	Not Applicable						
Modify Endpoint Description:	<table><tr><td>Added in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Modified in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Removed in this Release</td></tr><tr><td>returns a 400 response and message saying cloud operations are no longer supported</td></tr></table>	Added in this Release	Not Applicable	Modified in this Release	Not Applicable	Removed in this Release	returns a 400 response and message saying cloud operations are no longer supported
Added in this Release							
Not Applicable							
Modified in this Release							
Not Applicable							
Removed in this Release							
returns a 400 response and message saying cloud operations are no longer supported							
URL:	{{protocol}}//{{server}}:{{port}}/univmax/restapi/performance/cloudprovider/keys						
User Roles:	Admin/StorageAdmin/PerfMon						
Prerequisite:	Not Applicable						

Path Parameters:	Not Applicable
Query Parameters:	Not Applicable
Request Parameters:	Not Applicable
Response Parameters:	Not Applicable

2.2.1.1.1 Sample JSON request

<pre>{ "symmetrixId": "{{v4SystemId}}" }</pre>
--

2.2.1.1.2 Sample JSON response

400 response and message saying cloud operations are no longer supported
--

2.2.1.2 metrics

Resource	cloudprovider
Request Type:	POST
New Endpoint Description:	Not Applicable
Modify Endpoint Description:	
	Added in this Release
	Not Applicable
	Modified in this Release
	Not Applicable

	Removed in this Release	
	returns a 400 response and message saying cloud operations are no longer supported	
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/cloudprovider/metrics	
User Roles:	Admin/StorageAdmin/PerfMon	
Prerequisite:	Not Applicable	
Path Parameters:	Not Applicable	
Query Parameters:	Not Applicable	
Request Parameters:	Not Applicable	
Response Parameters:	Not Applicable	

2.2.1.2.1 Sample JSON request

```
{
  "symmetrixId": "{{v4SystemId}}",
  "name": "{{cloudProviderFirstV4Key}}",
  "startDate": {{keyStartDate}},
  "endDate": {{keyEndDate}},
  "dataFormat": "{{dataFormat}}",
  "metrics": [
    "DeleteResponseTime",
    "ReadResponseTime",
    "ReadThroughput",
    "TotalThroughput",
    "TotalUsedCapacity",
```

```

    "WriteResponseTime",
    "WriteThroughput"
  ]
}

```

2.2.1.2.2 Sample JSON response

400 response and message saying cloud operations are no longer supported

2.2.2 ZHyperLinkMailbox

2.2.2.1 keys

Resource	ZHyperLinkMailbox		
Request Type:	POST		
New Endpoint Description:	New endpoint for ZHyperLinkMailbox		
Modify Endpoint Description:	Added in this Release		
	Not Applicable		
	Modified in this Release		
	Not Applicable		
	Removed in this Release		
	Not Applicable		
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/ZHyperLinkMailbox/keys		
User Roles:	Admin/StorageAdmin/PerfMon		

Prerequisite:	Not Applicable
Path Parameters:	Not Applicable
Query Parameters:	Not Applicable
Request Parameters:	Not Applicable
Response Parameters:	Not Applicable

2.2.2.1.1 Sample JSON request

```
{
  "systemId": "{{v4SystemId}}"
}
```

2.2.2.1.2 Sample JSON response

```
{
  "zHyperLinkMailboxInfoType": [
    {
      "mailboxId": "EF-4D:4:1",
      "firstAvailableDate": 1689596100000,
      "lastAvailableDate": 1689599100000
    },
    {
      "mailboxId": "EF-4D:4:3",
      "firstAvailableDate": 1689596100000,
      "lastAvailableDate": 1689599100000
    }
  ]
}
```

```

    },
    {
      "mailboxId": "EF-2D:4:0",
      "firstAvailableDate": 1689596100000,
      "lastAvailableDate": 1689599100000
    },
    {
      "mailboxId": "EF-2D:4:1",
      "firstAvailableDate": 1689596100000,
      "lastAvailableDate": 1689599100000
    },
    {
      "mailboxId": "EF-4D:4:2",
      "firstAvailableDate": 1689596100000,
      "lastAvailableDate": 1689599100000
    },
    {
      "mailboxId": "EF-4D:4:0",
      "firstAvailableDate": 1689596100000,
      "lastAvailableDate": 1689599100000
    }
  ]
}

```

2.2.2.2 metrics

Resource	ZHyperLinkMailbox
----------	-------------------

Request Type:	POST						
New Endpoint Description:	ZHyperLinkMailbox						
Modify Endpoint Description:	<table><tr><td>Added in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Modified in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Removed in this Release</td></tr><tr><td>Not Applicable</td></tr></table>	Added in this Release	Not Applicable	Modified in this Release	Not Applicable	Removed in this Release	Not Applicable
Added in this Release							
Not Applicable							
Modified in this Release							
Not Applicable							
Removed in this Release							
Not Applicable							
URL:	{{protocol}}//{{server}}:{{port}}/univmax/restapi/performance/ZHyperLinkMailbox/metrics						
User Roles:	Admin/StorageAdmin/PerfMon						
Prerequisite:	Not Applicable						
Path Parameters:	Not Applicable						
Query Parameters:	Not Applicable						
Request Parameters:	Not Applicable						
Response Parameters:	Not Applicable						

2.2.2.2.1 Sample JSON request

<pre>{ "systemId": "{{v4SystemId}}", "mailboxId": "EF-4D:4:1", "startDate": {{keyEndDate}}, "endDate": {{keyEndDate}}, "dataFormat": "{{dataFormat}}",</pre>
--

```
"metrics": [  
  "PercentBusy"  
]  
  
}
```

2.2.2.2.2 Sample JSON response

```
{  
  "resultList": {  
    "result": [  
      {  
        "PercentBusy": 0.0,  
        "timestamp": 1686240600000  
      }  
    ],  
    "from": 1,  
    "to": 1  
  },  
  "id": "bb5fb2a0-7e1f-47b3-be5b-ada2528cb8d5_0",  
  "count": 1,  
  "expirationTime": 1690285552244,  
  "maxPageSize": 1000  
}
```

2.2.3 Array

2.2.3.1 help

Resource	Array						
Request Type:	GET						
New Endpoint Description :	Not Applicable						
Modify Endpoint Description :	<table><tr><td>Added in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Modified in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Removed in this Release</td></tr><tr><td>Cloudprovider category is removed from output response</td></tr></table>	Added in this Release	Not Applicable	Modified in this Release	Not Applicable	Removed in this Release	Cloudprovider category is removed from output response
Added in this Release							
Not Applicable							
Modified in this Release							
Not Applicable							
Removed in this Release							
Cloudprovider category is removed from output response							
URL:	{{protocol}}://{{server}}{{port}}/univmax/restapi/performance/Array/help/{{v4SystemId}}/categories						
User Roles:	Admin/PerfMonitor/Manager						
Prerequisite :	Not Applicable						
Path Parameters:	Not Applicable						
Query Parameters:	Not Applicable						
Request Parameters:	Not Applicable						

2.2.3.1.1 Sample JSON Response

<pre>{ "categoryName": ["Array", "BEDirector",</pre>

"BEPort",
"BeEmulation",
"Board",
"CachePartition",
"Core",
"DIMM",
"DeviceGroup",
"Disk",
"DiskGroup",
"DiskTechPool",
"EDSDirector",
"EDSEmulation",
"Endpoint",
"ExternalDirector",
"ExternalDisk",
"ExternalDiskGroup",
"FEDirector",
"FEPort",
"FeEmulation",
"FiconEmulation",
"FiconEmulationThread",
"FiconPortThread",
"Host",
"IMDirector",
"IMEmulation",
"IPInterface",
"Initiator",


```

    "MaskingView",
    "PortGroup",
    "RDFA",
    "RDFDirector",
    "RDFEmulation",
    "RDFPort",
    "RDFS",
    "SRP",
    "StorageContainer",
    "StorageGroup",
    "StorageResource",
    "ThinPool",
    "Volume" ]
}

```

2.2.3.1.2 zHyperLinkPort

Resource	zHyperLinkPort	
Request Type:	GET	
New Endpoint Description:	Not Applicable	
Modify Endpoint Description:	Added in this Release	
	- WritesRejected - WriteIO - WriteProcessingTime - WriteRequests - WriteThroughputProcessed	
	Modified in this Release	
	Not Applicable	

	Removed in this Release	
	Not Applicable	
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/Array/help/{{v4SystemId}}/zHyperLinkPort/metrics/All	
User Roles:	Admin/StorageAdmin/PerfMon	
Prerequisite:	Not Applicable	
Path Parameters:	Not Applicable	
Query Parameters:	Not Applicable	
Request Parameters:	Not Applicable	
Response Parameters:	Not Applicable	

2.2.3.1.2.1 Sample JSON response

```
{
  "metricName": [
    "ReadIO",
    "ReadProcessingTime",
    "ReadRequests",
    "ReadThroughputProcessed",
    "ReadsRejected",
    "WriteIO",
    "WriteProcessingTime",
    "WriteRequests",
    "WriteThroughputProcessed",
    "WritesRejected"
  ]
}
```

```
]
}
```

2.2.3.1.3 ZHyperLinkMailbox

2.2.3.1.3.1 Sample JSON response

```
{
  "metricName": [
    "PercentBusy"
  ]
}
```

2.2.3.1.4 RDFA AIOps New Metrics

Resource	RDFA		
Request Type:	GET		
New Endpoint Description:	Not Applicable		
Modify Endpoint Description:	Added in this Release		
	- NumberCyclesBehind - CycleNumberTransmitApply		
	Modified in this Release		
	Not Applicable		
	Removed in this Release		
	Not Applicable		
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/Array/help/{{v4SystemId}}/RDFA/metrics/All		

User Roles:	Admin/StorageAdmin/PerfMon
Prerequisite:	Not Applicable
Path Parameters:	Not Applicable
Query Parameters:	Not Applicable
Request Parameters:	Not Applicable
Response Parameters:	Not Applicable

2.2.3.1.4.1 Sample JSON response

```
{
  "metricName": [
    "ActiveCycleCapacitySize",
    "AvgCycleSizeCapacity",
    "AvgCycleTime",
    "AvgIOServiceTime",
    "CapacityOfRDFInvalidTracks",
    "CapacityTracksSpilledBack",
    "CapacityTracksSpilledOver",
    "CapacityTracksSpilledOverUsed",
    "CompressedMBReceived",
    "CompressedMBSent",
    "CompressedMBSentAndReceived",
    "CycleNumber",
    "CycleNumberTransmitApply",
```

"DSEThreshold",
"DSEThresholdCapacity",
"DSEUsedTracksCapacity",
"InactiveCycleCapacitySize",
"LocalWPUsedCapacity",
"MBReads",
"MBWritten",
"NumDevsInSession",
"NumberCyclesBehind",
"NumberOfCompressedLinks",
"NumberOfLinks",
"PercentCompressedMBReceived",
"PercentCompressedMBSent",
"PercentCompressedMBSentAndReceived",
"R1_R2_Lag_Time",
"R2_LastRestoreTime",
"RDFAWPCountCapacity",
"RDFA_ActiveIndicator",
"RDFA_SessionIndicator",
"RDFRewrites",
"RDF_R1_R2_IOS",
"RDF_R1_R2_MB",
"RDF_R2_R1_IOS",
"RDF_R2_R1_MB",
"RdfMBRead",
"RdfMBWritten",
"RdfReads",

```
"RdfResponseTime",  
"RdfWrites",  
"ReadHits",  
"SessionNumber",  
"SpillOverPackedSlotsCapacity",  
"TimeSinceLastSwitch",  
"TotalHARepetWrites",  
"TotalHAWrites",  
"TotalReads",  
"TotalWrites",  
"UncommittedTracksCapacity"  
]  
}
```

2.2.3.1.5 Array

Resource	Array
Request Type:	GET
New Endpoint Description:	Not Applicable
Modify Endpoint Description:	Added in this Release • BTU • PowerUsage

	Modified in this Release	
	Not Applicable	
	Removed in this Release	
	Not Applicable	
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/Array/help/{{v4SystemId}}/Array/metrics/All	
User Roles:	Admin/StorageAdmin/PerfMon	
Prerequisite:	Not Applicable	
Path Parameters :	Not Applicable	
Query Parameters :	Not Applicable	
Request Parameters :	Not Applicable	
Response Parameters :	Not Applicable	

2.2.3.1.5.1 Sample JSON response

```
{
  "metricName": [
    "AvgFallThruTime",
    "AvgOptimizedReadMissSize",
    "BEIOs",
    "BEReadReqs",
    "BEReqs",
    "BEUtilization",
    "BEWriteReqs",
```

"BTU",
"CapacityHS",
"CapacityR1CacheSlotsInUse",
"CapacityR2CacheSlotsInUse",
"CompressionDedupSavingsCapacity",
"CopySlotCountUsedCapacity",
"CriticalAlertCount",
"DA_Balance",
"DataProtectionHealthScore",
"DataReductionRatioOnReducible",
"DeviceWPEvents",
"DisabledCapacity",
"DiskUtilization",
"EFD_Balance",
"EffectiveResourcesCapacity",
"EffectiveUsedCapacity",
"FEHitReqs",
"FEReadHitReqs",
"FEReadMissReqs",
"FEReadReqs",
"FEReqs",
"FEUtilization",
"FEWriteHitReqs",
"FEWriteMissReqs",
"FEWriteReqs",
"FE_Balance",
"HWConfigHS",

"HostIOs",
"HostMBReads",
"HostMBWritten",
"HostMBs",
"HostReads",
"HostWrites",
"InfoAlertCount",
"LocalWPUsedCapacity",
"MaxEffectiveCapacity",
"MaxProvisioning",
"NumberR1ActiveSessions",
"NumberR1MscActiveSessions",
"NumberR1MscSessions",
"NumberR2ActiveSessions",
"NumberR2MscActiveSessions",
"NumberR2MscSessions",
"OptimizedMBReadMisses",
"OptimizedReadMisses",
"OverallHealthScore",
"PatternDetectionSavings",
"PercentCacheWP",
"PercentEffectiveUsedCapacity",
"PercentHit",
"PercentReads",
"PercentWrites",
"PerformanceHealthScore",
"PhysicalCapacity",

"PowerUsage",
"PrefetchedTracks",
"ProvisionedCapacity",
"ProvisionedPercent",
"ProvisionedResourcesUsedPercent",
"QueueDepthUtilization",
"RDFAWPCapacity",
"RDFUtilization",
"RDF_Balance",
"ReadResponseTime",
"ReducibleCapacity",
"ResponseTime",
"SnapshotResourcesCapacity",
"SnapshotResourcesUsed",
"SnapshotResourcesUsedPercent",
"SystemMaxWPLimitCapacity",
"SystemWPEvents",
"TotalNumberR1Sessions",
"TotalNumberR2Sessions",
"TotalNumberRdfSessions",
"UnreducibleCapacity",
"VersionWritePendingUsedCapacity",
"WPUsedCapacity",
"WarningAlertCount",
"WriteResponseTime"

]

}

2.2.3.1.6 StorageGroup

2.2.3.1.6.1 Sample JSON response

```
{
  "metricName": [
    "AllocatedCapacity",
    "AvgIOSize",
    "AvgQOSDelayPerIO",
    "AvgReadResponseTime6",
    "AvgReadResponseTime7",
    "AvgReadSize",
    "AvgWriteResponseTime6",
    "AvgWriteResponseTime7",
    "AvgWriteSize",
    "BEMBReads",
    "BEMBTransferred",
    "BEMBWritten",
    "BEOptimizeWriteThroughput",
    "BEPercentReads",
    "BEPercentWrites",
    "BEPrefetchedMBs",
    "BEPrefetchedTrackUsed",
    "BEPrefetchedTrackss",
    "BERDFCopy",
    "BERDFCopyThroughput",
```

"BEReadReqs",
"BEReadsForCopy",
"BEReqs",
"BEThroughputReadForCopy",
"BEWriteReqs",
"BEWriteThroughputForCopy",
"BEWriteThroughputForRebuild",
"BEWritesForCopy",
"BEWritesForRebuild",
"BlockSize",
"CompressionRatio",
"CriticalAlertCount",
"DataReduction",
"ExternalReadResponseTime",
"ExternalResponseTime",
"ExternalWriteResponseTime",
"HostHits",
"HostIOLimitIOsPerSec",
"HostIOLimitPercentTimeExceeded",
"HostIOLimitThroughput",
"HostIOLimitTimeExceeded",
"HostIOs",
"HostMBReads",
"HostMBWritten",
"HostMBs",
"HostMisses",
"HostReadHits",

"HostReadMisses",
"HostReads",
"HostWriteHits",
"HostWriteMisses",
"HostWrites",
"IODensity",
"InfoAlertCount",
"InternalReadResponseTime",
"InternalResponseTime",
"InternalWriteResponseTime",
"MaxWPCapacityThreshold",
"MaxWPThreshold",
"PPAvgResponseTime",
"PPObservedDeltaRT",
"PPReadRespTime",
"PPRelativeRT",
"PPWriteRespTime",
"PercentHit",
"PercentMisses",
"PercentRandomIO",
"PercentRandomReadHit",
"PercentRandomReadMiss",
"PercentRandomReads",
"PercentRandomWriteHit",
"PercentRandomWriteMiss",
"PercentRandomWrites",
"PercentRead",

"PercentReadHit",
"PercentReadMiss",
"PercentSeqIO",
"PercentSeqRead",
"PercentSeqReadHit",
"PercentSeqReadMiss",
"PercentSeqWriteHit",
"PercentSeqWriteMiss",
"PercentSeqWrites",
"PercentWrite",
"PercentWriteHit",
"PercentWriteMiss",
"PhysicalUsed",
"RDFRewrites",
"RDFS_WriteResponseTime",
"RandomIOs",
"RandomReadHits",
"RandomReadMisses",
"RandomReads",
"RandomWriteHits",
"RandomWriteMisses",
"RandomWrites",
"RdfMBRead",
"RdfMBWritten",
"RdfReads",
"RdfResponseTime",
"RdfWrites",

"ReadMissResponseTime",
"ReadResponseTime",
"ReadResponseTimeCount1",
"ReadResponseTimeCount2",
"ReadResponseTimeCount3",
"ReadResponseTimeCount4",
"ReadResponseTimeCount5",
"ReadResponseTimeCount6",
"ReadResponseTimeCount7",
"ResponseTime",
"SRDFA_MBSent",
"SRDFA_WriteReqs",
"SRDFS_MBSent",
"SRDFS_WriteReqs",
"SeqIOs",
"SeqReadHits",
"SeqReadMisses",
"SeqReads",
"SeqWriteHits",
"SeqWriteMisses",
"SeqWrites",
"SnapDRRatio",
"SnapEffectiveUsed",
"SnapPhysicalUsed",
"SnapResourcesPercent",
"SnapUnreducible",
"TotalCapacity",

"TotalDRRatio",
"TotalEffectiveUsed",
"TotalPhysicalUsed",
"TotalResponseTime",
"TotalUnreducibleUsed",
"UnreducibleData",
"UserData",
"VAAITotalCommandCount",
"VAAITotalTime",
"VAAIUnmapCommandCount",
"VAAIUnmapKB",
"VAAIWriteSameCommandCount",
"VAAIWriteSameKB",
"VAAIXCopyCommandCount",
"VAAIXCopyKB",
"WPCount",
"WPUsedCapacity",
"WarningAlertCount",
"WriteMissResponseTime",
"WriteResponseTime",
"WriteResponseTimeCount1",
"WriteResponseTimeCount2",
"WriteResponseTimeCount3",
"WriteResponseTimeCount4",
"WriteResponseTimeCount5",
"WriteResponseTimeCount6",
"WriteResponseTimeCount7"


```
]
}
```

2.2.3.1.7 StorageContainer

2.2.3.1.7.1 Sample JSON response

```
{
  "metricName": [
    "AllocatedCapacity",
    "AvgIOSize",
    "AvgReadResponseTime6",
    "AvgReadResponseTime7",
    "AvgReadSize",
    "AvgWriteResponseTime6",
    "AvgWriteResponseTime7",
    "AvgWriteSize",
    "BEMBReads",
    "BEMBTransferred",
    "BEMBWritten",
    "BEOptimizeWriteThroughput",
    "BEPercentReads",
    "BEPercentWrites",
    "BEPrefetchedMBs",
    "BEPrefetchedTrackUsed",
    "BEPrefetchedTrackss",
    "BEReadReqs",
```

"BEReadsForCopy",
"BEReqs",
"BEThroughputReadForCopy",
"BEWriteReqs",
"BEWriteThroughputForCopy",
"BEWriteThroughputForRebuild",
"BEWritesForCopy",
"BEWritesForRebuild",
"BlockSize",
"CriticalAlertCount",
"ExternalReadResponseTime",
"ExternalResponseTime",
"ExternalWriteResponseTime",
"HostHits",
"HostIOLimitIOsPerSec",
"HostIOLimitPercentTimeExceeded",
"HostIOLimitThroughput",
"HostIOLimitTimeExceeded",
"HostIOs",
"HostMBReads",
"HostMBWritten",
"HostMBs",
"HostMisses",
"HostReadHits",
"HostReadMisses",
"HostReads",
"HostWriteHits",

"HostWriteMisses",
"HostWrites",
"IODensity",
"InfoAlertCount",
"InternalReadResponseTime",
"InternalResponseTime",
"InternalWriteResponseTime",
"MaxWPCapacityThreshold",
"MaxWPTreshold",
"PercentHit",
"PercentMisses",
"PercentRandomIO",
"PercentRandomReadHit",
"PercentRandomReadMiss",
"PercentRandomReads",
"PercentRandomWriteHit",
"PercentRandomWriteMiss",
"PercentRandomWrites",
"PercentRead",
"PercentReadHit",
"PercentReadMiss",
"PercentSeqIO",
"PercentSeqRead",
"PercentSeqReadHit",
"PercentSeqReadMiss",
"PercentSeqWriteHit",
"PercentSeqWriteMiss",

"PercentSeqWrites",
"PercentWrite",
"PercentWriteHit",
"PercentWriteMiss",
"RandomIOs",
"RandomReadHits",
"RandomReadMisses",
"RandomReads",
"RandomWriteHits",
"RandomWriteMisses",
"RandomWrites",
"ReadMissResponseTime",
"ReadResponseTime",
"ReadResponseTimeCount1",
"ReadResponseTimeCount2",
"ReadResponseTimeCount3",
"ReadResponseTimeCount4",
"ReadResponseTimeCount5",
"ReadResponseTimeCount6",
"ReadResponseTimeCount7",
"ResponseTime",
"SeqIOs",
"SeqReadHits",
"SeqReadMisses",
"SeqReads",
"SeqWriteHits",
"SeqWriteMisses",

```

    "SeqWrites",
    "TotalCapacity",
    "TotalTracks",
    "WPCount",
    "WPUsedCapacity",
    "WarningAlertCount",
    "WriteMissResponseTime",
    "WriteResponseTime",
    "WriteResponseTimeCount1",
    "WriteResponseTimeCount2",
    "WriteResponseTimeCount3",
    "WriteResponseTimeCount4",
    "WriteResponseTimeCount5",
    "WriteResponseTimeCount6",
    "WriteResponseTimeCount7"
  ]
}

```

2.2.3.1.8 StorageResource

2.2.3.1.8.1 Sample JSON response

```

{
  "metricName": [
    "AllocatedCapacity",
    "AvgIOSize",
    "AvgReadResponseTime6",
    "AvgReadResponseTime7",
    "AvgReadSize",

```

"AvgWriteResponseTime6",
"AvgWriteResponseTime7",
"AvgWriteSize",
"BEMBReads",
"BEMBTransferred",
"BEMBWritten",
"BEOptimizeWriteThroughput",
"BEPercentReads",
"BEPercentWrites",
"BEPrefetchedMBs",
"BEPrefetchedTrackUsed",
"BEPrefetchedTrackss",
"BEReadReqs",
"BEReadsForCopy",
"BEReqs",
"BETHroughputReadForCopy",
"BEWriteReqs",
"BEWriteThroughputForCopy",
"BEWriteThroughputForRebuild",
"BEWritesForCopy",
"BEWritesForRebuild",
"BlockSize",
"CompressionRatio",
"CriticalAlertCount",
"ExternalReadResponseTime",
"ExternalResponseTime",
"ExternalWriteResponseTime",

"HostHits",
"HostIOLimitPerSec",
"HostIOLimitPercentTimeExceeded",
"HostIOLimitThroughput",
"HostIOLimitTimeExceeded",
"HostIOs",
"HostMBReads",
"HostMBWritten",
"HostMBs",
"HostMisses",
"HostReadHits",
"HostReadMisses",
"HostReads",
"HostWriteHits",
"HostWriteMisses",
"HostWrites",
"IODensity",
"InfoAlertCount",
"InternalReadResponseTime",
"InternalResponseTime",
"InternalWriteResponseTime",
"MaxWPCapacityThreshold",
"MaxWPTreshold",
"PercentHit",
"PercentMisses",
"PercentRandomIO",
"PercentRandomReadHit",

"PercentRandomReadMiss",
"PercentRandomReads",
"PercentRandomWriteHit",
"PercentRandomWriteMiss",
"PercentRandomWrites",
"PercentRead",
"PercentReadHit",
"PercentReadMiss",
"PercentSeqIO",
"PercentSeqRead",
"PercentSeqReadHit",
"PercentSeqReadMiss",
"PercentSeqWriteHit",
"PercentSeqWriteMiss",
"PercentSeqWrites",
"PercentWrite",
"PercentWriteHit",
"PercentWriteMiss",
"RandomIOs",
"RandomReadHits",
"RandomReadMisses",
"RandomReads",
"RandomWriteHits",
"RandomWriteMisses",
"RandomWrites",
"ReadMissResponseTime",
"ReadResponseTime",

"ReadResponseTimeCount1",
"ReadResponseTimeCount2",
"ReadResponseTimeCount3",
"ReadResponseTimeCount4",
"ReadResponseTimeCount5",
"ReadResponseTimeCount6",
"ReadResponseTimeCount7",
"ResponseTime",
"SeqIOs",
"SeqReadHits",
"SeqReadMisses",
"SeqReads",
"SeqWriteHits",
"SeqWriteMisses",
"SeqWrites",
"TotalCapacity",
"TotalTracks",
"WPCount",
"WPUsedCapacity",
"WarningAlertCount",
"WriteMissResponseTime",
"WriteResponseTime",
"WriteResponseTimeCount1",
"WriteResponseTimeCount2",
"WriteResponseTimeCount3",
"WriteResponseTimeCount4",
"WriteResponseTimeCount5",

```
"WriteResponseTimeCount6",  
"WriteResponseTimeCount7"  
]  
}
```

2.2.3.1.9 Initiator

2.2.3.1.9.1 Sample JSON response

```
{  
  "metricName": [  
    "BandwidthLimitExceededSecs",  
    "ExternalReadResponseTime",  
    "ExternalResponseTime",  
    "ExternalWriteResponseTime",  
    "HostIOs",  
    "HostMBReads",  
    "HostMBWrites",  
    "InternalReadResponseTime",  
    "InternalResponseTime",  
    "InternalWriteResponseTime",  
    "MBs",  
    "ReadResponseTime",  
    "Reads",  
    "ResponseTime",  
    "SyscallCount",  
    "WriteResponseTime",  
    "Writes"  
  ]  
}
```

```
]
}
```

2.2.3.1.10 Host

2.2.3.1.10.1 Sample JSON Response

```
{
  "metricName": [
    "BandwidthLimit",
    "BandwidthLimitExceededSecs",
    "ExternalReadResponseTime",
    "ExternalResponseTime",
    "ExternalWriteResponseTime",
    "HostIOs",
    "HostMBReads",
    "HostMBWrites",
    "InternalReadResponseTime",
    "InternalResponseTime",
    "InternalWriteResponseTime",
    "MBs",
    "ReadResponseTime",
    "Reads",
    "ResponseTime",
    "SyscallCount",
    "WriteResponseTime",
    "Writes"
  ]
}
```

}

2.2.3.1.11 FEPort

2.2.3.1.11.1 GET Metrics Help

Resource	FEPort						
Request Type:	POST						
New Endpoint Description:	Not Applicable						
Modify Endpoint Description:	<table><tr><td>Added in this Release</td></tr><tr><td> - ExternalReadResponseTime - ExternalResponseTime - ExternalWriteResponseTime - InternalReadResponseTime - InternalResponseTime - InternalWriteResponseTime </td></tr><tr><td>Modified in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Removed in this Release</td></tr><tr><td>Not Applicable</td></tr></table>	Added in this Release	- ExternalReadResponseTime - ExternalResponseTime - ExternalWriteResponseTime - InternalReadResponseTime - InternalResponseTime - InternalWriteResponseTime	Modified in this Release	Not Applicable	Removed in this Release	Not Applicable
Added in this Release							
- ExternalReadResponseTime - ExternalResponseTime - ExternalWriteResponseTime - InternalReadResponseTime - InternalResponseTime - InternalWriteResponseTime							
Modified in this Release							
Not Applicable							
Removed in this Release							
Not Applicable							

URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/Array/help/{{v4SystemId}}/FEPort/metrics/All
User Roles:	Admin/StorageAdmin/PerfMon
Prerequisite:	Not Applicable
Path Parameters:	Not Applicable
Query Parameters:	Not Applicable
Request Parameters:	Not Applicable
Response Parameters:	Not Applicable

Sample JSON response

```
{
  "metricName": [
    "AvgIOSize",
    "BadReceiveCharCount",
    "DiscardedFramesCount",
    "ExpiredFramesCount",
    "ExternalReadResponseTime",
    "ExternalResponseTime",
    "ExternalWriteResponseTime",
    "IOs",
    "ISCSIChecksumErrorCount",
    "InternalReadResponseTime",
    "InternalResponseTime",
```

```
"InternalWriteResponseTime",
"InvalidCRCCount",
"LinkFailureCount",
"LossOfSignalCount",
"LossOfSyncCount",
"MBRead",
"MBWritten",
"MBs",
"MaxSpeedGBs",
"PercentBusy",
"PrimSeqErrorCount",
"ReadResponseTime",
"Reads",
"ReceivedEOFACount",
"ResponseTime",
"RxPower",
"SpeedGBs",
"TxPower",
"WriteResponseTime",
"Writes"
]
}
```

2.2.4 RDFFPort

Resource	RDFFPort
Request Type:	GET

New Endpoint Description:	Not Applicable						
Modify Endpoint Description:	<table><tr><th>Added in this Release</th></tr><tr><td> - BadReceiveCharCount - DiscardedFramesCount - ExpiredFramesCount - InvalidCRCCount - LinkFailureCount - LossOfSignalCount - LossOfSyncCount - PrimSeqErrorCount - ReceivedEOFACount </td></tr><tr><th>Modified in this Release</th></tr><tr><td>Not Applicable</td></tr><tr><th>Removed in this Release</th></tr><tr><td>Not Applicable</td></tr></table>	Added in this Release	- BadReceiveCharCount - DiscardedFramesCount - ExpiredFramesCount - InvalidCRCCount - LinkFailureCount - LossOfSignalCount - LossOfSyncCount - PrimSeqErrorCount - ReceivedEOFACount	Modified in this Release	Not Applicable	Removed in this Release	Not Applicable
Added in this Release							
- BadReceiveCharCount - DiscardedFramesCount - ExpiredFramesCount - InvalidCRCCount - LinkFailureCount - LossOfSignalCount - LossOfSyncCount - PrimSeqErrorCount - ReceivedEOFACount							
Modified in this Release							
Not Applicable							
Removed in this Release							
Not Applicable							
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/Array/help/{{v4SystemId}}/RDFPort/metrics/All						
User Roles:	Admin/StorageAdmin/PerfMon						
Prerequisite:	Not Applicable						
Path Parameters:	Not Applicable						
Query Parameters:	Not Applicable						
Request Parameters:	Not Applicable						
Response Parameters:	Not Applicable						

2.2.4.1.1 Sample JSON response

```
{
  "metricName": [
    "AvgIOSize",
    "BadReceiveCharCount",
    "DiscardedFramesCount",
    "ExpiredFramesCount",
    "IOs",
    "InvalidCRCCCount",
    "LinkFailureCount",
    "LossOfSignalCount",
    "LossOfSyncCount",
    "MBRead",
    "MBWritten",
    "MBs",
    "MaxSpeedGBs",
    "PercentBusy",
    "PrimSeqErrorCount",
    "Reads",
    "ReceivedEOFACount",
    "SpeedGBs",
    "Writes"
  ]
}
```


2.2.5 threshold

2.2.5.1 GET Floor and Ceiling Intelligent Thresholds

Resource	threshold																											
Request Type:	GET																											
New Endpoint Description:	Provide a floor and ceiling Intelligent Thresholds that analyzes past performance and system capability to assist customers in setting thresholds. 15 days (about 2 weeks) of performance data required. Valid Categories are Array and StorageGroup"																											
Modify Endpoint Description:	<table><tr><td colspan="4">Added in this Release</td></tr><tr><td colspan="4">Not Applicable</td></tr><tr><td colspan="4">Modified in this Release</td></tr><tr><td colspan="4">Not Applicable</td></tr><tr><td colspan="4">Removed in this Release</td></tr><tr><td colspan="4">Not Applicable</td></tr></table>				Added in this Release				Not Applicable				Modified in this Release				Not Applicable				Removed in this Release				Not Applicable			
Added in this Release																												
Not Applicable																												
Modified in this Release																												
Not Applicable																												
Removed in this Release																												
Not Applicable																												
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/threshold/list/{{v4SystemId}}/StorageGroup/00000/HostIOs																											
User Roles:	Admin/StorageAdmin/PerfMon																											
Prerequisite:	Minimum 15 days data without gaps																											
Path Parameters:	<table><tr><th>Attribute Name</th><th>Type</th><th>Optional</th><th>Description</th></tr><tr><td>systemId</td><td>String</td><td>No</td><td>Unique identifier of the symmetrix</td></tr><tr><td>category</td><td>String</td><td>No</td><td>Array or StorageGroup</td></tr><tr><td>instance</td><td>String</td><td>No</td><td>valid instanceId for Array or StorageGroup</td></tr><tr><td>metric</td><td>String</td><td>No</td><td>valid for Category Array or StorageGroup</td></tr></table>				Attribute Name	Type	Optional	Description	systemId	String	No	Unique identifier of the symmetrix	category	String	No	Array or StorageGroup	instance	String	No	valid instanceId for Array or StorageGroup	metric	String	No	valid for Category Array or StorageGroup				
Attribute Name	Type	Optional	Description																									
systemId	String	No	Unique identifier of the symmetrix																									
category	String	No	Array or StorageGroup																									
instance	String	No	valid instanceId for Array or StorageGroup																									
metric	String	No	valid for Category Array or StorageGroup																									

Query Parameters:	Not Applicable
Request Parameters:	Not Applicable
Response Parameters:	Not Applicable

2.2.5.2 GET List Thresholds for Category (New Threshold attribute Names)

Resource	threshold						
Request Type:	Get						
New Endpoint Description:	Not Applicable						
Modify Endpoint Description:	<table><tr><td>Added in this Release</td></tr><tr><td> "firstLowerThreshold" "firstUpperThreshold" "secondLowerThreshold" "secondUpperThreshold" </td></tr><tr><td>Modified in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Removed in this Release</td></tr><tr><td>Not Applicable</td></tr></table>	Added in this Release	"firstLowerThreshold" "firstUpperThreshold" "secondLowerThreshold" "secondUpperThreshold"	Modified in this Release	Not Applicable	Removed in this Release	Not Applicable
Added in this Release							
"firstLowerThreshold" "firstUpperThreshold" "secondLowerThreshold" "secondUpperThreshold"							
Modified in this Release							
Not Applicable							
Removed in this Release							
Not Applicable							
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/threshold/list/{{v4SystemId}}/Array						
User Roles:	Admin/StorageAdmin/PerfMon						
Prerequisite :	Not Applicable						

Path Parameters:	Not Applicable
Query Parameters:	Not Applicable
Request Parameters:	Not Applicable
Response Parameters:	Not Applicable

2.2.5.2.1 Sample JSON response

```
{
  "category": "StorageGroup",
  "num_of_metric_performance_thresholds": 155,
  "performanceThreshold": [
    {
      "metric": "PercentRandomReadHit",
      "kpi": false,
      "alertError": false,
      "firstLowerThreshold": "",
      "firstUpperThreshold": "",
      "secondLowerThreshold": "",
      "secondUpperThreshold": ""
    },
    {
      "metric": "RDFRewrites",
      "kpi": false,
      "alertError": false,
```

```

    "firstLowerThreshold": "",
    "firstUpperThreshold": "",
    "secondLowerThreshold": "",
    "secondUpperThreshold": ""
  },
  {
    "metric": "PercentRandomWriteHit",
    "kpi": false,
    "alertError": false,
    "firstLowerThreshold": "",
    "firstUpperThreshold": "",
    "secondLowerThreshold": "",
    "secondUpperThreshold": ""
  },
  {
    "metric": "PercentRead",
    "kpi": true,
    "alertError": false,
    "firstLowerThreshold": "",
    "firstUpperThreshold": "",
    "secondLowerThreshold": "",
    "secondUpperThreshold": ""
  },
  {
    "metric": "BEOptimizeWriteThroughput",
    "kpi": false,
    "alertError": false,

```

```

    "firstLowerThreshold": "",
    "firstUpperThreshold": "",
    "secondLowerThreshold": "",
    "secondUpperThreshold": ""
  },
  {
    "metric": "ReadResponseTimeCount3",
    "kpi": false,
    "alertError": false,
    "firstLowerThreshold": "",
    "firstUpperThreshold": "20",
    "secondLowerThreshold": "",
    "secondUpperThreshold": "30"
  },

```

2.2.5.3 PUT Update Thresholds for Category (New Threshold attribute Names)

Resource	threshold														
Request Type:	PUT														
New Endpoint Description:	Not Applicable														
Modify Endpoint Description:	<table> <tr> <th colspan="2">Added in this Release</th></tr> <tr> <td>•</td><td>"firstLowerThreshold"</td></tr> <tr> <td>•</td><td>"firstUpperThreshold"</td></tr> <tr> <td>•</td><td>"secondLowerThreshold"</td></tr> <tr> <td>•</td><td>"secondUpperThreshold"</td></tr> <tr> <th colspan="2">Modified in this Release</th></tr> <tr> <td colspan="2">Not Applicable</td></tr> </table>	Added in this Release		•	"firstLowerThreshold"	•	"firstUpperThreshold"	•	"secondLowerThreshold"	•	"secondUpperThreshold"	Modified in this Release		Not Applicable	
Added in this Release															
•	"firstLowerThreshold"														
•	"firstUpperThreshold"														
•	"secondLowerThreshold"														
•	"secondUpperThreshold"														
Modified in this Release															
Not Applicable															

	Removed in this Release	
	Not Applicable	
URL:	{{protocol}}//{{server}}:{{port}}/univmax/restapi/performance/threshold/update/FEDirector	
User Roles:	Admin/StorageAdmin/PerfMon	
Prerequisite:	Not Applicable	
Path Parameters:	Not Applicable	
Query Parameters:	Not Applicable	
Request Parameters:	Not Applicable	
Response Parameters:	Not Applicable	

2.2.5.3.1 Sample JSON request

```
{
  "firstLowerThreshold": 25,
  "secondLowerThreshold": 35,
  "firstUpperThreshold":50,
  "secondUpperThreshold":60,
  "firstThresholdSamples": 5,
  "metric": "HWConfigHS",
  "alert": false,
  "firstThresholdOccurrences": 3,
  "firstThresholdSeverity": "INFORMATION"
}
```

2.2.5.3.2 Sample JSON response

```
{
  "success": true,
  "message": "Threshold Successfully Updated...Category:Array,Metric:HWConfigHS,1st Upper Threshold:null,2nd Upper Threshold:null,1st Lower Threshold:25,2nd Lower Threshold:35,Alert Enabled:false"
}
```

2.2.5.4 PUT Update Thresholds for Category (Map Old Attribute Names to New Attribute Names)

Resource	threshold					
Request Type:	PUT					
New Endpoint Description:	Not Applicable					
Modify Endpoint Description:						
	Added in this Release					
	Not Applicable					
	Modified in this Release					
	Not Applicable					
	Removed in this Release					
			Not Applicable			
URL:	{{protocol}}://{{server}}:{{port}}/univmax/restapi/performance/threshold/update/Array					
User Roles:	Admin/StorageAdmin/PerfMon					
Prerequisite:	Not Applicable					
Path Parameters:	Not Applicable					
Query Parameters:	Not Applicable					

Request Parameters:	Not Applicable
Response Parameters:	Not Applicable

2.2.5.4.1 Sample JSON request

```
{
  "firstThreshold": 25,
  "firstThresholdSamples": 5,
  "metric": "HWConfigHS",
  "alert": false,
  "firstThresholdOccurrences": 3,
  "firstThresholdSeverity": "INFORMATION",
  "secondThreshold": 35
}
```

2.2.5.4.2 Sample JSON response

```
{
  "success": true,
  "message": "Threshold Successfully Updated...Category:Array,Metric:HWConfigHS,1st Upper Threshold:null,2nd Upper Threshold:null,1st Lower Threshold:25,2nd Lower Threshold:35,Alert Enabled:false"
}
```

2.3 SLO Provisioning

2.3.1 symmetrix

2.3.1.1 GET (Object)

Resource	symmetrix			
Request Type:	GET			
New Endpoint Description:	Not Applicable			
Modify Endpoint Description:				
	Added in this Release			
	Added a new disk_group_total_capacity_gb attribute			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
Not Applicable				
URL:	.../102/sloprovisioning/symmetrix/{symmetrixId}			
User Roles:	Monitor and above			
Prerequisite:	Not Applicable			
Path Parameters:	Not Applicable			
Query Parameters:	Not Applicable			
Request Parameters:	Not Applicable			
Response Parameters:	Attribute Name	Type	Optional	Description
	disk_group_total_capacity_gb	String	Yes	The total disk group (raw) capacity including RAID overhead

2.3.1.1.1 Sample JSON response

```
{
```

```

"symmetrixId": "000297903340",
"device_count": 1143,
...
"host_visible_device_count": 951,
"disk_group_total_capacity_gb": 79923.11
}

```

2.3.2 port

2.3.2.1 GET

Resource	port			
Request Type:	GET			
New Endpoint Description:	Not Applicable			
Modify Endpoint Description:				
	Added in this Release			
	Added a new endpoints to retrieve the NVMe/TCP host authentication statistics for all the director ports or for a specific director port			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Not Applicable			
URL:	.../102/sloprovisioning/symmetrix/{symmetrixId}/port/nvme_auth_stats			
User Roles:	Monitor and above			
Prerequisite:				
Path Parameters:	Attribute Name	Type	Optional	Description
	symmetrixId	String	No	Unique identifier of the symmetrix

Query Parameters:				
	Attribute Name	Type	Optional	Description
	directorNum	String	Yes	The director port number. If provided, only the stats for that port is retrieved
Request Parameters:	Not Applicable			
Response Parameters:	Not Applicable			

2.3.2.1.1 Sample JSON response

```
{
  "director_port_nvme_tcp_host_auth_stats": [{
    "director_num": "1",
    "authenticated_connections": "6"
    "unauthenticated_connections": "1"
    "nvme_tcp_auth_allowed_hashes": {
      "sha_256": "1"
      "sha_384": "1"
      "sha_512": "5"
    },
    "nvme_tcp_auth_dh_groups": {
      "dh_2048_bit": "0"
      "dh_3072_bit": "0"
      "dh_4096_bit": "1"
      "dh_6144_bit": "0"
      "dh_8192_bit": "5"
      "dh_null": "0"
    }
  }],
}
```

```
"nvme_tcp_profile_stats": [{
    "profile_id": "0",
    "profile_consumers": "2",
},
{
    "profile_id": "1",
    "profile_consumers": "0",
},
{
    "profile_id": "2",
    "profile_consumers": "0",
},
{
    "profile_id": "3",
    "profile_consumers": "0",
},
{
    "profile_id": "4",
    "profile_consumers": "0",
},
{
    "profile_id": "5",
    "profile_consumers": "0",
},
{
    "profile_id": "6",
    "profile_consumers": "0",
},
},
```

```
{
  "profile_id": "7",
  "profile_consumers": "0",
},
{
  "profile_id": "8",
  "profile_consumers": "0",
},
{
  "profile_id": "9",
  "profile_consumers": "0",
},
{
  "profile_id": "10",
  "profile_consumers": "0",
},
{
  "profile_id": "11",
  "profile_consumers": "0",
},
{
  "profile_id": "12",
  "profile_consumers": "0",
},
{
  "profile_id": "13",
  "profile_consumers": "0",
},
},
```

```
{
  "profile_id": "14",
  "profile_consumers": "0",
},
{
  "profile_id": "15",
  "profile_consumers": "0",
},
{
  "profile_id": "16",
  "profile_consumers": "2",
},
{
  "profile_id": "17",
  "profile_consumers": "0",
},
{
  "profile_id": "18",
  "profile_consumers": "0",
},
{
  "profile_id": "19",
  "profile_consumers": "0",
},
{
  "profile_id": "20",
  "profile_consumers": "0",
},
},
```

```
{
  "profile_id": "21",
  "profile_consumers": "0",
},
{
  "profile_id": "22",
  "profile_consumers": "0",
},
{
  "profile_id": "23",
  "profile_consumers": "0",
},
{
  "profile_id": "24",
  "profile_consumers": "0",
},
{
  "profile_id": "25",
  "profile_consumers": "0",
},
{
  "profile_id": "26",
  "profile_consumers": "0",
},
{
  "profile_id": "27",
  "profile_consumers": "0",
},
},
```

```

    {
      "profile_id": "28",
      "profile_consumers": "0",
    },
    {
      "profile_id": "29",
      "profile_consumers": "0",
    },
    {
      "profile_id": "30",
      "profile_consumers": "0",
    },
    {
      "profile_id": "31",
      "profile_consumers": "0",
    }
  ]
}
};

```

2.3.3 initiator

2.3.3.1 GET List of Initiators

Resource	Initiator
Request Type:	GET
New Endpoint Description:	Not Applicable

Modify Endpoint Description:	Added in this Release				
	Not Applicable				
	Modified in this Release				
	Added 2 new request parameters to return initiator Ids with chap set/enabled.				
	Removed in this Release				
	Not Applicable				
URL:	.../102/sloprovisioning/symmetrix/{symmetrixId}/initiator				
User Roles:	<u>Monitor and above</u>				
Prerequisite:	Not Applicable				
Path Parameters:	Attribute Name	Type	Optional	Description	
	symmetrixId	String	No	Unique identifier of the symmetrix	
Query Parameters:	Not Applicable				
Request Parameters:	Only displaying the new request parameters				
	Object		InitiatorEntity		
	Attribute Name		Type	Optional	Description
	chap_set		Boolean	Yes	Whether chap is set
	chap_enabled		Boolean	Yes	Whether Chap is enabled
Response Parameters:	Not Applicable				

2.3.3.1.1 Sample JSON Response – List of initiators with Chap set filter

{
"initiatorId": [

"OR-3C:000:iqn.53453454"

]

}

2.3.3.2 GET Initiator Details

Resource	Initiator																											
Request Type:	GET																											
New Endpoint Description:	Not Applicable																											
Modify Endpoint Description:	<table><tr><td colspan="4">Added in this Release</td></tr><tr><td colspan="4">Not Applicable</td></tr><tr><td colspan="4">Modified in this Release</td></tr><tr><td colspan="4">Added 2 new properties to retrieve information about the initiator Chap authentication and if it is set and enabled</td></tr><tr><td colspan="4">Removed in this Release</td></tr><tr><td colspan="4">Not Applicable</td></tr></table>				Added in this Release				Not Applicable				Modified in this Release				Added 2 new properties to retrieve information about the initiator Chap authentication and if it is set and enabled				Removed in this Release				Not Applicable			
Added in this Release																												
Not Applicable																												
Modified in this Release																												
Added 2 new properties to retrieve information about the initiator Chap authentication and if it is set and enabled																												
Removed in this Release																												
Not Applicable																												
URL:	.../102/sloprovisioning/symmetrix/{symmetrixId}/initiator/{initiatorId}																											
User Roles:	Monitor and above																											
Prerequisites:																												
Path Parameters:	Attribute Name	Type	Optional	Description																								
	symmetrixId	String	No	Unique identifier of the symmetrix																								
	initiatorId	String	No	Unique identifier of the initiator																								
Query Parameters:																												

Request Parameters:				
Response Parameters:	Only displaying the new response parameters			
		InitiatorEntity		
		Attribute Name	Type	Optional
		chap_set	Boolean	Yes
		Whether chap is set		
		chap_enabled	Boolean	Yes
		Whether Chap is enabled		

2.3.3.2.1 Sample JSON Response – Chap is set and enabled

```
{
  "initiatorId": "iqn.53453454",
  "symmetrixPortKey": [
    {
      "directorId": "OR-3C",
      "portId": "000"
    }
  ],
  "type": "iSCSI",
  "fcid_lockdown": "No",
  "logged_in": false,
  "on_fabric": false,
  "port_flags_override": false,
```

```

"chap_set": true,
"chap_enabled": true,
"num_of_vols": 1,
"host": "TEST_ISCSI",
"num_of_host_groups": 0,
"num_of_masking_views": 1,
"maskingview": [
    "iscsitest_MV"
],
"num_of_powerpath_hosts": 0
}}

```

2.3.3.3 PUT

Resource	Initiator						
Request Type:	PUT						
New Endpoint Description:	Not Applicable						
Modify Endpoint Description:	<table><tr><td>Added in this Release</td></tr><tr><td>Not Applicable</td></tr><tr><td>Modified in this Release</td></tr><tr><td>Add new options to set/ modify Chap on an Initiator</td></tr><tr><td>Removed in this Release</td></tr><tr><td>Not Applicable</td></tr></table>	Added in this Release	Not Applicable	Modified in this Release	Add new options to set/ modify Chap on an Initiator	Removed in this Release	Not Applicable
Added in this Release							
Not Applicable							
Modified in this Release							
Add new options to set/ modify Chap on an Initiator							
Removed in this Release							
Not Applicable							

URL:	.../102/sloprovisioning/symmetrix/{symmetrixId}/initiator/{initiatorId}				
User Roles:	StoAdmin and above				
Prerequisite:	Not Applicable				
Path Parameters:	Attribute Name	Type	Optional	Description	
	symmetrixId	String	No	Unique identifier of the symmetrix	
	initiatorId	String	No	Unique identifier of the initiator	
Query Parameters:	Not Applicable				
Request Parameters:					
	Object		editInitiatorActionParam		
	Attribute Name		Type	Optional	Description
	modify_initiator_chap_authentication_param		ModifyInitiatorChapAuthenticationParamType	Yes	An object with the Chap Configuration Details
	Object		modifyInitiatorChapAuthenticationParamType		
	Attribute Name		Type	Optional	Description
	action		ChapAuthenticationAction String enum: Set/Enable/Disable	No	Defines the action
	set		SetupChapAuthenticationParamType	Yes	Defines the Chap Credentials

				if action is Set
	Object	set		
	Attribute Name	Type	Optional	Description
	credential	String	No	Chap username
	secret	String	No	Chap Password
Response Parameters:	Not Applicable			

2.3.3.3.1 Sample JSON Response – chap setup

```
{
  "editInitiatorActionParam": {
    "modify_initiator_chap_authentication_param": {
      "action": "Set",
      "set": {
        "credential": "smc",
        "secret": "smc"
      }
    }
  }
}
```

2.3.3.3.2 Sample JSON Response – disable chap

```
{ "editInitiatorActionParam": {  
  "modify_initiator_chap_authentication_param": {  
    "action": "Disable"  
  }  
}}
```

2.3.3.3.3 Sample JSON Response

```
{  
  "initiatorId": "iqn.53453454",  
  "symmetrixPortKey": [  
    {  
      "directorId": "OR-3C",  
      "portId": "000"  
    }  
  ],  
  "type": "iSCSI",  
  "fcid_lockdown": "No",  
  "logged_in": false,  
  "on_fabric": false,  
  "port_flags_override": false,  
  "chap_set": true,  
  "chap_enabled": true,  
  "num_of_vols": 1,  
  "host": "TEST_ISCSI",  
  "num_of_host_groups": 0,  
  "num_of_masking_views": 1,
```

```
"maskingview": [  
    "iscsitest_MV"  
],  
"num_of_powerpath_hosts": 0  
}
```

2.3.4 volume

2.3.4.1 PUT

Resource	volume			
Request Type:	PUT			
New Endpoint Description:	Not Applicable			
Modify Endpoint Description:	Added in this Release Not Applicable Modified in this Release Add new options to reset a Volumes Effective WWN. Removed in this Release Not Applicable			
URL:	<u>.../102/sloprovisioning/symmetrix/{symmetrixId}/volume/{Id}</u>			
User Roles:	StoAdmin and above			
Prerequisite:				
Path Parameters:	Attribute Name	Type	Optional	Description
	symmetrixId	String	No	Unique identifier of the symmetrix

	volumeld	String	No	Unique identifier of the volume
Query Parameters:	Not Applicable			
Request Parameters:				
	Object	EditVolumeActionParam		
	Attribute Name	Type	Optional	Description
	reset_wwn_param	reset_wwn	No	Set to true to reset the volume's Effective WWN
Response Parameters:				

2.3.4.1.1 Sample JSON request – Reset Volume WWN

```
{
  "editVolumeActionParam": {
    "reset_wwn_param": {
      "reset_wwn": true
    }
  }
}
```

2.4 Replication

2.4.1 symmetrix

2.4.1.1 GET(List)

Resource	symmetrix		
Request Type:	GET		
New Endpoint Description:	Not Applicable		
Modify Endpoint Description:			
	Added in this Release		
	New properties in the list response object. Two lists, for local and remote system IDs		

	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Removed Attributes: cloud_snapshot_policy_count			
URL:	... /102/replication/symmetrix			
User Roles:	Monitor and above			
Prerequisite:	Not Applicable			
Path Parameters:	Not Applicable			
Query Parameters:	Not Applicable			
Request Parameters:	Not Applicable			
Response Parameters:	Object	SymmetrixIdList		
	Attribute Name	Type	Optional	Description
	local_system_ids	List<String>	Yes	List of local system IDs
	remote_system_ids	List<String>	Yes	List of remote system IDs

2.4.1.2 metrodr

2.4.1.2.1 POST

Resource	metrodr
Request Type:	POST
New Endpoint Description:	Not Applicable
Modify Endpoint	

Description:	Added in this Release			
	Add a PerformanceImpactValidationOption with two values – Preview and IfRecommended. If performance_impact_validation_option is not specified, there is no change from /101 behavior. If Preview is specified and no replication validation errors are encountered, a 202 Accepted is returned along with a Performance_Impact_Result. If IfRecommended is specified and no replication validation errors are encountered, performance impact test is run against the specified or automatically selected RDF group or ports. If the performance impact check fails, a 412 Precondition Failed is returned along with a Performance_Impact_Result. For each Metro DR leg, allow RDFG attributes to be specified via new object PerformanceImpactGeneratedRdfGroupType. This should primarily be used for generated values from performance impact tests (performance_impact_validation_option = Preview).			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	ForceNewRdfGroup flag will be removed. In automatic mode (no RDFG specified), a new RDF group will always be created.			
URL:	... /102/replication/symmetrix/{symmetrixId}/metrodr			
User Roles:	StorAdmin and above			
Prerequisite:	Not Applicable			
Path Parameters:	Not Applicable			
Query Parameters:	Not Applicable			
Request Parameters:	StorageGroupMetroDrEnvironmentCreate			
	New Attribute Name	Type	Optional	Description
	performance_impact_generated_rdf_group_metro_r1_r2	PerformanceImpactGeneratedRdfGroupType	Yes	The name of

				the new RDF Group generated during performance impact test
	performance_impact_generated_rdf_g_metro_r1_dr	PerformanceImpactGeneratedRdfGroupType	Yes	The MetroDR R1-DR RDF Group attributes generated during performance impact test
	performance_impact_generated_rdf_g_metro_r2_dr	PerformanceImpactGeneratedRdfGroupType	Yes	The MetroDR R2-DR RDF Group attributes generated during performance impact test
	performance_impact_validation_option	PerformanceImpactValidationOption	Yes	Optional setting to validate based on performance impact of request. Must be registered for performance data

				collection. n.
		PerformanceImpactGeneratedRdfGroupType		
	Attribute Name	Type	Optional	Description
	rdfg_name	string	No	The name of the new RDF Group generated during performance impact test
	local_rdfg_number	string	No	The number of the new Local SRDF Group generated during performance impact test
	remote_rdfg_number	string	No	The number of the new Remote SRDF Group generated during performance impact test
	local_port_keys	List of SymmetrixPortKeyTypes	No	The collection of Port Keys for the new Local SRDF Group generated during performance impact test
	remote_port_keys	List of SymmetrixPortKeyTypes	No	The collection of Port Keys for the new Remote SRDF Group generated

				during performance impact test	
Response Parameters:					

2.4.1.2.1.1 Sample JSON request

```
{
  "action": "CreateEnvironment",
  "create_environment_param": {
    "storage_group_name": "wlp_io_slow_batch",
    "environment_name": "oltp2_env2",
    "metro_r2_array_id": "000120200799",
    "dr_array_id": "000197802859",
    "metro_r2_storage_group_name": "metro_r2_sg_name2",
    "dr_storage_group_name": "metro_dr_sg_name2",
    "performance_impact_generated_rdfg_metro_r1_r2": {
      "rdfg_name": "specified_rdfh_name",
      "local_rdfg_number": "29",
      "remote_rdfg_number": "29",
      "local_port_keys": [
        {
          "directorId": "RF-2G",
          "portId": "6"
        },
        {
          "directorId": "RF-1G",
          "portId": "4"
        }
      ]
    }
  }
}
```

```

],
"remote_port_keys": [
  {
    "directorId": "OR-2C",
    "portId": "1"
  },
  {
    "directorId": "OR-1C",
    "portId": "1"
  }
],
"performance_impact_validation_option": "Preview"
}
}

```

2.4.1.2.1.2 Sample JSON response

```

{
  "recommended": true,
  "performance_impact_score": 24.82,
  "rdf_performance_impact": {
    "r1": {
      "current": 7.86,
      "updated": 24.82
    },
    "r2": {
      "current": 0.04,
      "updated": 7.89
    }
  }
}

```

```

},
"dr": {
  "current": 7.16,
  "updated": 8.49
},
"overall": {
  "current": 7.86,
  "updated": 24.82
}
},
"generated_input_param": {
  "action": "CreateEnvironment",
  "create_environment_param": {
    "storage_group_name": "wlp_io_slow_batch",
    "environment_name": "oltp2_env2",
    "metro_r2_array_id": "000120200799",
    "dr_array_id": "000197802859",
    "metro_r2_storage_group_name": "metro_r2_sg_name2",
    "dr_storage_group_name": "metro_dr_sg_name2",
    "performance_impact_generated_rdfg_metro_r1_r2": {
      "rdfg_name": "specified_rdfh_name",
      "local_rdfg_number": "29",
      "remote_rdfg_number": "29",
      "local_port_keys": [
        {
          "directorId": "RF-2G",
          "portId": "6"

```



```

    },
    {
        "directorId": "RF-1G",
        "portId": "4"
    }
],
"remote_port_keys": [
    {
        "directorId": "OR-2C",
        "portId": "1"
    },
    {
        "directorId": "OR-1C",
        "portId": "1"
    }
]
},
"performance_impact_generated_rdfg_metro_r1_dr": {
    "rdfg_name": "wlp_io_015",
    "local_rdfg_number": "29",
    "remote_rdfg_number": "29",
    "local_port_keys": [
        {
            "directorId": "RF-2G",
            "portId": "6"
        },
        {

```

```

        "directorId": "RF-1G",
        "portId": "6"
    }
],
"remote_port_keys": [
    {
        "directorId": "RF-3H",
        "portId": "11"
    },
    {
        "directorId": "RF-1H",
        "portId": "11"
    }
]
},
"performance_impact_generated_rdfg_metro_r2_dr": {
    "rdfg_name": "wlp_io_016",
    "local_rdfg_number": "30",
    "remote_rdfg_number": "30",
    "local_port_keys": [
        {
            "directorId": "OR-2C",
            "portId": "1"
        },
        {
            "directorId": "OR-1C",
            "portId": "1"
        }
    ]
}

```

```

    }
  ],
  "remote_port_keys": [
    {
      "directorId": "RF-3H",
      "portId": "11"
    },
    {
      "directorId": "RF-1H",
      "portId": "11"
    }
  ]
},
"performance_impact_validation_option": "IfRecommended"
}
},
"generated_link":
"https://10.247.73.190:8443/univmax/restapi/102/replication/symmetrix/000197904383/metrodr",
"success": true
}

```

2.4.2 rdf_group

2.4.2.1 GET(Object)

Resource	rdf_group
Request Type:	GET
New Endpoint Description:	Not Applicable

Modify Endpoint Description:				
	Added in this Release			
	Not Applicable			
	Modified in this Release			
	New actions to view if SRDF/A Autorecovery is Active/Inactive for an SRDF Group New actions to view if SRDF/A Autorecovery is Enabled/Disabled for an SRDF Group New actions to view if SRDF/A Autorecovery is Configured/Unconfigured for an SRDF Group			
	Removed in this Release			
	Not Applicable			
URL:	... /102/replication/symmetrix/{symmetrixId}/rdf_group/{rdfgNumId}			
User Roles:	StorAdmin and above			
Prerequisite:	Not Applicable			
Path Parameters:	Not Applicable			
Query Parameters:	Not Applicable			
Request Parameters:	Not Applicable			
Response Parameters:	Object	RdfGroup		
	Attribute Name	Type	Optional	Description
	srdfa_auto_recovery_active	Boolean	Yes	SRDF/A Autorecovery Active/Inactive
	srdfa_auto_recovery_enabled	Boolean	Yes	SRDF/A Autorecovery Enabled/Disabled
	srdfa_auto_recovery_configured	Boolean	Yes	SRDF/A Autorecovery Configured/Unconfigured

2.4.2.1.1 Sample JSON response

```
{
  "rdfgNumber": 1710,
  "label": "DRD2975yRZ",
  "remoteRdfgNumber": 371,
  "remoteSymmetrix": "000220002297",
  "numDevices": 1,
  "totalDeviceCapacity": 1.0,
  "localPorts": [
    "OR-1C:4",
    "OR-1C:5",
    "OR-2C:4",
    "OR-2C:5"
  ],
  "remotePorts": [
    "OR-1C:4",
    "OR-1C:5",
    "OR-2C:4",
    "OR-2C:5"
  ],
  "modes": [
    "Asynchronous"
  ],
  "type": "Dynamic",
  "metro": false,
  "async": true,
```

```
"witness": false,
"witnessProtectedPhysical": false,
"witnessProtectedVirtual": false,
"witnessConfigured": false,
"witnessEffective": false,
"biasConfigured": false,
"biasEffective": false,
"witnessDegraded": false,
"localOnlinePorts": [
  "OR-1C:4",
  "OR-1C:5",
  "OR-2C:4",
  "OR-2C:5"
],
"remoteOnlinePorts": [
  "OR-1C:4",
  "OR-1C:5",
  "OR-2C:4",
  "OR-2C:5"
],
"vasa_group": false,
"link_limbo": 10,
"hardware_compression": false,
"software_compression": false,
"device_polarity": "RDF1",
"offline": false,
"rdfa_properties": {
```

```

    "session_uncommitted_tracks": 0,
    "r1_to_r2_lag_time": 3,
    "duration_of_last_cycle": 0,
    "average_cycle_time": 15,
    "minimum_cycle_time": 15,
    "duration_of_last_transmit_cycle": 0,
    "transmit_queue_depth": 1,
    "cycle_number": 3,
    "transmit_idle_state": "Enabled",
    "transmit_idle_time": 0,
    "consistency_protection": "Disabled",
    "dse_active": true,
    "dse_threshold": 50,
    "dse_autostart": "Enabled",
    "session_priority": 33,
    "consistency_exempt_volumes": false
  },
  "srdfa_auto_recovery_configured": true,
  "srfda_auto_recovery_enabled": true,
  "srdfa_auto_recovery_active": false
}

```

2.4.2.2 PUT

Resource	rdf_group
Request Type:	PUT

New Endpoint Description:	Not Applicable			
Modify Endpoint Description:				
	Added in this Release			
	New actions to enable/disable SRDF/A Autorecovery for an SRDF Group			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Not Applicable			
URL:	... /102/replication/symmetrix/{symmetrixId}/rdf_group/{rdfgNumId}			
User Roles:	StorAdmin and above			
Prerequisite:	Not Applicable			
Path Parameters:	Not Applicable			
Query Parameters:	Not Applicable			
Request Parameters:		EnableSrdfaAutoRecovery		
	Attribute Name	Type	Optional	Description
	enable_srdfa_auto_recovery	Boolean	Yes	Parameters for enabling SRDF/A Autorecovery
Response Parameters:	Object		RdfGroup	
	Attribute Name	Type	Optional	Description
	RdfGroup	RdfGroup	Yes	SRDG Group Details

2.4.2.2.1 Sample JSON request

```
{
```



```
"action": "EnableSrdfaAutoRecovery",
"enable_srdfa_auto_recovery": {
  "enable": true
}
}
```

2.4.2.2.2 Sample JSON response

```
{
  "rdfgNumber": 1710,
  "label": "DRD2975yRZ",
  "remoteRdfgNumber": 371,
  "remoteSymmetrix": "000220002297",
  "numDevices": 1,
  "totalDeviceCapacity": 1.0,
  "localPorts": [
    "OR-1C:4",
    "OR-1C:5",
    "OR-2C:4",
    "OR-2C:5"
  ],
  "remotePorts": [
    "OR-1C:4",
    "OR-1C:5",
    "OR-2C:4",
    "OR-2C:5"
  ],
  "modes": [
```

```
"Asynchronous"
],
"type": "Dynamic",
"metro": false,
"async": true,
"witness": false,
"witnessProtectedPhysical": false,
"witnessProtectedVirtual": false,
"witnessConfigured": false,
"witnessEffective": false,
"biasConfigured": false,
"biasEffective": false,
"witnessDegraded": false,
"localOnlinePorts": [
  "OR-1C:4",
  "OR-1C:5",
  "OR-2C:4",
  "OR-2C:5"
],
"remoteOnlinePorts": [
  "OR-1C:4",
  "OR-1C:5",
  "OR-2C:4",
  "OR-2C:5"
],
"vasa_group": false,
"link_limbo": 10,
```

```
"hardware_compression": false,
"software_compression": false,
"device_polarity": "RDF1",
"offline": false,
"rdfa_properties": {
  "session_uncommitted_tracks": 0,
  "r1_to_r2_lag_time": 24,
  "duration_of_last_cycle": 15,
  "average_cycle_time": 15,
  "minimum_cycle_time": 15,
  "duration_of_last_transmit_cycle": 15,
  "transmit_queue_depth": 1,
  "cycle_number": 16,
  "transmit_idle_state": "Enabled",
  "transmit_idle_time": 0,
  "consistency_protection": "Disabled",
  "dse_active": true,
  "dse_threshold": 50,
  "dse_autostart": "Enabled",
  "session_priority": 33,
  "consistency_exempt_volumes": false
},
"srdfa_auto_recovery_configured": true,
"srfda_auto_recovery_enabled": false,
"srdfa_auto_recovery_active": false
}
```

2.4.3 storagegroup

2.4.3.1 GET

Resource	storagegroup				
Request Type:	GET				
New Endpoint Description:	Get Replication Storage Group				
Modify Endpoint Description:	Added in this Release				
	Not Applicable				
	Modified in this Release				
	Not Applicable				
	Removed in this Release				
	Removed Response Attributes: - num_cloud_snapshots - sgSnapPolicyAssociation - cloud				
URL:	.../102/replication/symmetrix/{symmetrixId}/storagegroup/{storageGroupId}				
User Roles:	Monitor				
Prerequisite:	Not Applicable				
Path Parameters:	Attribute Name	Type	Optional	Description	
	symmetrixId	String	No	Unique identifier of the symmetrix	
	storageGroupId	String	No	Unique identifier of the Storage Group	
Query Parameters:	Not Applicable				
Request Parameters:	Not Applicable				

Response Parameters:	Not Applicable
-----------------------------	----------------

2.4.3.2 rdf_group

2.4.3.2.1 POST

Resource	rdf_group
Request Type:	POST
New Endpoint Description:	Not Applicable
Modify Endpoint Description:	Added in this Release Add a PerformanceImpactValidationOption with two values – Preview and IfRecommended. If performance_impact_validation_option is not specified, there is no change from /101 behavior. If Preview is specified and no replication validation errors are encountered, a 202 Accepted is returned along with a Performance_Impact_Result. If IfRecommended is specified and no replication validation errors are encountered, performance impact test is run against the specified or automatically selected RDF group or ports. If the performance impact check fails, a 412 Precondition Failed is returned along with a Performance_Impact_Result. Allow RDFG attributes to be specified via new object PerformanceImpactGeneratedRdfGroupType. This should primarily be used for generated values from performance impact tests (performance_impact_validation_option = Preview). Modified in this Release N/A Removed in this Release ForceNewRdfGroup flag will be removed. In automatic mode (no RDFG specified), a new RDF group will always be created.
URL:	... /102/replication/symmetrix/{symmetrixId}/storagegroup/{storageGroupId}/rdf_group

User Roles:	StorAdmin and above			
Prerequisite:	Not Applicable			
Path Parameters:	Not Applicable			
Query Parameters:	Not Applicable			
Request Parameters:		StorageGroupSrdfCreate		
	New Attribute Name	Type	Optional	Description
	performance_impact_generated_rdfg	PerformanceImpactGeneratedRdfGroupType	Yes	The RDF Group attributes generated during performance impact test
	performance_impact_validation_option	PerformanceImpactValidationOption	Yes	Optional setting to validate based on performance impact of request. Must be registered for performance data collection.
		PerformanceImpactGeneratedRdfGroupType		
	Attribute Name	Type	Optional	Description
rdfg_name	string	No	The name of the new RDF	

				Group generated during performance impact test
	local_rdfg_number	string	No	The number of the new Local SRDF Group generated during performance impact test
	remote_rdfg_number	string	No	The number of the new Remote SRDF Group generated during performance impact test
	local_port_keys	List of SymmetrixPortKeyTypes	No	The collection of Port Keys for the new Local SRDF Group generated during performance impact test
	remote_port_keys	List of SymmetrixPortKeyTypes	No	The collection of Port Keys for the new Remote SRDF Group generated during performance impact test
Response Parameters:	generated_input_param can contain new changes above.			

2.4.3.2.1.1 Sample JSON request

```
{
  "remoteSymmId" : "000197802859",
  "replicationMode" : "Active",
```

```

"remoteStorageGroupName" : "wlp_io_cache_friendly",
"performance_impact_generated_rdfg": {
  "rdfg_name": "specified_rdfg_name",
  "local_rdfg_number": "29",
  "remote_rdfg_number": "29",
  "local_port_keys": [
    {
      "directorId": "RF-2G",
      "portId": "6"
    },
    {
      "directorId": "RF-1G",
      "portId": "6"
    }
  ],
  "remote_port_keys": [
    {
      "directorId": "RF-3H",
      "portId": "11"
    },
    {
      "directorId": "RF-1H",
      "portId": "11"
    }
  ]
},
"performance_impact_validation_option" : "Preview"
}

```

2.4.3.2.1.2 Sample JSON response

```

{
  "recommended": true,
  "performance_impact_score": 8.19,
  "rdf_performance_impact": {
    "source": {
      "current": 7.86,
      "updated": 8.19
    },
    "target": {
      "current": 7.16,
      "updated": 7.21
    },
    "overall": {
      "current": 7.86,
      "updated": 8.19
    }
  },
  "generated_input_param": {
    "remoteSymmId": "000197802859",
    "replicationMode": "Active",

```



```

"remoteStorageGroupName": "wlp_io_cache_friendly",
"performance_impact_generated_rdfg": {
  "rdfg_name": " specified_rdfg_name",
  "local_rdfg_number": "29",
  "remote_rdfg_number": "29",
  "local_port_keys": [
    {
      "directorId": "RF-2G",
      "portId": "6"
    },
    {
      "directorId": "RF-1G",
      "portId": "6"
    }
  ],
  "remote_port_keys": [
    {
      "directorId": "RF-3H",
      "portId": "11"
    },
    {
      "directorId": "RF-1H",
      "portId": "11"
    }
  ]
},
"performance_impact_validation_option": "IfRecommended"
},
"generated_link": "https://10.247.73.190:8443/univmax/restapi/102/replication/symmetrix/000197904383
/storagegroup/wlp_io_cache_friendly/rdf_group",
"success": true
}

```

2.4.4 snapshot_policy

2.4.4.1 GET

Resource	snapshot_policy	
Request Type:	GET	
New Endpoint Description:	Get Replication Snapshot Policy	
Modify Endpoint Description:	Added in this Release	
	Not Applicable	

	Modified in this Release				
	Not Applicable				
	Removed in this Release				
	Removed Response Attributes: - provider_name - retention_days				
URL:	.../102/replication/symmetrix/{symmetrixId}/snapshot_policy/{snapshotPolicyId}				
User Roles:	Monitor				
Prerequisite:	Not Applicable				
Path Parameters:	Attribute Name	Type	Optional	Description	
	symmetrixId	String	No	Unique identifier of the symmetrix	
	snapshotPolicyId	String	No	Unique identifier of the Snapshot Policy	
Query Parameters:	Not Applicable				
Request Parameters:	Not Applicable				
Response Parameters:	Not Applicable				

2.4.4.2 POST

Resource	snapshot_policy		
Request Type:	GET		
New Endpoint Description:	Create Replication Snapshot Policy		
Modify Endpoint Description:	Added in this Release		
	Not Applicable		
	Modified in this Release		
	Not Applicable		

	Removed in this Release				
	Removed Request Attributes: cloud_snapshot_policy_details				
URL:	.../102/replication/symmetrix/{symmetrixId}/snapshot_policy				
User Roles:	Monitor				
Prerequisite:	Not Applicable				
Path Parameters:	Attribute Name	Type	Optional	Description	
	symmetrixId	String	No	Unique identifier of the symmetrix	
Query Parameters:	Not Applicable				
Request Parameters:	Not Applicable				
Response Parameters:	Not Applicable				

2.5 Mainframe

2.5.1 CU Image

Resource	mainframe				
Request Type:	DELETE				
New Endpoint Description:	Endpoint to delete a Mainframe CU Image Object				
Modify Endpoint Description:	Added in this Release				
	Not Applicable				
	Modified in this Release				
	Not Applicable				
	Removed in this Release				
	Not Applicable				
	Not Applicable				

URL:	... /102/mainframe/symmetrix/{symmetrixId}/split/{splitId}/cu_image/{culImageSsid}		
User Roles:	Mainframe Admin/StorAdmin and above		
Prerequisite:	Not Applicable		
Path Parameters:			
	Attribute Name	type	Description
	symmetrixId	String	The unique system ID.
	splitId	String	The unique split name.
	culImageSsid	String	The unique CU Image Subsystem ID.
Query Parameters:			
	Attribute Name	Type	Description
	unmap_volumes	Boolean	Optional flag that will attempt to unmap all volumes from a CU Image before deleting. Attempting to delete a CU Image with mapped volumes will fail.
Request Parameters:	Not Applicable		
Response Parameters:	Not Applicable		

2.6 Migration

2.7 Mobility

2.8 VVOL

2.8.1 pemaskingview

2.8.1.1 POST

Resource	pemaskingview
Request Type:	POST

New Endpoint Description:	Not Applicable
Modify Endpoint Description:	
	Added in this Release
	Not Applicable
	Modified in this Release
	Not Applicable
	Removed in this Release
	Endpoint removed
URL:	.../102/vvol/symmetrix/{symmetrixId}/pemaskingview
User Roles:	SecurityAdmin and above
Prerequisite:	Not Applicable
Path Parameters:	Not Applicable
Query Parameters:	Not Applicable
Request Parameters:	Not Applicable
Response Parameters:	Not Applicable

2.9 WLP

2.9.1 symmetrix

2.9.1.1 GET

Resource	symmetrix
Request Type:	GET
New Endpoint Description :	Not Applicable

Modify Endpoint Description :	Added in this Release			
	Added new response parameters.			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Not Applicable			
URL:	... /102/wlp/symmetrix/{symmetrixId}			
User Roles:	Monitor and above			
Prerequisite:	Not Applicable			
Path Parameters :	Not Applicable			
Query Parameters :	Not Applicable			
Request Parameters :	Not Applicable			
Response Parameters :	Object	WlpSymmetrix		
	Attribute Name	Type	Optional	Description
	performance_data_processing_state	DataProcessingStateTy pe *Enumeration possible values [Current, Stale, NoData]	Yes	Returns Current if system is registered for performance data collection and most recently processed timestamp is no more than 4 hours old. Otherwise, returns Stale.

	compliance_calculation_state	DataProcessingStateType *Enumeration possible values [Current, Stale, NoData]	Yes	Returns Current if service level compliance states have been updated within 4 hours of the most recently processed performance data timestamp. Otherwise, returns Stale.
	performance_data_processing_timestamp	Long	Yes	Timestamp associated with most recent performance data.
	compliance_calculation_timestamp	Long	Yes	Timestamp of most recent service level compliance calculations.

2.9.1.1.1 Sample JSON response

```
{
  "symmetrixId": "000197802859",
  "lastProcessed": 1697825400000,
  "nextUpdate": 1682,
  "performance_data_processing_state": "Current",
  "compliance_calculation_state": "Current",
  "performance_data_processing_timestamp": 1697825400000,
```

```
"compliance_calculation_timestamp": 1697825400000
}
```

2.9.2 headroom

2.9.2.1 GET

Resource	headroom			
Request Type:	GET			
New Endpoint Description:	Not Applicable			
Modify Endpoint Description:				
	Added in this Release			
	Added new response parameters.			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Not Applicable			
URL:	... /102/wlp/symmetrix/{symmetrixId}/headroom			
User Roles:	Monitor and above			
Prerequisite:	Not Applicable			
Path Parameters:	Not Applicable			
Query Parameters:	Not Applicable			
Request Parameters:	Not Applicable			
Response Parameters:	Object	HeadroomResult		
	Attribute Name	Type	Optional	Description
	capacity_load_index	double	Yes	Percentage of system effective

				capacity used.
	performance_load_index	double	Yes	Percentage of system performance capacity used (with system component best practice limits applied).

2.9.2.1.1 Sample JSON response

```
{
  "gbHeadroom": [
    {
      "srpId": "SRP_1",
      "emulation": "FBA",
      "capacity": 18064.54
    }
  ],
  "iopsHeadroom": 78194.74,
  "capacity_load_index": 11.9,
  "performance_load_index": 2.98
}
```

2.10 System

2.10.1 symmetrix

2.10.1.1 GET

Resource	symmetrix				
Request Type:	GET				
New Endpoint Description:	Not Applicable				
Modify Endpoint Description:					
	Added in this Release				
	Added new response property that defines whether XP10 Compression Hardware is configured on the system.				
	Modified in this Release				
	Not Applicable				
	Removed in this Release				
	Not Applicable				
URL:	restapi/102/system/symmetrix/{symmetrixId}				
User Roles:	Monitor and above				
Prerequisite:	Not Applicable				
Path Parameters:	Not Applicable				
Query Parameters:	Not Applicable				
Request Parameters:	Not Applicable				
Response Parameters:	Object	System			
	Attribute Name	Type	Optional	Description	
	xp10_compression_hardware	String	Yes	Defines whether XP10 Compression Hardware is configured on the system.	

2.10.2 secure_provision

2.10.2.1 GET

Resource	secure_provision				
Request Type:	GET				
New Endpoint Description	Retrieves the Secure Provision Restriction policy configured in the System				
Modify Endpoint Description	Added in this Release				
	Not Applicable				
	Modified in this Release				
	Not Applicable				
	Removed in this Release				
	Not Applicable				
URL:	.../102/system/symmetrix/{symmetrixId}/security/secure_provision				
User Roles:	SecurityAdmin and above				
Prerequisite:					
Path Parameters:	Attribute Name	Type	Optional	Description	
	symmetrixId	String	No	Unique identifier of the symmetrix	
Query Parameters:	Not Applicable				
Request Parameters:	Not Applicable				
Response Parameters:	Object	SecureProvision			
	Attribute Name	Type	Optional	Description	
	Secure_provision_restriction_enabled	Boolean	No	If true, it means that the secure provision operations are restricted to embedded. False otherwise	

2.10.2.1.1 Sample JSON response

```
{
  "secure_provision_restriction_enabled": true
}
```

2.10.2.2 PUT

Resource	secure_provision			
Request Type:	PUT			
New Endpoint Description	Enables or disables the Secure Provision Restriction policy configured in the System			
Modify Endpoint Description	Added in this Release			
	Not Applicable			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Not Applicable			
URL:	.../102/system/symmetrix/{symmetrixId}/security/secure_provision			
User Roles:	SecurityAdmin and above			
Prerequisite:				
Path Parameters:	Attribute Name	Type	Optional	Description
	symmetrixId	String	No	Unique identifier of the symmetrix
Query Parameters				
Request Parameters	Object	ModifySecureProvisionRestrictionParamType		
	Attribute Name	Type	Optional	Description
	action	ModifySecureProvisionAction	No	The action to perform

	Object	ModifySecureProvisionAction			
	Type	Value			
	Enumeration	[Enable, Disable]			
Response Parameters	Object	SecureProvision			
	Attribute Name	Type	Optional	Description	
	Secure_provision_restriction_enabled	Boolean	No	If true, it means that the secure provision operations are restricted to embedded. False otherwise	

2.10.2.2.1 Sample JSON Request

```
{
  "action": "Enable"
}
```

2.10.2.2.2 Sample JSON Response

```
{
  "secure_provision_restriction_enabled": true
}
```

2.10.3 Cloud

2.10.3.1 General Update

In the 10.2 release, U4P is no longer supporting any Cloud mobility functionality hence there will be no new Cloud Endpoints added to the /102 namespace.

The existing the Cloud endpoints up to /102 will still exist but will return the following response

Response Code: 400

Response Msg: Cloud operations are no longer supported.

2.10.4 ldap

2.10.4.1 GET

Resource	ldap			
Request Type:	GET			
New Endpoint Description:	Returns LDAP authority enablement status			
Modify Endpoint Description:				
	Added in this Release			
	Not Applicable			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Not Applicable			
URL:	... /102/system/authorization/ldap			
User Roles:	Administrator/Storage Administrator/Security Administrator/Monitor/Auditor/Performance Monitor			
Prerequisite:	Not Applicable			
Path Parameters:	Not Applicable			
Query Parameters:	Not Applicable			
Request Parameters:	Not Applicable			
Response Parameters:	Object	ldapConfiguration		
	Attribute Name	Type	Optional	Description
	authority_enabled	boolean	Yes	The LDAP authority enablement status

2.10.4.1.1 Sample JSON response

```
{
  "authority_enabled": true
}
```

2.10.4.2 PUT

Resource	ldap			
Request Type:	PUT			
New Endpoint Description:	Allows the user to enable LDAP authority			
Modify Endpoint Description:				
	Added in this Release			
	Not Applicable			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
URL:	... /102/system/authorization/ldap			
User Roles:	Administrator/Security Administrator			
Prerequisite:	Not Applicable			
Path Parameters:	Attribute Name	Type	Description	
	symmetrixId	String	Unique identifier of the symmetrix	
Query Parameters:	Not Applicable			

**Request
Parameters:**

Object	ModifyLdapConfigurationParam		
Attribute Name	Type	Optional	Description
action	String enum: Enable	No	The action to be performed.
enable_ldap_authority	EnableLdapAuthorityParamType	No	Enable LDAP-SSL Authentication Authority

Object	EnableLdapAuthorityParamType		
Attribute Name	Type	Optional	Description
server	String	No	IP address or hostname of the LDAP server to use for authentication
port	string	No	Port number of the LDAP service
bind_dn	string	No	Distinguished name of the privileged account used to perform operations, such as searching users and groups, on the LDAP directory
bind_password	string	No	Password of the privileged account
user_search_path	string	No	Distinguished name of the node at which to begin user searches
user_object_class	string	No	Object class identifying

				users in the LDAP hierarchy
	user_id_attribute	string	No	Attribute identifying the user login ID within the user object
	group_search_path	string	No	Distinguished name of the node at which to begin group searches
	group_name_attribute	string	No	Attribute identifying the group name
	group_member_attribute	string	No	Attribute indicating group membership for a user within the group object
	group_object_class	string	No	Object class identifying groups in the LDAP hierarchy
	ssl_certificate	string	No	Root Certificate of LDAP Server
	limit_authentication_to_ldap_group_members	boolean	No	Specifies whether to limit authentication to members of LDAP groups
	ldap_group_names	string	Yes	Comma-separated list of LDAP groups
Response Parameters:				
	Object	ldapConfiguration		

	Attribute Name	Type	Optional	Description	
	authority_enabled	boolean	Yes	The LDAP authority enablement status	

2.10.4.2.1 Sample JSON request

```
{
  "action": "Enable",
  "enable_ldap_authority": {
    "server": "10.247.74.173",
    "port": "636",
    "bind_dn": "CN=tuser1,CN=Users,DC=eee,DC=infra,DC=dev",
    "bind_password": "Password1",
    "user_search_path": "DC=eee,DC=infra,DC=dev",
    "user_object_class": "user",
    "user_id_attribute": "samsaccountname",
    "group_search_path": "DC=eee,DC=infra,DC=dev",
    "group_name_attribute": "cn",
    "group_member_attribute": "member",
    "group_object_class": "group",
    "ssl_certificate": "-----BEGIN CERTIFICATE-----
\nMIIG9TCCBN2gAwIBAgITLQAABmeFwV98WOc6AAAAAAGTANBgkqhkiG9w0BAQ0FADBbMRMwE
QYKCZImiZPyLGBGRyDZGV2MRUwEwYKCZImiZPyLGBGRyFaW5mcmExEzARBgoJkiaJk/
+NtLBz+TBQ4qUzmiJ0THW45RjFkRI2iP3fUgNCJw52dS075o+QjgQpXclwJvah6FzTIY9fZv41uDbanMVbZ
GhvnBseCRrdEmcwb0Cf/F94Tpi0phS/epVEy1xILhMzc1ddOM367t/rtyrty546547gJEiMVsyqS09RLZT2fXte
niHVorSN3WeSqYhKR0yDuLUB+YOIZB1zlpTlzcNEJPKvOmXWNRFYSCQK3MEDmLVrgM78oRnVeeoRr
MIJRqq+MEfgPBLfG+XvguyP\n-----END CERTIFICATE-----\n",
    "limit_authentication_to_ldap_group_members": "true",
    "ldap_group_names": "group1, group2"
  }
}
```

2.10.4.2.2 Sample JSON response

```
{
  "authority_enabled": true
}
```

2.10.5 director/port

2.10.5.1 GET (Object)

Resource	port
Request Type:	GET

New Endpoint Description:	Not Applicable				
Modify Endpoint Description:	Added in this Release				
	Not Applicable				
	Modified in this Release				
	Added Response Properties negotiated_speed				
	Added 2 new properties to retrieve information about the Director Port Chap authentication and if it is set and enabled				
	Removed in this Release				
	wwn_node. Query Parameter doesn't appear to ever have been used, going as far back as 9.1, therefore this will no longer be an optional query parameter.				
URL:	.../102/system/symmetrix/{symmetrixId}/director/{directorId}/port/{portId}}				
User Roles:	Monitor				
Prerequisite:	Not Applicable				
Path Parameters:	Attribute Name	Type	Optional	Description	
	symmetrixId	String	No	Unique identifier of the symmetrix	
	directorId	String	No	The Director ID, e.g. OR-3C	
	portId	String	No	The Port ID, e.g. 001	
Query Parameters:					
	Attribute Name	Type		Description	
	negotiated_speed	String		Filter ports based on their negotiated speed. When querying negotiated speed, please use the following formats. Equals: negotiated_speed=32 Greater Than: negotiated speed=>32	

			Less Than: negotiated_speed=<32
	chap_set	Boolean	Whether chap is set
	chap_enabled	Boolean	Whether Chap is enabled
Request Parameters:			
Response Parameters:	Not Applicable		

2.10.5.1.1 Sample JSON response

```
{
  "symmetrixPort": {
    "symmetrixPortKey": {
      "directorId": "OR-3C",
      "portId": "000"
    },
    "port_status": "ON",
    "director_status": "Online",
    "type": "OSHostAndRDF",
    "identifier": "nqn.se.test.com",
    "negotiated_speed": "16",
    "num_of_port_groups": 0,
    "num_of_masking_views": 0,
    "num_of_mapped_vols": 0,
    "vcm_state": "Enabled",
    "aclx": true,
    "vnx_attached": false,
    "avoid_reset_broadcast": false,
    "environ_set": false,
    "disable_q_reset_on_ua": false,
    "soft_reset": false,
    "scsi_3": false,
    "scsi_support1": false,
    "spc2_protocol_version": false,
    "rx_power_level_mw": 0.5621,
    "tx_power_level_mw": 0.676,
    "power_levels_last_sampled_date_milliseconds": 1695811101000,
    "max_speed": "32",
    "wwn_node": "5000097200120bff",
    "iscsi_target": false,
    "iscsi_endpoint": false,
    "nvmetcp_endpoint": false,
    "network_id": 1,
  }
}
```

```
"tcp_port": 0,  
"ip_addresses": [  
  "172.125.0.130"  
]  
}  
}
```

2.10.5.1.2 Sample JSON Response – Chap is set and disabled.

```
{  
  "symmetrixPort": {  
    "symmetrixPortKey": {  
      "directorId": "OR-3C",  
      "portId": "000"  
    },  
    "port_status": "ON",  
    "director_status": "Online",  
    "type": "OSHostAndRDF",  
    "identifier": "iqn.1988-11.com.dell:600009700d1ffcd156e901770000028b",  
    "negotiated_speed": "32",  
    "num_of_port_groups": 2,  
    "num_of_masking_views": 2,  
    "num_of_mapped_vols": 6,  
    "vcm_state": "Enabled",  
    "aclx": true,  
    "vnx_attached": false,  
    "avoid_reset_broadcast": false,  
    "environ_set": false,  
    "disable_q_reset_on_ua": false,  
    "soft_reset": false,  

```

```
"scsi_3": true,
"scsi_support1": true,
"spc2_protocol_version": true,
"portgroup": [
  "00_KB_1",
  "iscsitest_PG"
],
"maskingview": [
  "iscsitest_MV",
  "00_KB_1_MV"
],
"rx_power_level_mw": 0.8988,
"tx_power_level_mw": 1.0245,
"power_levels_last_sampled_date_milliseconds": 1713972724000,
"max_speed": "32",
"wwn_node": "50000974100247ff",
"chap_set": true,
"chap_enabled": false,
"iscsi_target": true,
"iscsi_endpoint": true,
"nvmetcp_endpoint": false,
"network_id": 22,
"tcp_port": 3260,
"ip_addresses": [
  "151.151.151.1"
]
}
```

}

2.10.5.2 GET (List)

Resource				
Request Type:	GET			
New Endpoint Description:	Not Applicable			
Modify Endpoint Description:				
	Added in this Release			
	Not Applicable			
	Modified in this Release			
	Added two new request parameters to filter on chap authentication.			
	Removed in this Release			
	Not Applicable			
URL:	.../102/system/symmetrix/{symmetrixId}/director/{directorId}/port			
User Roles:	Monitor and above			
Prerequisites:				
Path Parameters:	Attribute Name	Type	Optional	Description
	symmetrixId	String	No	Unique identifier of the symmetrix
	directorId	String	No	Unique director Id

Query Parameters:			
Request Parameters:	Only displaying the new request parameters		
	Object	InitiatorEntity	
	Attribute Name	Type	Optional
	chap_set	Boolean	Yes
	chap_enabled	Boolean	Yes
Response Parameters:			

2.10.5.2.1 Sample JSON Response – List of Director Ports with Chap set

```
{  "symmetrixPortKey": [  
    {  
        "directorId": "OR-3C",  
        "portId": "000"  
    },  
    {  
        "directorId": "OR-3C",  
        "portId": "002"  
    }  
  ]  
}
```

2.10.5.3 PUT

Resource	Director Port
----------	---------------

Request Type:	PUT			
New Endpoint Description:	Not Applicable			
Modify Endpoint Description:				
	Added in this Release			
	Not Applicable			
	Modified in this Release			
	Add new options to set/ modify Chap on a Director Port.			
	Removed in this Release			
URL:	.../102/system/symmetrix/{symmetrixId}/director/{directorId}/port/{portId}			
User Roles:	StoAdmin and above			
Prerequisite:				
Path Parameters:	Attribute Name	Type	Optional	Description
	symmetrixId	String	No	Unique identifier of the symmetrix
	directorId	String	No	Unique identifier of the director
	portId	String	No	Unique identifier of the Port
Query Parameters:	Not Applicable			
Request Parameters:				
	Object	editPortActionParamType		
	Attribute Name	Type	Optional	Description

	modify_port_chap_authentication_param	ModifyPortChapAuthenticationParam	Yes	An object with the Chap Configuration Details
	Object	ModifyPortChapAuthenticationParam		
	Attribute Name	Type	Optional	Description
	action	ChapAuthenticationAction String enum: Set/Enable/Disable/Clear	No	Defines the action
	set	SetupChapAuthenticationParamType	Yes	Defines the Chap Credentials if action is Set
	Object	set		
	Attribute Name	Type	Optional	Description
	credential	String	No	Chap username
	secret	String	No	Chap Password
Response Parameters:				

2.10.5.3.1 Sample JSON Request – chap setup

```

{"editPortActionParamType":{
  " modify_port_chap_authentication_param":{
    "action":"Set",

```

```
"set":{
  "credential": "smc",
  "secret":"smc"
}
}
```

2.10.5.3.2 Sample JSON Request – disable chap

```
{"editPortActionParamType":{
  "modify_port_chap_authentication_param":{
    "action":"Disable",
  }
}
```

2.10.5.3.3 Sample JSON response

```
{
  "symmetrixPort": {
    "symmetrixPortKey": {
      "directorId": "OR-3C",
      "portId": "000"
    },
    "port_status": "ON",
    "director_status": "Online",
    "type": "OSHostAndRDF",
    "identifier": "iqn.1988-11.com.dell:600009700d1ffcd156e901770000028b",
    "negotiated_speed": "32",
    "num_of_port_groups": 2,
    "num_of_masking_views": 2,
  }
}
```

```
"num_of_mapped_vols": 6,
"vcm_state": "Enabled",
"aclx": true,
"vnx_attached": false,
"avoid_reset_broadcast": false,
"environ_set": false,
"disable_q_reset_on_ua": false,
"soft_reset": false,
"scsi_3": true,
"scsi_support1": true,
"spc2_protocol_version": true,
"portgroup": [
    "00_KB_1",
    "iscsitest_PG"
],
"maskingview": [
    "iscsitest_MV",
    "00_KB_1_MV"
],
"rx_power_level_mw": 0.89,
"tx_power_level_mw": 1.0245,
"power_levels_last_sampled_date_milliseconds": 1714234809000,
"max_speed": "32",
"wwn_node": "50000974100247ff",
"chap_set": true,
"chap_enabled": true,
"iscsi_target": true,
```

```
"iscsi_endpoint": true,  
"nvmetcp_endpoint": false,  
"network_id": 22,  
"tcp_port": 3260,  
"ip_addresses": [  
    "151.151.151.1"  
]  
}  
}
```

3 Appendix

3.1 Basic Authentication

Unisphere for VMAX REST API authorization is implemented using HTTP Basic Access Authentication. Basic Access Authentication allows the user to send an unencrypted Base64-encoded string that contains a username and password to the Unisphere for VMAX server.

Anonymous requests for a protected resource are rejected with a 401 (Access Denied) status code.

Known requests are validated against the existing Unisphere for VMAX users:

- Administrator
- Storage administrator
- Security administrator
- Monitor
- Auditor
- Performance monitor

3.2 Request Types

3.2.1 GET (OBJECT)

3.2.1.1 Sample

Resource	storagegroup
Request Type:	GET
New Endpoint Description:	Get a storage group object
Modify Endpoint Description:	
	Added in this Release
	Not Applicable
	Modified in this Release
	Not Applicable

	Removed in this Release			
	Not Applicable			
URL:	.../84/sloprovisioning/symmetrix/{symmetrixId}/storagegroup/{storagegroupid}			
User Roles:	Administrator/Storage Administrator/Security Administrator/Monitor/Auditor/Performance Monitor			
Prerequisite:	Not Applicable			
Path Parameters:	Attribute Name	Type	Optional	Description
	symmetrixId	String	No	Unique identifier of the symmetrix
	storageGroupId	String	No	The Storage Group Name
Query Parameters:	Not Applicable			
Header Parameters:	Not Applicable			
Request Parameters:	Not Applicable			
Response Parameters:				
	Object	storageGroup		
	Attribute Name	Type	Optional	Description
	storageGroupId	String	No	Unique identifier of the storage group instance
	slo	String	Yes	SLO that is associated with the storage group
	srp	String	Yes	SRP that is associated with the storage group
	hostIOLimit	HostIOLimitType	Yes	SRP that is associated with the storage group
	Object	HostIOLimitType		
	Attribute Name	Type	Optional	Description
	host_io_limit_mb_sec	String	No	The Host MB/s limit for the storage group
	host_io_limit_io_sec	String	Yes	The Host IO/s limit for the storage group
	dynamicDistribution	String	Yes	The dynamic distribution type, which can have "never", "always", or "on_failure" values

3.2.1.2 Response Codes

Response status code	Description
200	OK. The request is successful
401	Returned if an incorrect username, password, or both are specified
403	Returned if the specified username and password are correct, but the user is not authorized to make this request
404	Returned if the storage group [storageGroupId] on the Symmetrix [SymmetrixId] system cannot be found.
500	Returned if a problem occurred when the system was retrieving the <STORAGE_GROUP> resource: <STORAGE_GROUP_Name>
503	Returned if the server was unable to fulfill the request

3.2.2 GET (LIST)

3.2.2.1 Sample

Resource	storagegroup		
Request Type:	GET		
New Endpoint Description:	Get a list of storage group names		
Modify Endpoint Description:			
	Added in this Release		
	Not Applicable		
	Modified in this Release		
	Not Applicable		
	Removed in this Release		
	Not Applicable		
URL:	... /84/sloprovisioning/symmetrix/{symmetrixId}/storagegroup		
User Roles:	Administrator/Storage Administrator/Security Administrator/Monitor/Auditor/Performance Monitor		
Prerequisite:	Not Applicable		
Path Parameters:	Attribute Name	Type	Description
	symmetrixId	String	Unique identifier of the symmetrix
Query Parameters:	Attribute Name	Type	Description
	storageGroupId	String	An optional value that filters the returned list so it displays storage group names that contain the specified volume names only, for

			example, equal to "storageGroupId=gold_SG" or contain "storageGroupId=< like>gold"	
	sym_vol_name	String	An optional value that filters the returned list so it displays storage group names that contain the specified volumes names only, for example, equal to "sym_vol_name=00123" or contain "sym_vol_name=< like>12"	
	And so on			
Header Parameters:	Not Applicable			
Request Parameters:	Not Applicable			
Response Parameters:	Object	ListStorageGroupResult		
	Attribute Name	Type	Optional	Description
	storageGroupId	String array	No	A list of storage group names

3.2.2.2 Response Codes

Response status code	Description
200	OK. The request is successful
401	Returned if an incorrect username, password, or both are specified
403	Returned if the specified username and password are correct, but the user is not authorized to make this request
500	Returned if a problem occurred when the system was retrieving the <STORAGE_GROUP> resource: <STORAGE_GROUP_Name>
503	Returned if the server was unable to fulfill the request

3.2.3 POST

3.2.3.1 Sample

Resource	storagegroup
Request Type:	POST
New Endpoint Description:	Create a storage group
Modify Endpoint Description:	Added in this Release

	Not Applicable				
	Modified in this Release				
	Not Applicable				
	Removed in this Release				
	Not Applicable				
URL:	... /84/sloprovisioning/symmetrix/{symmetrixId}/storagegroup				
User Roles:	Administrator/Storage Administrator				
Prerequisite :	Not Applicable				
Path Parameters:	Attribute Name	Type	Description		
	symmetrixId	String	Unique identifier of the symmetrix		
Query Parameters:	Not Applicable				
Header Parameters:	Not Applicable				
Request Parameters:	Object				
	createStorageGroupParam				
	Attribute Name		Type	Optional	Description
	storageGroupId		String	No	Unique identifier of the new storage group instance
	create_empty_storage_group		boolean	Yes	An empty storage group is created if you set this parameter to true. This parameter overrides any other

				create setting.
	sloBasedStorageGroupParam	SloBasedStorageGroupParamType	Yes	This parameter is required to create a SLO-based storage group. Multiple occurrences create multiple child storage groups.
	Object	SloBasedStorageGroupParamType		
	Attribute Name	Type	Optional	Description
	slold	String	No	The SLO that is to be associated with the storage group
	volumeAttribute	VolumeAttributeType	No	Size of each volume that is to be added to the storage group
	Object	VolumeAttributeType		
	Attribute Name	Type	Optional	Description
Response Parameters:	volume_size	String	No	The size of the volume
	capacityUnit	String enum: CYL MB GB TB	No	Unit of capacity
	SYNCHRONOUS:			
	Object	storageGroup		
	Attribute Name	Type	Optional	Description

	<Insert the noun or noun phrase that describes what is detailed> is detailed in the GET method.		
	ASYNCHRONOUS:		
	Object	job	
	Attribute Name	Type	Optional
	Description		
	<Insert the noun or noun phrase that describes what is detailed> is detailed in the Appendix.		

3.2.3.2 Response Codes

Response status code	Description
200	OK, returned when endpoint is used for operations that do NOT create a Resource using SYNCHRONOUS execution option.
201	Created, returned when Resource is created using SYNCHRONOUS execution option.
202	Accepted, returned when the request to create the resource is accepted using the ASYNCHRONOUS execution option.
400	Returned when an error occurs with the validation of the Request payload , for example:<STORAGE_GROUP> must be 1-64 alphanumeric, '_', or '-' characters
401	Returned if an incorrect username, password, or both are specified
403	Returned if the specified username and password are correct, but the user is not authorized to make this request
409	Returned if the requested <STORAGE_GROUP> resource already exists.
500	Returned if a problem occurred when the system was creating the <STORAGE_GROUP> resource: <STORAGE_GROUP_Name>
503	Returned if the server was unable to fulfill the request

3.2.3.3 Response Header

Asynchronous

The URL of the job

- Example: restapi/84/system/job/{jobId}

Synchronous:

The URL of the resource that is being created:

- Example:restapi/84/sloprovisioning/symmetrix/{symmetrixId}/storagegroup/{storageGroupId}

3.2.4 PUT

3.2.4.1 Sample

Resource	storagegroup
Request Type:	PUT

New Endpoint Description:	Modifies a storage group			
Modify Endpoint Description:				
	Added in this Release			
	Not Applicable			
	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Not Applicable			
URL:	... /84/sloprovisioning/symmetrix/{symmetrixId}/storagegroup/{storageGroupID}			
User Roles:	Administrator/Storage Administrator			
Prerequisite :	Not Applicable			
Path Parameters:	Attribute Name	Type	Description	
	symmetrixId	String	Unique identifier of the symmetrix	
	storageGroupId	String	The Storage Group Name	
Query Parameters:	Not Applicable			
Header Parameters:	Not Applicable			
Request Parameters:	Object		editStorageGroupParam	
	Attribute Name	Type	Optional	Description
	editStorageGroupActionParam	EditStorageGroupParamType	No	Select one of the Edit Options to modify the specified storage group

	Object		EditStorageGroupParamType		
	Attribute Name		Type	Optional	Description
	renameStorageGroupParam		RenameStorageGroupParamType	Yes	Renames the specified storage group
	editStorageGroupSLOParam		EditStorageGroupSLOParamType	Yes	Edit the SG SLO Applicable to stand-alone and child storage groups only
	Object		RenameStorageGroupParamType		
	Attribute Name		Type	Optional	Description
	new_storage_Group_name		String	No	The New Storage Group Name.
	Object		EditStorageGroupSLOParamType		
	Attribute Name		Type	Optional	Description
	slold		String	No	The New SLO Selection
Response Parameters:	SYNCHRONOUS:				
	Object		storageGroup		
	Attribute Name		Type	Optional	Description
	<Insert the noun or noun phrase that describes what is detailed> is detailed in the GET method.				
	ASYNCHRONOUS:				
	Object		job		
	Attribute Name		Type	Optional	Description

	<Insert the noun or noun phrase that describes what is detailed> is detailed in the Common Objects section.	
--	---	--

3.2.4.2 Response Codes

Response status code	Description
200	Ok, returned when Resource is edited using SYNCHRONOUS execution option.
202	Accepted, returned when the request to edit the resource is accepted using the ASYNCHRONOUS execution option. <u>Note:</u> In some rare circumstances, such as unmapping all volumes from a cu image, the cu image no longer exists; hence, there is no object or content to be returned. In these circumstances, a 204: No content will be returned after the job completes
400	Returned when an error occurs with the validation of the Request payload , for example:<STORAGE_GROUP> must be 1-64 alphanumeric, '_', or '-' characters
401	Returned if an incorrect username, password, or both are specified
403	Returned if the specified username and password are correct, but the user is not authorized to make this request
409	Returned if the requested <STORAGE_GROUP> resource already exists.
500	Returned if a problem occurred when the system was editing the <STORAGE_GROUP> resource: <STORAGE_GROUP_Name>
503	Returned if the server was unable to fulfill the request

3.2.4.3 Response Header:

Asynchronous:

The URL of the job

- For example, restapi/84/system/job/{jobId}

Synchronous:

A URI Header cannot be passed back in a 200(ok) Response

3.2.5 DELETE

3.2.5.1 Sample

Resource	storagegroup
Request Type:	DELETE
New Endpoint Description:	Deletes a storage group
Modify Endpoint Description:	Added in this Release Not Applicable

	Modified in this Release			
	Not Applicable			
	Removed in this Release			
	Not Applicable			
URL:	... /84/sloprovisioning/symmetrix/{symmetrixId}/storagegroup/{storagegroupId}			
User Roles:	Administrator/Storage Administrator			
Prerequisite:	Not Applicable			
Path Parameters:	Attribute Name	Type	Optional	Description
	symmetrixId	String	No	Unique identifier of the symmetrix
	storageGroupId	String	No	The Storage Group Name
Query Parameters:	Not Applicable			
Header Parameters:	Not Applicable			
Request Parameters:	Not Applicable			
Response Parameters:	No content			

3.2.5.2 Response Codes:

Response status code	Description
204	No Content, returned when Resource is deleted successfully
401	Returned if an incorrect username, password, or both are specified
403	Returned if the specified username and password are correct, but the user is not authorized to make this request
404	Returned if the requested <STORAGE_GROUP> resource cannot be found
500	Returned if a problem occurred when the system was deleting the <STORAGE_GROUP> resource: <STORAGE_GROUP_Name>
503	Returned if the server was unable to fulfill the request

3.3 Common Objects

3.3.1 Iterator

An Iterator is a paged list of objects that is cached for a set period of time. Until the expiry time has been reached, the list of objects can be queried by page from the following locations:

.../restapi/common/iterator/{iteratorId}

../restapi/common/Iterator/{iteratorId}/page?from=1050&to=1100

Object	iterator		
Attribute Name	Type	Optional	Description
id	String	No	Unique iterator identifier that is used to look up the result until the expiry time is reached
count	int	No	Total number of result objects
ExpirationTime	String	No	Unix timestamp that shows when the result will be removed from cache and no longer queryable
maxPageSize	int	No	Maximum number of results that is allowed per result list page
result	Object Array	No	Array of objects that is returned

3.3.1.1 Sample Object Array:

Object	Iterator that contains list of: daysToFullResultType		
Attribute Name	Type	Optional	Description
projectionDaysToFull	float	Yes	Number of days until the specified category will be full, - to a maximum of 180 days
ProjectionMaxProjectedData	float	Yes	Maximum number of days that will be projected
ProjectionCapacityTrend	float	Yes	Projected capacity
PercentUsedCapacity	double	Yes	Current percentage of used capacity
TotalPoolCapacityGB	double	Yes	Current total capacity
instanceId	String	No	The unique identifier of the returned category object

3.3.1.1.1 Sample JSON Response:

```
{
  "resultList": {
    "result": [
      {
        "ProjectionDaysToFull": 181,
```

```

    "ProjectionMaxProjectedData": 180,
    "ProjectionCapacityTrend": 0,
    "PercentUsedCapacity": 35.10973774908589,
    "TotalPoolCapacityGB": 45727.2,
    "instanceId": "0000000000001"
  }
],
"from": 1,
"to": 1
},
"id": "31d90275-c8d3-42d2-ab98-0343a3b3b16e_0",
"count": 1,
"expirationTime": 1474474773510,
"maxPageSize": 1000
}

```

3.3.2 Job

Object	job		
Attribute Name	Type	Optional	Description
jobId	String	No	Unique identifier of the job instance
name	String	Yes	Name of the job
status	JobStatus enum: CREATED SCHEDULED RUNNING SUCCEEDED FAILED ABORTED UNKNOWN VALIDATING VALIDATED VALIDATE_FAILED INVALID RETRIEVING_PICTURE	No	Current status of the job
username	string	No	User who initiated the job
last_modified_date	String	Yes	Date the job was last modified
last_modified_date_milliseconds	String	Yes	Date the job was last modified in milliseconds
scheduled_date	String	No	Date the job was last scheduled

scheduled_date_milliseconds	String	Yes	Date the job was last scheduled in milliseconds
completed_date	String	Yes	Date the job was completed
completed_date_milliseconds	String	Yes	Date the job was last completed in milliseconds
task	<u>TaskType</u>	Yes	Current status of the job
resourceLink	String	Yes	URL of the object that is created, when applicable
result	String	Yes	Description of the job outcome, its failure or success

Object	TaskType		
Attribute Name	Type	Optional	Description
execution_order	int	Yes	Order of the task
description	String	Yes	Description of the task

3.3.2.1 Sample JSON Response:

```
{
  "jobId": "1476181321815",
  "name": "Create SAMPLE_REST_PG ",
  "status": " SUCCEEDED ",
  "username": "smc",
  "last_modified_date": "Oct-11-2016 11:22:01.817",
  "last_modified_date_milliseconds": 1476181321817,
  "scheduled_date": "",
  "scheduled_date_milliseconds": 0,
  "completed_date": " Oct-11-2016 11:22:01.817",
  "completed_date_milliseconds": 1476181321817,
  "task": [
    {
      "execution_order": 1,
      "description": "Create Port Group : SAMPLE_REST_PG"
    }
  ],
}
```

```

"resourceLink":
https://IP\_ADDRESS:8443/univmax/restapi/84/sloprovisioning/symmetrix/{symmetrixId}/portgroup/SAMPLE\_REST\_PG,
"result": "SUCCEEDED - Started job execution on Fri 27 Jan 2017 07:57:59 AM GMT
Finished job execution on Fri 27 Jan 2017 07:58:49 AM GMT
Successfully created volume(s): 01076",
}

```

3.3.2.2 Response Codes:

Response status code	Description
200	Ok, returned when Resource is retrieved successfully
401	Returned if an incorrect username, password, or both are specified
403	Returned if the specified username and password are correct, but the user is not authorized to make this request
404	Returned if the requested resource cannot be found
500	Returned if a problem occurred when the system was retrieving the resource: <RESOURCE_NAME>
503	Returned if the server was unable to fulfill the request

3.3.3 Configuration Management Type

Object	ConfigurationManagementParamType		
Attribute Name	Type	Optional	Description
executionOption	String enum: SYNCHRONOUS ASYNCHRONOUS	Yes	Indicates whether the requested configuration management request should run synchronously or asynchronously

3.4 Automatic Cleanup of REST API jobs

All asynchronous and synchronous configuration change requests that are made through the REST API create a Job resource. Over time, the number of completed jobs accumulates and, without a mechanism to delete those jobs via the REST API, system performance might be impacted.

Because REST API jobs can be considered temporary resources that are relevant only while jobs run and to preempt any performance degradation, an automatic REST API cleanup task could perform a valuable function by deleting completed jobs.

The following list provides the functional requirements for implementing the automatic cleanup of REST API jobs:

- Only jobs that are created for REST API requests are eligible for automatic deletion.
- A cleanup task runs at a default of every 1 hour and deletes any eligible REST API jobs.
- A REST API job is eligible for deletion if it meets the following requirements:
 - Its status is one of SUCCEEDED, FAILED, or ABORTED.
 - At least the 1-hour default has passed since the job completed.
- The minimum time that must pass before a job is eligible for deletion is specified in hours, with a default value of 1. The valid range of values is from 1 to 32,767. The interval is configurable, and a new configuration requires an offline change to become active.
- Automatic cleanup of REST API jobs is enabled by default, but it is configurable. Cleanup can be disabled, and any new configuration requires an offline change to become active.
- If the Unisphere server is shutdown for any reason the REST API jobs on the system do not persist and will be deleted.

3.5 Enhanced Endpoints (PowerAPI)

PowerAPI style endpoints return all defined attributes in a single call instead of the traditional approach of querying for the id(s) of an object and then issuing another request to get the complete list of defined attributes.

It also allows for a common approach to filtering, sorting and selecting the desired attributes of the object, see below example and details of this Query approach.

Old style (using 2 requests):

```
../storagegroup?cap_gb=>100
{
    "storageGroupId": [
        "SG1",
        "SG2",
        .
    ]
}
../storage/SG1
{
    "storageGroupId": "SG1",
    "cap_gb": 100.01,
    .
}
```

New PowerAPI style:

```
../storage-groups?select=cap_gb&filter=cap_gb gt 100&order=id.asc
{
    "storage_groups":[
        {
            "id":"SG1",
            "cap_gb":101
        },
        {
            "id":"SG2",
```

```

    "cap_gb":150
  }
]
}

```

3.5.1 Base URL

3.5.1.1 <https://{ipaddress}:{port}/univmax/rest/>

3.5.2 Query Details:

3.5.2.1 Filtering:

filter (<i>row filtering</i>)	<attribute> <operator> <value>	?filter=age ge 13
---------------------------------	--------------------------------	-------------------

Operator	Meaning	Notes	Numeric	String	Enum
eq	equal		y	y	y
ne	not equal		y	y	y
gt	greater than		y	y	y
ge	greater than or equal		y	y	y
lt	less than		y	y	y
le	less than or equal		y	y	y
like	Simple substring match			y	
ilike	case insensitive substring match			y	

3.5.2.2 Ordering:

order (<i>sorting</i>)	<property>[.asc .dsc]	?order=last_name,age.dsc
--------------------------	-----------------------	--------------------------

3.5.2.3 Selecting:

select (<i>column filtering</i>)	<property>,<property>.<nested_property>	?select=id,name,volumes.id
------------------------------------	---	----------------------------

3.5.2.4 Sample

Below is a sample definition of how all query params will be handled, this will be used as the reference point for each query param.

Attribute Name	Optional	Type	Description
object_id	NO	String	this Attribute is <u>mandatory</u> , therefore there is no need to define it in the 'select' statement

			An optional value that can be used to 'filter' the response list ?filter=object_id eq string_value (see other options in the filter table defined above) An optional value that can be used to 'order' the response list: ?order=object_id.dsc
attribute_name	YES	String	An optional value that <u>must</u> be defined in the 'select' to be included in the response objects: ?select=attribute_name An optional value that can be used to 'filter' the response list: ?filter=attribute_name eq attribute_value (see other options in the filter table defined above) An optional value that can be used to 'order' the response list: ?order= attribute_name.dsc
nested_attribute_name	YES	Nested String	An optional value that <u>must</u> be defined in the 'select' to be included in the response objects: ?select=attribute_name. nested_attribute_name An optional value that can be used to 'filter' the response list: ?filter=attribute_name. nested_attribute_name eq attribute_value (see other options in the filter table defined above) // todo: should we only sort on top level attributes ? An optional value that can be used to 'order' the response list: ?order= attribute_name.dsc

3.5.2.4.1 Example query

3.5.2.4.1.1 URL

../storage-groups?**select**=snapshots.num_of_volumes,cap_gb&**filter**=cap_gb gt 100&**order**=id.asc

3.5.2.4.1.2 Response:

```
{
  "storage_groups":[
    {
      "id":"SG1",
      "cap_gb":101,
      "snapshots": {
        "num_of_volumes":12
      }
    },
    {
      "id":"SG2",
      "cap_gb":150,
      "snapshots": {
        "num_of_volumes":3
      }
    }
  ]
}
```