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IBM XIV Storage System User Manual



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Contents

Chapter 1. Introduction 1
Purpose and Scope 1
Intended Audience 1
Related Documentation 1
Documentation Conventions 1
Parameter Definitions 2

Chapter 2. Host and Cluster Management 3
Adding a Host to a Cluster 3
Creating a Cluster 4
Deleting Clusters 5
Listing Clusters 6
Removing a Host from a Cluster. 6
Renaming Clusters 7
Adding a Port to a Host 8
Defining a New Host 9
Deleting a Host 10
Listing Hosts 11
Listing Ports 12
Removing a Port from a Host 13
Renaming a Host 14
Updating a Host Definition 15
Mapping a Volume to a Host or Cluster 16
Listing the Mapping of Volumes to Hosts or Clusters 18
Setting the Special Type of Hosts or Clusters . . . 18
Listing Hosts/Cluster to which a Volume is Mapped 19
Unmapping a Volume from a Host or Cluster . . . 20
Creating a Performance Class 21
Deleting a Performance Class 22
Renaming a Performance Class 23
Listing Details on Performance Classes 23
Adding a Host to a Performance Class 24
Removing a Host from its Performance Class . . . 25
Setting the Rate for a Performance Class. 26

Chapter 3. Volume Management 29
Clearing Reservations of a Volume 29
Listing Reservation Keys 30
Listing Volume Reservations. 31
Finding a Volume Based on a SCSI Serial Number 32
Copying Volumes 33
Creating a Volume 36
Deleting a Volume 37
Formatting a Volume 39
Listing Volumes 40
Locking a Volume 42
Renaming a Volume 43
Resizing a Volume 44
Unlocking a Volume 47
Enabling VAAI Support For A Volume 48
Disabling VAAI Support For A Volume 49

Chapter 4. LUN Mapping Management 51

Chapter 5. Volume Snapshot Management 53
Changing a Snapshot Deletion Priority 53
Creating a Snapshot 54
Deleting a Snapshot 57
Duplicating a Snapshot 58
Formatting a Snapshot. 59
Listing Snapshot Information 61
Restoring a Volume from a Snapshot 62

Chapter 6. Consistency Group Management 65
Adding a Volume to a Consistency Group 65
Creating Consistency Groups 68
Deleting a Consistency Group 69
Listing Consistency Groups 70
Removing a Volume from a Consistency Group . . 71
Renaming Consistency Groups 73

Chapter 7. Snapshot Set Management 75
Snapshotting a Consistency Group 75
Changing Snapshot Group Deletion Priority . . . 77
Deleting a Snapshot Group 79
Disbanding a Snapshot Group 80
Duplicating a Snapshot Group 80
Formatting a Snapshot Group 82
Listing Snapshot Groups 83
Locking a Snapshot Group 84
Renaming a Snapshot Group 85
Restoring a Consistency Group from a Snapshot Group 86
Unlocking a Snapshot Group 87

Chapter 8. Storage Pool Management 89
Moving Consistency Groups between Storage Pools 89
Changing Pool Limitation 90
Changing Pool Settings for Snapshots 91
Creating Storage Pools. 93
Deleting a Storage Pool 95
Listing Storage Pools 96
Renaming a Storage Pool 97
Resizing a Storage Pool 98
Moving a Volume between Storage Pools 100

Chapter 9. System Management . . . 103
Displaying Current Consumed Capacity of the System 104
Printing Configuration Parameters 104
Setting Configuration Parameters. 106
Testing the DNS 107
Printing Help 108
Printing the Current Maintenance Urgency . . . 109
Adding a Patch Script that will be Run on System's Modules 110

Deletes a Patch Script 111
Listing Patch Scripts 112
Updating a Patch Script that will be Run on Systems Modules 113
Gets a Patch Script Result 114
Shutting Down 115
Changing the Operational State 116
Listing Operational State 117
Showing System Capacity, Free Space and Spares 118
Showing the Current Time 118
Setting the System's Time 119
Listing Optional Time Zones 120
Setting the Time Zone 120
Aborting the Upgrade to a New Software Version 121
Initiating Download of a New Software Version 121
Canceling an Upgrade Download Process 122
Forcing a Continuation of the Upgrade Process . . 123
Displaying Status of Upgrade Process 123
Upgrading a System 124
Validating the Prerequisites of an Upgrade to a New Software Version 126
Printing the Current System Version. 127
Showing Values of VPD Parameters.. 127
Setting VPD Parameters 128
Showing Values of Maintenance Module Parameters. 130
Displaying the System's MIB File. 131
Retrieves the Electronic License Acceptance Status 132
Retrieving a Fragment of the Electronic License File 132
Accept the Electronic License Agreement 133

Chapter 10. Remote Target Connectivity 135
Setting a Threshold for Link Disruption Duration that Triggers an Event 136
Updating the Target Mirroring Configuration. . . 136
Activating Connectivity to a Remote Target . . . 137
Deactivating Connectivity to a Remote Target . . 139
Defining Connectivity to a Remote Target 140
Deleting Connectivity to a Remote Target 141
Listing Target Connectivity Definitions 143
Defining a Remote Target 143
Deleting a Remote Target 145
Listing Remote Targets 146
Allowing Remote Mirroring Access 147
Activating a Port 148
Adding a New Port to a Remote Target 149
Deactivating a Port 150
Deleting a Port from a Remote System 151
Listing the Ports of a Remote Target. 152
Renaming a Remote Target 152
Updating the Target Configuration 153
Setting a threshold for target connectivity 154
Obtaining the threshold for target connectivity . . 154

Chapter 11. Remote Mirroring 157
Canceling a Snapshot Mirror (Ad Hoc Sync Job) 158
Creating a Snapshot Mirror (Ad Hoc Sync Job) . . 159
Activating Mirroring 163
Changing the RPO for Local/Remote System. . . 164
Changing a the Mirroring Peers' Designation . . . 166
Changing a Mirroring Schedule for Remote Slave Peers 167
Changing the Roles of a Mirrored Volume. . . . 169
Changing a Mirroring Schedule for Local Peers . . 171
Creating a Mirroring Definition 173
Deactivating Mirroring 178
Deleting a Remote Mirroring Definition 179
Viewing Mirroring Status 181
Obtaining Statistics On Past Sync Jobs 184
Switching Roles between Master and Slave . . . 185
Retrieving RPO Threshold 187
Setting RPO Threshold 187
Changes the Interval For a Schedule. 188
Creating a Schedule Object 189
Deletes a Schedule Object 191
Listing a Schedule Object 192
Renaming a Schedule Object 193
Viewing Sync Job Status. 193

Chapter 12. Data Migration 195
Activating Data Migration 195
Deactivating Data Migration 196
Defining Data Migration Configuration. 197
Deleting the Data Migration Process. 199
Listing Data Migration Statuses 200
Testing the Data Migration Definition 201

Chapter 13. Event Handling 203
Generating a Custom Event 204
Defining a New Event Notification Destination . . 204
Deleting a Destination 207
Listing Event Notification Destinations 208
Renaming a Destination 209
Testing a Destination 210
Updating an Event Notification Destination . . . 212
Adding a Destination to a Destination Group . . 214
Creating a Destination Group 215
Deleting a Destination Group 216
Listing Destination Groups 217
Removing a Destination from Destination Group 218
Renaming a Destination Group 219
Clearing Alerting Events 220
Listing Events 221
Listing Uncleared Alerting Events 223
Setting the Threshold for Events Notification . . . 224
Listing Thresholds. 225
Generating a Custom Event 226
Activating a Rule 227
Creating Event Notification Rules 228
Deactivating a Rule 230
Deleting Event Notification Rules 231
Listing Event Notification Rules 232
Renaming Event Notification Rules 233
Updating an Event Notification Rule 234
Defining an SMS Gateway 236
Deleting an SMS Gateway 238
Listing SMS Gateways 239
Prioritizing SMS Gateways 240
Renaming an SMS Gateway 241

Updating an SMS Gateway 242
Defining a New SMTP Gateway 243
Deleting an SMTP Gateway 245
Listing SMTP Gateways 246
Prioritizing SMTP Gateways 247
Renaming an SMTP Gateway 248
Updating an SMTP Gateway 249

Chapter 14. IP Configuration 251
Adding Ethernet Ports to IP Interfaces 251
Creating a New IP Interface 252
Deleting IP Interfaces. 254
Listing IP Interface Configuration 255
Showing the Status and Configuration of Ethernet Ports 256
Removing Ethernet Ports from IP Interfaces . . . 257
Renaming an IP Interface 258
Printing the ARP Database of an IP Interface . . . 258
Testing the Traceroute to a Remote IP 259
Updating an IP Interface 260
Connecting to a Support Center 261
Defining a Support Center 263
Deleting a Support Center 263
Disconnecting from a Support Center 264
Listing Support Centers 265
Presenting Status of a Support Center 265

Chapter 15. Infiniband. 267
Moves Existing Infiniband Port 267
Lists Configured IB Ports 268
Resumes a Port That Was Shutdown Due to Performance Problems 269
Collecting IB Switch Logs 270
List Configured IB Switches. 270
Listing sm_port Services Statuses. 273

Chapter 16. Access Control 275
Adding an Access Control Definition 275
Deleting an Access Control Definition 276
Listing Access Control Definitions 278
Adding an LDAP Server Definition 279
Testing an LDAP Configuration 280
Listing LDAP Configuration Parameters 281
Configuring LDAP in the System. 282
Listing LDAP Servers Defined in the System . . . 286
Listing LDAP-Based Authentication Mode. . . . 287
Enabling or Disabling LDAP-Based Authentication Mode 287
Updating an LDAP Server Definition 288
Removing an LDAP Server Definition 289
Testing User Credentials in LDAP Authentication 290
Defining a New User. 291
Deleting a User. 293
Adding Users to a User Groups 294
Creating User Groups 295
Deleting a User Group 297
Listing User Groups 298
Removing a User from a User Group 299
Renaming User Groups 300
Updating a User Group 301
Listing Users 301
Renaming Users 303
Updating a User Definition. 304

Chapter 17. Fibre Channel and iSCSI Configuration and Status 307
Discovering FC Hosts 307
Changing FC Port Configuration 308
Listing FC Ports 309
Resetting FC Ports. 310
Listing Connectivity to Hosts 311

Chapter 18. Hardware Maintenance 313
Listing ATS Configuration 314
Listing CFs in the System 316
Listing System Components 317
Phasing Out a Component 318
Phasing In a Component 320
Testing a Component. 321
Setting a Component as Equipped 322
Listing System Components Requiring Service . . 323
Forces the Service Required of a Component to OK 324
Mark Component as Failed. 325
Listing DIMMs in the System 326
Listing CPUs in the System. 327
Listing PCI Adapters in the System 329
Listing MaintenanceModules in the System . . . 330
Listing NICs in the System 331
Listing Modules Intternal Temperatures 333
Monitoring Rebuild or Redistribution Processes 334
Listing Disk Status 335
Listing Module Configuration 336
Reset Ethernet Interface 337
Check Modules Serial Connections 338
Lists Serial Consoles Statuses 339
Check File Systems Health State 340
Lists File Systems Statuses 340
Lists Visdors Statuses. 341
Listing UPS Component Statuses 343
Listing Service Status. 345
Listing PSUs in the System 345
Stopping System Traces 346
Resuming System Traces 347
Listing Status of System Traces 348
Sending a System Logs File as an Email Attachment 349
Notifying the System of a Technician at Work . . 350
Cancel UPS Calibration 352
Check UPS Monitor Cables. 352
Set the UPS Battery Date 353
Start UPS Calibration. 354
Start UPS Self Test. 355
Turn UPS Off 356
Listing Fans in the System 357
Listing SSDs that are Used as Flash Cache in the System 357

Chapter 19. Statistics 359
Getting Performance Statistics 359
Retrieving History Usage 363

Chapter 20. Meta-data 365
Setting Meta Data 365
Deleting Meta Data 366
Listing Meta Data 367

Chapter 21. Events 369

Chapter 22. Return Codes 469

Chapter 23. Glossary 471

Chapter 1. Introduction

Reliable high-end storage systems are critical for the successful operation of businesses. The XIV Grid Storage Platform is designed to guarantee secure, dependable, enterprise-grade data storage and access, straightforward and non-intrusive installation and upgrade and full scalability.

At the heart of the system are proprietary and innovative algorithms to offset any imaginable hardware malfunction and to minimize maintenance requirements. The flexibility and robustness of the system is further enhanced by virtue of the off-the-shelf hardware components (such as the SATA disk drives) that are easily integrated and supported.

Purpose and Scope

This document presents the XIV Command Line Interface (XCLI) functions. Relevant tables, charts, sample outputs and appropriate examples are also provided, as applicable.

This document contains the following chapters:

Introduction	Introduces the document, intended audience, related documentation and document conventions.
CLI Commands	Provides detailed information about each command in the XIV Command Line Interface (XCLI).
Event Descriptions	Provides detailed information about the events generated by the system.
Return Codes	Lists all UNIX return codes returned by the XCLI command.
Glossary	Provides an alphabetically ordered list of the definitions of the key terms and abbreviations used in this document.
Index	Provides an index of this document.

Intended Audience

This document serves as a reference for System Administrators and all IT staff that interface with the system via the CLI.

Related Documentation

- IBM XIV Theory of Operations
- IBM XIV XCLI Utility
- IBM XIV Storage System Release Notes - this document lists command addition, deletion and change for version 10.1.

Documentation Conventions

- *Notes* are embedded in the text, as shown in the example below.

  Note:

  This is an example of a Note.

- Code samples or output samples are documented in monospaced font. The text box for examples and output is framed around it. For example:
  –

    Example:

    ```
    vol_rename vol=DBVolume new_name=DBVolume1
    ```

  –

    Output:

    ```
    Command completed successfully
    ```

Parameter Definitions

Definition	Description	Syntax
IP Address	An address of the form N.N.N.N, where each N is a number between 0 and 255	n.n.n.n for n between 0 and 255.
Existing <object>	The name of an object. The object must already exist	Letters, digits, ~, \, ., _, -, with a maximum of 63, no spaces at the beginning and the end, no ALL or NONE (regardless of case).
Format string with runtime tokens.	A format string, where pre-defined tokens are replaced with run time information.	Letters, digits, ., - with a maximum of 64, with {} to define tokens.
iSCSI initiator name.	A legal name of iSCSI initiator.	Up to 253 characters with no spaces.

Chapter 2. Host and Cluster Management

The following sections describe the XIV Command Line Interface (XCLI) for host and cluster management.

The sections are listed as follows:

- cluster_add_host(Adds a host to a cluster.)
- cluster_create(Creates a new cluster.)
- cluster_delete(Deletes a cluster.)
- cluster_list(Lists a specific cluster or all of them.)
- cluster_remove_host(Removes a host from a cluster.)
- cluster_rename(Renames a cluster.)
- host_add_port(Adds a port address to a host.)
- host_define(Defines a new host to connect to the XIV system.)
- host_delete(Deletes a host.)
- host_list(Lists a specific host or all hosts.)
- host_list_ports(Lists all the ports of a host)
- host_remove_port(Removes a port from a host.)
- host_rename(Renames a host.)
- host_update(Updates a host definition.)
- map_vol(Maps a volume to a host or a cluster.)
- mapping_list(Lists the mapping of volumes to a specified host or cluster.)
- special_type_set(Sets the special type of a host or a cluster.)
- vol_mapping_list(Lists all hosts and clusters to which a volume is mapped.)
- unmap_vol(Unmaps a volume from a host or a cluster.)
- perf_class_create(Creates a Performance Class)
- perf_class_delete(Deletes a Performance Class)
- perf_class_rename(Renames a Performance Class)
- perf_class_list(Lists Performance Classes)
- perf_class_add_host(Adds a host to a Performance Class)
- perf_class_remove_host(Removes a host from its Performance Class)
- perf_class_set_rate(Sets the rate for a Performance Class)

The following commands are no longer in use:

- host_define_fc (This command has been replaced by the host_define command)
- host_define_iscsi (This command has been replaced by the host_define command)
- host_luns_list (This command has been replaced by map_list_luns)

Adding a Host to a Cluster

Adds a host to a cluster.

```
cluster_add_host cluster=ClusterName host=HostName map=<cluster|host>
```

Parameters:

Name	Type	Description	Mandatory	Default
cluster	Object name	Name of the cluster to contain the host.	Y	
host	Object name	Host to be added to the cluster.	Y	
map	Enumeration	Override the mapping of the host or cluster.	Y	

This command adds a host to a cluster.

This command fails if the host already belongs to another cluster.

This operation succeeds if the host already belongs to the specified cluster and has no effect.

Using the map parameter:

- If the map parameter is cluster, the mapping of the host and host type is changed to be the cluster's mapping and type.
- If the map parameter is host, the mapping of the cluster and its host type is changed to be the host's mapping and type.

The host or cluster is getting a single SCSI unit attention message, even if the change affects multiple volumes.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- CLUSTER_BAD_NAME
  Cluster name does not exist
- HOST_BELONGS_TO_ANOTHER_CLUSTER
  Host already belongs to another cluster

Creating a Cluster

Creates a new cluster.

```
cluster_create cluster=ClusterName
```

Parameters:

Name	Type	Description	Mandatory	Default
cluster	Object name	Name of the cluster to be created.	Y	

This command creates a new cluster. The newly created cluster does not contain hosts, has the default type and has no mapping.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CLUSTER_NAME_EXISTS
  Cluster name already exists
- MAX_CLUSTERS_REACHED
  Maximum number of clusters already defined

Deleting Clusters

Deletes a cluster.

```
cluster_delete cluster=ClusterName
```

Parameters:

Name	Type	Description	Mandatory	Default
cluster	Object name	Cluster to be deleted.	Y	

This command deletes a cluster. All hosts contained in the cluster remain active and are not deleted. The special type of each host is set to the cluster's special type. The mapping of each host is set to the cluster's mapping. No I/O interruption is caused by this command.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_ASSIGNED_CLUSTER
  Cluster *Cluster*' has hosts in it. Are you sure you want to delete it?

Completion Codes:

- CLUSTER_BAD_NAME
  Cluster name does not exist

Listing Clusters

Lists a specific cluster or all of them.

```
cluster_list [ cluster=ClusterName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
cluster	Object name	Cluster to be listed.	N	All clusters.

This command lists a specific cluster or all of them. For each cluster, a special type and a comma separated list of hosts is listed.

Id	Name	Description	Default Position
name	Name		1
hosts	Hosts		2
type	Type		3
creator	Creator		4
user_group	User Group		5

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Removing a Host from a Cluster

Removes a host from a cluster.

```
cluster_remove_host cluster=ClusterName host=HostName
```

Parameters:

Name	Type	Description	Mandatory	Default
cluster	Object name	Cluster name.	Y	

Name	Type	Description	Mandatory	Default
host	Object name	Host to be removed from cluster.	Y	

This command removes the specified host from a cluster. The host then no longer belongs to any cluster. The host's special type and mapping remain identical to the cluster's special type and mapping, and therefore, I/O is not interrupted. The association of the host with user or user groups remains the same as the cluster's association.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- CLUSTER_BAD_NAME
  Cluster name does not exist
- HOST_NOT_IN_CLUSTER
  Host is not part of specified cluster

Renaming Clusters

Renames a cluster.

```
cluster_rename cluster=ClusterName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
cluster	Object name	Cluster to be renamed.	Y	
new_name	Object name	New name of cluster.	Y	

This command renames the specified cluster.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CLUSTER_BAD_NAME
  Cluster name does not exist
- CLUSTER_NAME_EXISTS
  Cluster name already exists

Adding a Port to a Host

Adds a port address to a host.

```
host_add_port host=HostName < fcaddress=FCAdress | iscsi_name=iSCSIName >
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	The host name.	Y	
fcaddress		FC address of the added port.	N	
iscsi_name	iSCSI initiator name	iSCSI initiator name of the newly added port.	N	

The FC port address or iSCSI initiator (port) name assigned to the host must be unique per XIV system. The FC port name must be exactly 16 characters long, in hexadecimal form.

Only the following alphanumeric characters are valid: 0-9, A-F, a-f. In addition to the 16 characters, colons (:) may be used as separators in the 16 character port name. The iSCSI initiator name may not exceed 253 characters and may not contain any blank spaces.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- HOST_PORT_EXISTS
  Host with this port ID already defined
- ISCSI_HOST_ILLEGAL_PORT_NAME
  Port name for iSCSI Host is illegal
  Troubleshooting: Port names for iSCSI Hosts must contain only printable characters.
- MAX_PORTS_REACHED
  Maximum number of ports already defined in the system

Defining a New Host

Defines a new host to connect to the XIV system.

```
host_define host=HostName [ cluster=ClusterName ]
[ iscsi_chap_name=iscsiChapName iscsi_chap_secret=iscaiPass ]
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Name of host to be created.	Y	
cluster	Object name	Name of cluster to contain host.	N	No cluster.
iscsi_chap_name	String	The host's CHAP name identifier	N	[None]
iscsi_chap_secret	String	Password of initiator used to authenticate to XIV when CHAP is enabled	N	[None]

This command defines a host that will attach to the IBM XIV Storage System. The name of the host must be unique in the system.

Note:

Use the Adding a Port to a Host command to add port addresses to this host. Specifying the cluster is optional.

The parameters iscsi_chap_name and iscsi_chap_secret must either be both specified - or both left unspecified.

If the iscsi_chap_secret does not conform to the required secret length (96-128 bits)- the command will fail.

The command checks whether the iscsi_chap_name and iscsi_chap secret are unique. In case they are not, it displays an error message (but will not fail the command).

The secret has to be between 96 bits and 128 bits. There are 3 ways to enter the secret:

- Base64: requires to prefix the entry with 0b. each subsequent character entered is treated as a 6 bit equivalent length
- Hex: requires to prefix the entry with 0x. each subsequent character entered is treated as a 4 bit equivalent length
- String: requires no prefix (cannot be prefixed with 0b or 0x). Each character entered is treated as a 8 bit equivalent length

Example:

```
host_define host=server1
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ISCSI_CHAP_NAME_AND_SECRET_NOT_UNIQUE

  Both iSCSI CHAP name and secret are already used by another host. Are you sure you want to reuse those values?

Completion Codes:

- HOST_NAME_EXISTS

  Host name already exists
- MAX_HOSTS_REACHED

  Maximum number of hosts already defined
- CLUSTER_BAD_NAME

  Cluster name does not exist

Deleting a Host

Deletes a host.

```
host_delete host=HostName
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	The host name.	Y	

This command deletes a host. After this command is executed, the deleted host can no longer connect to the system, and I/O requests from this host are not handled.

Example:

```
host_delete host=mailserver
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_HOST
  Are you sure you want to delete host *Host*?

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist

Listing Hosts

Lists a specific host or all hosts.

```
host_list [ host=HostName ]  [ perf_class=perfClassName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	The host name.	N	All hosts.
perf_class	Object name	Name of a Performance Class	N	no filter.

This command lists all the hosts that have been defined in the XIV system.

A host name can be specified to list only a specific host or all the hosts.

The list contains the following comma separated information:

- Port addresses
- Containing cluster, if one exists
- Associated users and user groups

Example:

```
host_list host=mailserver
```

Output:

```
Name     Type      FC Ports   iSCSI Ports   User Group   Cluster
-------- --------- ---------- ------------- ------------ ---------
host_4   default              iscsi_4
host_5   default              iscsi_5
host_6   default              iscsi_6
host_7   default              iscsi_7
host_8   default              iscsi_8
host_9   default              iscsi_9
```

Id	Name	Description	Default Position
name	Name		1
type	Type		2
fc_ports	FC Ports		3
iscsi_ports	iSCSI Ports		4
creator	Creator		
user_group	User Group		5
cluster	Cluster		6
perf_class	Performance Class		7
iscsi_chap_name	iSCSI CHAP Name		
iscsi_chap_secret	iSCSI CHAP Secret		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Listing Ports

Lists all the ports of a host

```
host_list_ports host=HostName
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	The host name.	Y	

This command lists all the ports on a specified host.

Example:

```
host_list_ports host=tlib_host_pro125_fc0
```

Output:

```
Host                 Type       Port name
--------             ---------  ---------
tlib_host_pro125_fc0 FC         100000062B125CD0
```

Id	Name	Description	Default Position
host	Host		1
type	Type		2
port_name	Port Name		3

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Removing a Port from a Host

Removes a port from a host.

```
host_remove_port host=HostName < fcaddress=FCAdress | iscsi_name=iSCSIName >
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	The host name.	Y	
fcaddress		FC address of the port to be removed.	N	
iscsi_name	iSCSI initiator name	iSCSI initiator name of the port to be removed.	N	

This command removes a port from a host.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist

- PORT_DOES_NOT_BELONG_TO_HOST
  Port ID belongs to another host
- HOST_PORT_DOES_NOT_EXIST
  Port ID is not defined

Renaming a Host

Renames a host.

```
host_rename host=HostName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	The original host name.	Y	
new_name	Object name	The new host name. The new host name must be unique in the system.	Y	

This command renames a host. The new name of the host must be unique in the system.

The command still succeeds even if the new name is identical to the current name.

Example:

```
host_rename host=server2 new_name=mailserver
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- HOST_NAME_EXISTS
  Host name already exists

Updating a Host Definition

Updates a host definition.

```
host_update host=HostName [ iscsi_chap_name=iscsiChapName ][ iscsi_chap_secret=iscaiPass ]
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Name that represents the host to XIV	Y	
iscsi_chap_name	String	The host's CHAP name identifier	N	[unchanged]
iscsi_chap_secret	String	Password of initiator used to authenticate to XIV when CHAP is enabled	N	[unchanged]

This command updates the host definition. The command carries out the following CHAP-related checks:

- The parameters iscsi_chap_name and iscsi_chap_secret must either be both specified - or both left unspecified.These parameters have to be unique. In case they are not, an error message is presented to the user, but the command won't fail.
- The Secret needs to be between 96 bits and 128 bits. There are 3 ways to enter the secret:
  - Base64: requires to prefix the entry with 0b. each subsequent character entered is treated as a 6 bit equivalent length
  - Hex: requires to prefix the entry with 0x. each subsequent character entered is treated as a 4 bit equivalent length
  - String: requires no prefix (cannot be prefixed with 0b or 0x). Each character entered is treated as a 8 bit equivalent length
- If the iscsi_chap_secret does not conform to the required secret length (96-128 bits)- the command will fail.

Changing the chap_name and/or chap_secret:

- A warning message will be presented stating that the changes will apply only on the next time the host is connected.

Example:

```
host_update host iscsi_chap_name iscsi_chap_secret
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Disallowed	

Warnings:

- ISCSI_CHAP_NAME_AND_SECRET_NOT_UNIQUE

  Both iSCSI CHAP name and secret are already used by another host. Are you sure you want to reuse those values?
- ISCSI_CHAP_SECRET_NOT_UNIQUE

  iSCSI CHAP secret is already used by another host. Are you sure you want to reuse this value?
- ISCSI_CHAP_NAME_NOT_UNIQUE

  iSCSI CHAP name is already used by another host. Are you sure you want to reuse this value?

Completion Codes:

- HOST_BAD_NAME

  Host name does not exist
- ISCSI_CHAP_NAME_EMPTY

  CHAP name should be a non-empty string
- ISCSI_CHAP_NAME_TOO_LONG

  CHAP name is too long
- ISCSI_CHAP_SECRET_EMPTY

  CHAP secret should be a non-empty string
- ISCSI_CHAP_SECRET_BAD_SIZE

  CHAP secret should be 12 to 16 bytes long
- ISCSI_CHAP_SECRET_BAD_HEX_FORMAT

  CHAP secret is an illegal hexadecimal number or wrong size - should be 24 to 32 hexadecimal digits

Mapping a Volume to a Host or Cluster

Maps a volume to a host or a cluster.

```
map_vol <host=HostName | cluster=ClusterName> vol=VolName
lun=LUN [ override=<no|yes> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Host name.	N	
cluster	Object name	Cluster name.	N	
vol	Object name	Volume name.	Y	
lun	Integer	LUN identifier.	Y	
override	Boolean	Override existing mapping.	N	no

This command maps a volume to a host or to a cluster. It maps the volume to all the hosts that are contained in the cluster.

The command fails if:

- The host specified is contained in a cluster (must be done through the cluster)
- Another volume is mapped to the same LUN for this cluster/host, and the `override` parameter is not specified.
  - If the `override` parameter is specified, the mapping is replaced, so the host (or all hosts in the cluster) see continuous mapping of volume to this LUN, only that the content is changing (and maybe size).
- Mapping to a cluster, if the LUN was defined as an exception.
  - Whenever the LUN is defined as an exception, you have to map it directly to the host.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	This volume is a snapshot. The master volume of this snapshot is mapped to a host or cluster that is associated with the user executing this command. This snapshot was created by an application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_PERFORM_HOST_SPECIFIC_MAPPING
  '*Host*' is part of a cluster. Are you sure you want to map this volume only for that specific host?
- ARE_YOU_SURE_YOU_WANT_TO_MAP_VOLUME
  Are you sure you want to map volume *Volume*, which is already mapped to another host/cluster?

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- HOST_BELONGS_TO_CLUSTER
  Host is part of a cluster
- CLUSTER_BAD_NAME
  Cluster name does not exist
- VOLUME_BAD_NAME
  Volume name does not exist
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- VOLUME_ALREADY_ASSIGNED
  Mapping conflict: volume is already assigned
- LUN_ALREADY_IN_USE
  Mapping conflict: LUN is already in use
- EXT_LUN_ILLEGAL
  LUN is out of range or does not exist
- VOLUME_HAS_HOST_SPECIFIC_MAPPING
  Specified Volume is currently mapped to another LUN in a host-specific mapping

- LUN_HAS_HOST_SPECIFIC_MAPPING
  Specified LUN currently has another volume mapped in a host-specific mapping

Listing the Mapping of Volumes to Hosts or Clusters

Lists the mapping of volumes to a specified host or cluster.

```
mapping_list <host=HostName | cluster=ClusterName>
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Host name.	N	
cluster	Object name	Cluster name.	N	

This command indicates per each host mapping whether it is cluster-based.

Id	Name	Description	Default Position
lun	LUN		1
volume	Volume		2
size	Size		3
master	Master		4
serial	Serial Number		5
locked	Locked		6

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- CLUSTER_BAD_NAME
  Cluster name does not exist

Setting the Special Type of Hosts or Clusters

Sets the special type of a host or a cluster.

```
special_type_set <host=HostName | cluster=ClusterName>  type=<default|hpux|zvm>
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Host name.	N	
cluster	Object name	Cluster name.	N	
type	Enumeration	Special map type.	Y	

This command sets a special type for a host or a cluster. The supported special types are HPUX and ZVM. It should be specified for hosts or clusters that run the HP/UX operating system. All other operating systems do not require a special type.

Example:

```
special_type_set host=tlib_host_pro26_fc0 type=zvm
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- HOST_BELONGS_TO_CLUSTER
  Host is part of a cluster
- CLUSTER_BAD_NAME
  Cluster name does not exist

Listing Hosts/Cluster to which a Volume is Mapped

Lists all hosts and clusters to which a volume is mapped.

```
vol_mapping_list vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Volume name.	Y	

This command lists all the hosts and clusters to which a volume is mapped, as well as hosts that are part of a cluster and have host-specific mapping to the volume. The output list contains two columns: name of host/cluster and type (host or cluster).

Id	Name	Description	Default Position
host	Host/Cluster		1
type	Type		2
lun	LUN		3

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist

Unmapping a Volume from a Host or Cluster

Unmaps a volume from a host or a cluster.

```
unmap_vol <host=HostName | cluster=ClusterName> vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Host name.	N	
cluster	Object name	Cluster name.	N	
vol	Object name	Volume name.	Y	

This command unmaps a volume from a host or a cluster.

The command to unmap from a cluster will unmap the volume from all the hosts that are contained in that cluster.

The command fails if the specified host is contained in a cluster. In this case, the unmapping of the host must be performed through the cluster.

The command does not fail when the volume is not mapped to the host/cluster.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	

User Category	Permission	Condition
Application administrator	Conditionally Allowed	The volume is a snapshot, where its master volume is mapped to a host or cluster associated with the user and the snapshot was created by an application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- HOST_BELONGS_TO_CLUSTER
  Host is part of a cluster
- CLUSTER_BAD_NAME
  Cluster name does not exist
- VOLUME_BAD_NAME
  Volume name does not exist

Creating a Performance Class

Creates a Performance Class

```
perf_class_create perf_class=perfClassName
```

Parameters:

Name	Type	Description	Mandatory	Default
perf_class	String	Name of a Performance Class	Y	

This command creates a Performance Class. The Performance Class name must be unique. Up to 4 classes can be created.

Example:

```
perf_class_create perf_class=p1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- PERF_CLASS_EXISTS
  Performance Class already exists.
- MAX_PERF_CLASSES_REACHED
  Maximum number of volumes is already defined.

Deleting a Performance Class

Deletes a Performance Class

```
perf_class_delete perf_class=perfClassName
```

Parameters:

Name	Type	Description	Mandatory	Default
perf_class	Object name	Name of a Performance Class	Y	

This command deletes a Performance Class.

Example:

```
perf_class_delete perf_class=p1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_A_PERF_CLASS
  Are you sure you want to delete Performance Class *Performance Class*?
- ARE_YOU_SURE_YOU_WANT_TO_DELETE_A_PERF_CLASS_ASSOCIATED_WITH_HOSTS
  Deleting Performance Class *Performance Class* will remove the performance limits set for hosts associated with the Performance Class. Are you sure you want to delete Performance Class *Performance Class*?

Completion Codes:

- PERF_CLASS_BAD_NAME
  Performance Class does not exist

Renaming a Performance Class

Renames a Performance Class

```
perf_class_rename perf_class=perfClassName
        new_name=perfClassName
```

Parameters:

Name	Type	Description	Mandatory	Default
perf_class	Object name	Existing name of a Performance Class	Y	
new_name	String	New name for the Performance Class. Class new name must be unique.	Y	

This command renames a Performance Class.

Example:

```
perf_class_rename perf_class=p1 new_name=perf1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- PERF_CLASS_EXISTS
  Performance Class already exists.
- PERF_CLASS_BAD_NAME
  Performance Class does not exist

Listing Details on Performance Classes

Lists Performance Classes

```
perf_class_list [ perf_class=perfClassName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
perf_class	String	Name of a Performance Class. If left unspecified - all performance classes will be listed.	N	All Performance classes.

This command lists details of a specified Performance Class, or all Performance Classes.

Id	Name	Description	Default Position
name	Performance class		1
max_iops	Max IO rate(IOPOS)		2
max_bw	Max BW rate(MB/s)		3
hosts	Hosts		4

Example:

```
perf_class_list
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Allowed	
Technicians	Disallowed	

Adding a Host to a Performance Class

Adds a host to a Performance Class

```
perf_class_add_host perf_class=perfClassName host=host
```

Parameters:

Name	Type	Description	Mandatory	Default
perf_class	Object name	Name of a Performance Class	Y	
host	Object name	Name of a host that will be added to the performance class	Y	

This command adds a host to a Performance Class. If the host is already associated to another performance class, it is removed from it.

Example:

```
perf_class_add_host perf_class=p1 host=h1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- PERF_CLASS_BAD_NAME
  Performance Class does not exist
- HOST_BAD_NAME
  Host name does not exist

Removing a Host from its Performance Class

Removes a host from its Performance Class

```
perf_class_remove_host host=host
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Name of a host that will be removed from its Performance Class	Y	

This command removes a host from its Performance Class.

Example:

```
perf_class_remove_host host=h1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist

- PERF_CLASS_DOES_NOT_CONTAIN_ANY_HOSTS
  Performance Class is already empty

Setting the Rate for a Performance Class

Sets the rate for a Performance Class

```
perf_class_set_rate perf_class=perfClassName max_io_rate=iops & max_bw_rate=bw
```

Parameters:

Name	Type	Description	Mandatory	Default
perf_class	Object name	Name of a Performance Class	Y	
max_io_rate	Positive integer	Specifies the Performance Class maximum rate in IOPS per interface (IOPS). The max setting allowed is 100,000. If zero is specified, the IOPS rate will not be limited.	N	
max_bw_rate	Positive integer	Specifies the Performance Class maximum rate in bandwidth per interface (Mbps). The max setting allowed is 10,000. If zero is specified, the bandwidth rate will not be limited.	N	

This command sets the rate for a Performance Class. The specified rate is applied for each interface module. Either max_io_rate, max_bw_rate or both attributes must be set.

Example:

```
perf_class_set_rate perf_class=p1 max_io_rate=1000
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- PERF_CLASS_BAD_NAME
  Performance Class does not exist
- PERF_CLASS_INVALID_RATE
  The rate set for the Performance Class is invalid

Chapter 3. Volume Management

The following sections describe the XIV Command Line Interface (XCLI) for volume management. Other commands that are relevant to this topic are: Listing Volumes, Renaming a Volume, Moving a Volume between Storage Pools .

See also:

- Volume Snapshot Management
- Consistency Group Management
- Storage Pool Management

The sections are listed as follows:

- reservation_clear(Clears reservations of a volume.)
- reservation_key_list(Lists reservation keys.)
- reservation_list(Lists volume reservations.)
- vol_by_id(Prints the volume name according to its specified SCSI serial number.)
- vol_copy(Copies a source volume onto a target volume.)
- vol_create(Creates a new volume.)
- vol_delete(Deletes a volume.)
- vol_format(Formats a volume.)
- vol_list(Lists all volumes or a specific one.)
- vol_lock(Locks a volume so that it is read-only.)
- vol_rename(Renames a volume.)
- vol_resize(Resizes a volume.)
- vol_unlock(Unlocks a volume, so that it is no longer read-only and can be written to.)
- vol_enable_vaai(Enables VAAI support for a specified volume)
- vol_disable_vaai(Disables VAAI support for a specified volume)

The following commands are no longer in use:

- vol_clear_keys (Command is no longer in use in this version. Supplanted by new command reservation_clear.)

Clearing Reservations of a Volume

Clears reservations of a volume.

```
reservation_clear  vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to clear reservations of.	Y	

Clear reservations of a volume.

Example:

```
reservation_clear vol=Vol1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist

Listing Reservation Keys

Lists reservation keys.

```
reservation_key_list  [ vol=VolName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to list reservation keys.	N	All volumes.

Lists reservation keys.

Example:

```
reservation_key_list vol=Vol2
```

Output:

```
Initiator Port     Volume Name        Reservation Key
------------------ ------------------ -----------------
100000062B151C3C   vol-dmathies-0a7   2
100000062B151C3C   vol-dobratz-23a    3
```

Id	Name	Description	Default Position
initiator_port	Initiator Port		1
vol_name	Volume Name		2
reg_key	Reservation Key		3

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist

Listing Volume Reservations

Lists volume reservations.

```
reservation_list  [ vol=VolName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to list reservations of.	N	All volumes.

Lists volume reservations.

Example:

```
reservation_list vol=Vol1
```

Output:

```
Volume Name   Reserving Port   Reservation Type   Persistent
vol1                           none               none


Reservation Type   Persistent Access Type   Initiator UID   PR Generation
                   none                     -1              0
```

Id	Name	Description	Default Position
name	Volume Name		1
reserved_by_port	Reserving Port		2
reservation_type	Reservation Type		3
persistent_reservation_type	Persistent Reservation Type		4
access_type	Persistent Access Type		5
reserving_initiator_uid	Initiator UID	uid of reserving host	6
pr_generation	PR Generation		7
reservation_age	Reservation Age		8

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist

Finding a Volume Based on a SCSI Serial Number

Prints the volume name according to its specified SCSI serial number.

```
vol_by_id id=n
```

Parameters:

Name	Type	Description	Mandatory	Default
id	Positive integer	SCSI volume ID.	Y	

This command prints the volume name according to its specified SCSI serial number.

Id	Name	Description	Default Position
name	Name		1
size	Size (GB)		2
size_MiB	Size (MiB)		
master_name	Master Name		3
cg_name	Consistency Group		4
pool_name	Pool		5
creator	Creator		6
capacity	Capacity (blocks)		
modified	Modified		
sg_name	Snapshot Group Name		
delete_priority	Deletion Priority		
locked	Locked		
serial	Serial Number		
snapshot_time	Snapshot Creation Time		
snapshot_time_on_master	Master Copy Creation Time		
snapshot_of	Snapshot of		
sg_snapshot_of	Snapshot of Snap Group		
wwn	WWN		
mirrored	Mirrored		

Id	Name	Description	Default Position
locked_by_pool	Locked by Pool		
used_capacity	Used Capacity (GB)		7
used_capacity_MiB	Used Capacity (MiB)		
short_lived_io	Short Live IO		
enable_VAAI	VAAI enabled		
user_disabled_VAAI	VAAI disabled by user		
snapshot_format	Snapshot Format		
flash_caching	Flash Caching State		
use_flash_caching_default	Use Flash Caching Default State		

Example:

```
vol_by_id id=59
```

Output:

```
Name     Size (GB) Master Name Consistency Group Pool Creator Used Capacity(GB)
volume_1 51                                                    0
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_SERIAL

  Volume with requested SCSI serial number does not exist

Copying Volumes

Copies a source volume onto a target volume.

```
vol_copy vol_src=VolName vol_trg=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol_src	Object name	Name of the source volume from which the data is to be taken.	Y	

Name	Type	Description	Mandatory	Default
vol_trg	Object name	Name of the target volume to which the data is to be copied.	Y	

This command copies a source volume onto a target volume.

All data stored on the target volume is lost and cannot be restored.

This command performs the following as a single atomic action:

- Deletes the target volume.
- Creates a new volume with the same name as the target volume and the same size as the source volume.
- Instantly copies the source volume data onto the target volume.

All volume-to-host mappings of the target volume remain intact during this process. Except for its size, the target volume retains all of its properties, including its name, ID, lock state, creation time and all other attributes.

Immediately after the completion of the command, the volumes are independent of each other and are valid for any further operations (including deletion).

If the target volume is larger then the source volume, excess storage space is freed and returned to the target volume's Storage Pool. If the target volume is smaller than the source volume, all storage space that is needed to support the additional volume's capacity is reserved from the Storage Pool.

The command fails in the following cases:

- The target is not formatted.
- The source volume is larger than the target volume, and there is not enough free space in the Storage Pool that contains the target for target volume resizing.
- The target volume has a snapshot associated with it or if the target volume is a snapshot.
- The target volume is locked.
- The target volume is part of any mirroring definitions (either master or slave).
- The source volume is a slave of a synchronous mirroring, and it is currently inconsistent due to either a re-synchronization or an initialization process.
- There is not enough free space in the Storage Pool that contains the target

In the following example, the -y option suppresses the "ARE_YOU_SURE_YOU_WANT_TO_COPY_VOLUME Y/N" prompt.

Example:

```
vol_copy vol_src=DBVolume vol_trg=DBVolumeCopy
```

Output:

```
Command executed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_COPY_VOLUME
  Are you sure you want to copy the contents of volume *source Volume* to volume *target Volume*?

Completion Codes:

- NOT_ENOUGH_HARD_SPACE
  No space to allocate for volume's current usage
- NOT_ENOUGH_SPACE
  No space to allocate volume
- SOURCE_VOLUME_BAD_NAME
  Source volume name does not exist
- SOURCE_VOLUME_DATA_MIGRATION_UNSYNCHRONIZED
  Data Migration has not completed to source volume
- TARGET_VOLUME_BAD_NAME
  Target volume name does not exist
- TARGET_VOLUME_LOCKED
  Target volume is locked
- TARGET_VOLUME_HAS_MIRROR
  Mirror is defined for target volume
- TARGET_VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for target volume
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots
- VOLUME_IDENTICAL
  Source and target are the same volume
- VOLUME_HAS_SNAPSHOTS
  Volume has snapshots
- VOLUME_IS_NOT_CONSISTENT_SLAVE
  Operation not allowed on slave volume that is not consistent.
- TARGET_VOLUME_NOT_FORMATTED
  Target volume is not formatted
- SNAPSHOT_IS_FORMATTED
  Snapshot is formatted
- VOLUME_TOO_BIG_TO_COPY
  Volume is too large to be copied

Creating a Volume

Creates a new volume.

```
vol_create vol=VolName < size=GB | size_blocks=BLOCKS > pool=PoolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Volume name.	Y	
size	Positive integer	Volume size in GB.	N	
size_blocks	Positive integer	Size in number of blocks.	N	
pool	Object name	The name of the Storage Pool to which the volume belongs.	Y	

This command creates a new volume.

The name of the volume must be unique in the system.

Space for the volume is allocated from the specified Storage Pool and the volume belongs to that Storage Pool. Specifying the Storage Pool is mandatory.

When creating a volume, the storage space that is needed to support the volume's capacity is reserved from the soft capacity of the storage Pool for the volume.

The command fails if the reservation cannot be committed.

The volume is logically formatted at creation time, which means that any read operation results in returning all zeros as a response.

The size is the actual "net" storage space, as seen by the user's applications, not including any mirroring or other data protection overhead.

The free space consumed by the volume will be the smallest multiple of 17GB which is bigger than the specified size.

The size can be specified either in gigabytes or in blocks (where each block is 512 bytes). If the size is specified in blocks, volumes are created in the exact size specified. If the size is specified in gigabytes, the actual volume size is rounded up to the nearest 17GB multiple (making the actual size identical to the free space consumed by the volume, as described above). This rounding up prevents a situation where storage space is not fully utilized because of a gap between the free space used and the space available to the application. The size specified in blocks is exact.

The term GB (gigabytes) is defined in this context as 10^9 (and not as 2^{30} as in many other contexts).

Upon successful completion of the command, its lock state is *unlocked*, meaning that write, format and resize operations are allowed.

The creation time of the volume is set to the current time and is never changed.

Example:

```
vol_create vol=DBVolume size=2000 pool=DBPool
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_CANNOT_HAVE_ZERO_SIZE
  Volume size cannot be zero
- POOL_DOES_NOT_EXIST
  Storage Pool does not exist
- VOLUME_EXISTS
  Volume name already exists
- VOLUME_BAD_PREFIX
  Volume name has a reserved prefix
- NOT_ENOUGH_SPACE
  No space to allocate volume
- MAX_VOLUMES_REACHED
  Maximum number of volumes already defined
- ELECTRONIC_LICENSE_NOT_APPROVED
  Operation blocked until Electronic license approval
  Troubleshooting: Please retrieve Electronic license version and accept it

Deleting a Volume

Deletes a volume.

```
vol_delete vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to delete.	Y	

This command deletes a volume. All data stored on the volume is lost and cannot be restored.

This command cannot be applied to a snapshot. To delete a snapshot, use Deleting a Snapshot.

All storage space allocated (or reserved) for the volume is freed and returned to the volume's Storage Pool.

The volume is removed from all LUN Maps that contain a mapping of the volume.

This command deletes all snapshots associated with this volume. Even snapshots that are part of a Snapshot Group (this can happen when the volume was in a Consistency Group and was removed from it prior to the deletion).

This command cannot be applied to a volume that is part of a Consistency Group or to a volume that is mapped to a host or cluster.

The command succeeds regardless of the volume's lock state.

Example:

```
vol_delete vol=DBVolumeCopy
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_VOLUME
  Are you sure you want to delete volume *Volume*?
- ARE_YOU_SURE_YOU_WANT_TO_DELETE_VOLUME_WITH_SNAPSHOTS
  Volume *Volume* has snapshots! Are you sure you want to delete this volume AND all its snapshots?

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_HAS_MIRROR
  Mirror is defined for this volume
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- VOLUME_BELONGS_TO_CG
  Volume belongs to a Consistency Group
- VOLUME_IS_MAPPED
  Volume that is mapped to a host cannot be deleted

- VOLUME_HAS_MAPPED_SNAPSHOT
  Volume which has a snapshot that is mapped to a host cannot be deleted
- SNAPSHOT_HAS_ACTIVE_SYNC_JOB
  Snapshot is currently a target of an active sync job
  Troubleshooting: Please wait for sync job to complete

Formatting a Volume

Formats a volume.

```
vol_format vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to be formatted.	Y	

This command formats a volume. A formatted volume returns zeros as a response to any read command.

All data stored on the volume is lost and cannot be restored.

The formatting of the volume is done logically and no data is actually written to the physical storage space allocated for the volume. This allows the command to complete instantly.

The volume's lock state must be unlocked when the command is issued.

This command fails if the volume has snapshots associated with it, or if the volume is a snapshot, or if the volume is part of any mirroring or Data Migration definition.

Example:

```
vol_format vol=DBVolume
```

Output:

```
Command executed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_FORMAT_VOLUME
  Volume *Volume* may contain data. Formatting will cause data loss. Are you sure you want to format volume *Volume*?

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_HAS_SNAPSHOTS
  Volume has snapshots
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots
- VOLUME_LOCKED
  Volume is locked
- VOLUME_HAS_MIRROR
  Mirror is defined for this volume
- VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for this volume

Listing Volumes

Lists all volumes or a specific one.

```
vol_list [ vol=VolName | pool=PoolName | cg=CgName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of a specific volume to be listed.	N	All volumes.
pool	Object name	Name of a specific Pool whose volumes are to be listed.	N	Volumes in all Pools.
cg	Object name	List all the volumes in this Consistency Group.	N	All Consistency Groups.

This command lists volumes according to:

- Volume name
- Pool
- Consistency Group

If no parameter is indicated, the command lists all available volumes. In addition, the command indicates whether the volume is mirrored.

This command displays the following VAAI fields (available on the XML output format):

- enable_VAAI
- user_disabled_VAAI

This command displays the following snapshot format field (available on the XML output format):

- snapshot_format

Id	Name	Description	Default Position
name	Name		1

Id	Name	Description	Default Position
size	Size (GB)		2
size_MiB	Size (MiB)		
master_name	Master Name		3
cg_name	Consistency Group		4
pool_name	Pool		5
creator	Creator		6
capacity	Capacity (blocks)		
modified	Modified		
sg_name	Snapshot Group Name		
delete_priority	Deletion Priority		
locked	Locked		
serial	Serial Number		
snapshot_time	Snapshot Creation Time		
snapshot_time_on_master	Master Copy Creation Time		
snapshot_of	Snapshot of		
sg_snapshot_of	Snapshot of Snap Group		
wwn	WWN		
mirrored	Mirrored		
locked_by_pool	Locked by Pool		
used_capacity	Used Capacity (GB)		7
used_capacity_MiB	Used Capacity (MiB)		
short_lived_io	Short Live IO		
enable_VAAI	VAAI enabled		
user_disabled_VAAI	VAAI disabled by user		
snapshot_format	Snapshot Format		
flash_caching	Flash Caching State		
use_flash_caching_default	Use Flash Caching Default State		

Example:

```
vol_list
```

Output:

```
Name               Size (GB) Master Name Pool      Creator  Used Capacity (GB)
DBLog              3006                  MainPool  admin    0
Dev                2010                  MainPool  admin    0
Marketing          1013                  MainPool  admin    0
Dev.snapshot_00001 2010      Dev         MainPool  admin
Dev.snapshot_00002 2010      Dev         MainPool  admin
Dev.snapshot_00003 2010      Dev         MainPool  admin
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Locking a Volume

Locks a volume so that it is read-only.

```
vol_lock vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to lock.	Y	

This command locks a volume so that hosts cannot write to it.

A volume that is locked is write-protected, so that hosts can read the data stored on it, but cannot change it. In addition, a locked volume cannot be formatted or resized. In general, locking a volume prevents any operation (other than deletion) that changes the volume's image.

This command succeeds when the volume's lock state is already set to the one the user is trying to apply, while leaving it in the same lock state.

The lock states of master volumes are set to *unlocked* when they are created.

The lock states of snapshots are set to *locked* when they are created.

In addition to the lock state, snapshots also have a modification state. The modification state is a read-only state (which cannot be changed by the user explicitly) and it is initially set to *unmodified* when the snapshot is created. The first time a snapshot lock state is set to *unlocked*, the modification state of the snapshot is changed to *modified*, and it is never changed thereafter.

Example:

```
vol_lock vol=DBVolume
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	

User Category	Permission	Condition
Application administrator	Conditionally Allowed	The volume is a snapshot, where its master volume is mapped to a host or cluster associated with the user and the snapshot was created by an application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_IS_SLAVE
  Volume is defined as a slave volume
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group

Renaming a Volume

Renames a volume.

```
vol_rename vol=VolName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to be renamed.	Y	
new_name	Object name	New volume name.	Y	

This command renames a volume.

The new name of the volume must be unique in the system.

This command succeeds even if the new name is identical to the current name.

This command succeeds regardless of the volume's lock state.

Renaming a snapshot does not change the name of its master volume. Renaming a master volume does not change the names of its associated snapshots.

Example:

```
vol_rename vol=DBVolume new_name=DBVolume1
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	The volume is a snapshot, where its master volume is mapped to a host or cluster associated with the user and the snapshot was created by an application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_EXISTS
  Volume name already exists
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- VOLUME_BAD_PREFIX
  Volume name has a reserved prefix

Resizing a Volume

Resizes a volume.

```
vol_resize vol=VolName  < size=GB | size_blocks=BLOCKS >
[ shrink_volume=<yes|no> ] [ force_on_inactive_mirror=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	The name of the volume to be resized.	Y	
size		The new volume size.	N	
size_blocks		New size of volumes in number of blocks.	N	
shrink_volume	Boolean	Must be specified as yes if the new size is smaller than the current size.	N	No

This command resizes a volume.

The volume can be resized in either direction. However, whenever the volume is downsized, you have to specify this with shrink_volume="yes".

The new size of the volume is specified as an integer multiple of 10^9 bytes, but the actual new size of the volume is rounded up to the nearest valid size, which is an integer multiple of 16 x 2^{30} bytes.

If the new size equals the current size, the command will succeed without changes to the volume.

The volume's address space is extended at its end to reflect the increased size, and the additional capacity is logically formatted (that is, zeros are returned for all read commands).

When resizing a regular volume (not a writable snapshot), all storage space that is needed to support the additional volume's capacity is reserved (static allocation). This guarantees the functionality and integrity of the volume, regardless of the resource levels of the volume's Storage Pool. The command fails if this reservation cannot be committed.

The volume's lock state must be unlocked when the command is issued, or otherwise the command fails.

- Resizing a master volume does not change the size of its associated snapshots.
- These snapshots can still be used to restore their individual master volumes.
- The same goes for resizing a snapshot: it does not change the size of its master volume.

In the following example, the *-y* option suppresses the "ARE_YOU_SURE_YOU_WANT_TO_ENLARGE_VOLUME Y/N" prompt.

force_on_inactive_mirror

- This parameter enables to force the resizing of a mirror peer even if mirroring is inactive (this could happen when the mirroring cannot be activated due to size mismatch).

Example:

```
vol_resize -y vol=DBVolume size=2500
```

Output:

```
Command executed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_ENLARGE_VOLUME
  Are you sure you want to increase volume size?
- ARE_YOU_SURE_YOU_WANT_TO_REDUCE_VOLUME
  Decreasing volume size may cause data loss. Are you sure you want to proceed?
- VOLUME_WILL_CROSS_1TB_SIZE

Many operating systems do not support a resize operation across the 1TB boundary, are you sure?
Troubleshooting: Snapshot backup before resize is advised

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- ILLEGAL_VOLUME_SIZE
  Illegal volume size
- NOT_ENOUGH_SPACE
  No space to allocate volume
- REMOTE_VOLUME_SIZE_ABOVE_LIMIT
  Volume size specified is above limit of remote machine
- VOLUME_LOCKED
  Volume is locked
- VOLUME_IS_SLAVE
  Volume is defined as a slave volume
- MIRROR_IS_NON_OPERATIONAL
  Mirror is non-operational
- VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for this volume
- CAN_NOT_SHRINK_MAPPED_VOLUME
  Mapped volume's size cannot be decreased
- CAN_NOT_SHRINK_VOLUME_WITH_SNAPSHOTS
  Size of volume with snapshots cannot be decreased
- CAN_NOT_SHRINK_REMOTE_VOLUME_WITH_SNAPSHOTS
  Remote volume has snapshots
- CAN_NOT_SHRINK_MAPPED_REMOTE_VOLUME
  Remote volume is mapped
- REMOTE_VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for slave volume
- VOLUME_CANNOT_HAVE_ZERO_SIZE
  Volume size cannot be zero
- CAN_NOT_SHRINK_SNAPSHOTS
  Size of snapshots cannot be decreased
- CAN_NOT_RESIZE_ASYNC_INTERVAL_VOLUMES
  Size of volumes with asynchronous mirroring cannot be changed
- CAN_NOT_SHRINK_VOLUME
  Size of volumes cannot be decreased without explicit request
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds
- MIRROR_SIZE_MISMATCH
  Slave volume and Master Volume sizes are different
- MIRROR_POSSIBLE_SIZE_MISMATCH

Slave volume and Master Volume sizes may be different. This problem occurs whenever the Master does not receive an acknowledgement from the Slave until the command timed out, or any other unexpected failure.

- VOLUME_SIZE_ABOVE_LIMIT

  Volume size specified is above limit

Unlocking a Volume

Unlocks a volume, so that it is no longer read-only and can be written to.

```
vol_unlock vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	The name of the volume to unlock.	Y	

This command unlocks a volume so that it is no longer read-only and can be written into.

A volume that is unlocked is no longer write-protected.

The lock state of regular volumes is set to *unlocked* when they are created.

The lock state of snapshots is set to *locked* when they are created.

In addition to the lock state, snapshots also have a modification state. The modification state is a read-only state (which cannot be changed by the user explicitly) and it is initially set to *unmodified* when the snapshot is created. The first time a snapshot lock state is set to *unlocked*, the modification state of the snapshot is changed to *modified*, and it is never changed thereafter.

Note:

The modification time is the time when the unlock command was executed, regardless of the actual changes performed on the volume via write commands.

Example:

```
vol_unlock vol=DBVolume
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	

User Category	Permission	Condition
Application administrator	Conditionally Allowed	The volume is a snapshot, where its master volume is mapped to a host or cluster associated with the user and the snapshot was created by an application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_UNLOCK_SNAPSHOT
  Are you sure you want to unlock snapshot *Snapshot*?

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_IS_SLAVE
  Volume is defined as a slave volume
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group

Enabling VAAI Support For A Volume

Enables VAAI support for a specified volume

```
vol_enable_vaai [ vol=volName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Volume name.	N	All Volumes

This command enables VAAI support (Hardware Assisted Locking, Block Zeroing and Full Copy) for a specified volume (or for all volumes).

Example:

```
vol_enable_vaai vol=DBVolume
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_ENABLE_VAAI_FOR_ALL_VOLUMES
  Are you sure you want to enable VAAI for all volumes?

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist

Disabling VAAI Support For A Volume

Disables VAAI support for a specified volume

```
vol_disable_vaai [ vol=volName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Volume name.	N	All Volumes

This command disables VAAI support (Hardware Assisted Locking, Block Zeroing and Full Copy) for a specified volume (or for all volumes).

Example:

```
vol_disable_vaai vol=DBVolume
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DISABLE_VAAI_FOR_ALL_VOLUMES
  Are you sure you want to disable VAAI for all volumes?

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist

Chapter 4. LUN Mapping Management

All the LUN mapping commands are obsolete and were replaced by the clustering commands.

The sections are listed as follows:

The following commands are no longer in use:

- map_add_vol (The concept of mapping has been replaced by clusters. See map_volume.)
- map_create (The concept of mapping has been replaced by clusters. See map_volume and cluster_create.)
- map_delete (The concept of mapping has been replaced by clusters. See map_volume.)
- map_duplicate (The concept of mapping has been replaced by clusters.)
- map_link_host (The concept of mapping has been replaced by clusters. See map_volume.)
- map_list (The concept of mapping has been replaced by clusters.)
- map_list_luns (The concept of mapping has been replaced by clusters. See mapping_list)
- map_remove_vol (The concept of mapping has been replaced by clusters. See unmap_volume.)
- map_rename (The concept of mapping has been replaced by clusters.)
- map_set_special_type (The concept of mapping has been replaced by clusters. See special_type_set.)
- map_unlink_host (The concept of mapping has been replaced by clusters.)

Chapter 5. Volume Snapshot Management

The following sections describe the XIV Command Line Interface (XCLI) for snapshot management. Other commands that are relevant to this topic are: Listing Volumes, Renaming a Volume, Changing Pool Settings for Snapshots.

See also:

- Volume Management
- Consistency Group Management
- Storage Pool Management

The sections are listed as follows:

- snapshot_change_priority(Changes a snapshot's deletion priority.)
- snapshot_create(Creates a snapshot of an existing volume.)
- snapshot_delete(Deletes a snapshot.)
- snapshot_duplicate(Duplicates an existing snapshot.)
- snapshot_format(Formats a snapshot)
- snapshot_list(Lists snapshot information.)
- snapshot_restore(Restores a master volume or a snapshot from one of its associated snapshots.)

Changing a Snapshot Deletion Priority

Changes a snapshot's deletion priority.

```
snapshot_change_priority snapshot=SnapshotName  delete_priority=del_value
```

Parameters:

Name	Type	Description	Mandatory	Default
snapshot	Object name	Name of the snapshot whose delete_priority is to be changed.	Y	
delete_priority	Integer	The priority for deleting the volume's snapshot.	Y	

This command changes the priority of the deletion of an existing snapshot. The deletion priority determines which snapshots are deleted first when the system runs out of snapshot storage.

The Auto Delete Priority can have a value between 1 and 4, as follows:

- 1 = Is the last to be deleted automatically ("1" is the default set by the system)
- ...
- 4 = Is the first to be deleted automatically

Example:

```
snapshot_change_priority snapshot=DBVolume.snapshot1 delete_priority=4
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	The master volume of the snapshot is mapped to a host or cluster associated with the user and the snapshot was created by the application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_IS_NOT_A_SNAPSHOT
  Operation is permitted only on snapshots
- SNAPSHOT_ILLEGAL_PRIORITY
  Allowed delete priorities of a Snapshot are integers between 1 and 4, inclusive.
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- VOLUME_BAD_NAME
  Volume name does not exist
- SNAPSHOT_IS_CONSISTENT_ELCS
  If a mirrored volume is not consistent then its ELCS is protected and cannot be deleted.

Creating a Snapshot

Creates a snapshot of an existing volume.

```
snapshot_create vol=VolName  < [ name=SnapshotName ]
[ delete_priority=del_value ] > | < overwrite=SnapshotName >
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to snapshot.	Y	
name	Object name	Name of the new snapshot.	N	Auto-generated name.
delete_priority	Integer	The deletion priority of the volume's snapshot.	N	1

Name	Type	Description	Mandatory	Default
overwrite	Object name	Name of an existing snapshot to be overwritten with the current volume content.	N	

This command creates a new snapshot for an existing volume, which is referred to as the snapshot's master volume. The snapshot's content is the same as the master volume at the exact point in time that the snapshot was created. The snapshot remains unchanged, although the master volume keeps changing after the snapshot is created. Upon a successful completion of this command, the snapshot is created and assigned a name that can later be used by other commands. The name doesn't have to be new. It could be of an already existing snapshot (in such a case, the already existing snapshot is overridden).

A write operation can be processed at the exact time of the snapshot creation, meaning that the write operation request was sent to the system before the command was executed, while the write was acknowledged after the command was executed. In this case, the content of the snapshot is not deterministic and may either contain the original value before the write operation or the new value after the write operation. In fact, the snapshot's data may even contain a mixture of the two, where some blocks are equal to the volume before the write operation and other blocks are equal to the value after the write operation.

The new snapshot is initially locked for changes.

The snapshot that is created acts like a regular volume, except for the differences described below:

- The snapshot's name is either automatically generated from its master volume's name or given as a parameter to the command. It can later be changed without altering the snapshot's modification state.
- Upon successful completion of the command, the system assigns a unique SCSI ID to the snapshot. The creation time of the snapshot is set to the current time and is never changed until the snapshot is deleted.
- The size of the snapshot is the same as its master volume's size, but no storage space is reserved for the snapshot. This means that the functionality of the snapshot is not guaranteed. When the snapshot's Storage Pool is exhausted, the snapshot may be deleted.
- The snapshot's lock state is initially set to "locked", and as long as it is not "unlocked", the snapshot remains an exact image of the master volume at creation time and can be the source for a restore operation. The modification state of the snapshot is initially set to "unmodified".

During creation, the snapshot's deletion priority can be set explicitly, or it is automatically set to the default value. The deletion priority determines which snapshots will be deleted first when the Storage Pool runs out of snapshot storage. This may happen due to the redirect-on-write mechanisms which share unchanged data between volumes and their snapshots, as well as between snapshots of the same volume.

The Auto Delete Priority is from the list (1-4), as follows:

- 1 = Is last to be deleted automatically ("1" is the default set by the system)
- ...
- 4 = Is first to be deleted automatically

The snapshot is associated with its master volume and this association cannot be broken or changed as long as the snapshot exists.

The `overwrite` option copies the current content of the volume into one of its existing snapshots (set as an input argument). The overwritten snapshot keeps the same SCSI serial number and same mapping, so

hosts maintain a continuous mapping to the snapshot, without any need for a rescan or similar operation. The overwritten snapshot must be an existing snapshot of the given volume. The overwritten snapshot can't be part of a Snapshot Group.

This command fails when no snapshot space is defined in the Storage Pool the master volume belongs to.

Mirroring limitations:

- This command fails if the volume is a slave of an asynchronous mirroring coupling (either synchronous or asynchronous).
- This command fails if the volume is a slave of an inconsistent synchronous coupling.

Example:

```
snapshot_create vol=DBVolume name=DBVolume.snapshot1 delete_priority=2
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	The volume is mapped to a host or a cluster associated with the user. If a snapshot overwrite is used, the target snapshot must be one created by a server administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- MAX_VOLUMES_REACHED
  Maximum number of volumes already defined
- SNAPSHOT_ILLEGAL_PRIORITY
  Allowed delete priorities of a Snapshot are integers between 1 and 4, inclusive.
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots
- VOLUME_EXISTS
  Volume name already exists
- VOLUME_BAD_PREFIX
  Volume name has a reserved prefix
- VOLUME_DATA_MIGRATION_UNSYNCHRONIZED
  Data Migration has not completed to this volume
- OVERWRITE_SNAPSHOT_BAD_NAME
  Snapshot name does not exist

- OVERWRITE_SNAPSHOT_IS_MASTER_VOL
  Cannot overwrite Master Volume
  This snapshot cannot be overwritten as it is a master volume.
- SNAPSHOT_OVERWRITE_MISMATCH
  Specified snapshot is not a snapshot of the specified volume
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- POOL_SNAPSHOT_LIMIT_REACHED
  The maximum number of snapshots is reached.
- VOLUME_IS_NOT_CONSISTENT_SLAVE
  Operation not allowed on slave volume that is not consistent.

Deleting a Snapshot

Deletes a snapshot.

```
snapshot_delete snapshot=SnapshotName
```

Parameters:

Name	Type	Description	Mandatory	Default
snapshot	Object name	Snapshot to be deleted.	Y	

This command deletes a snapshot. It cannot be used to delete a master volume, to delete a snapshot which is mapped to a host or cluster, or to delete an internal snapshot of a mirroring.

Example:

```
snapshot_delete snapshot=DBVolume.snapshot1
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	The master volume of the snapshot is mapped to a host or cluster associated with the user and the snapshot was created by the application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_IS_NOT_A_SNAPSHOT
  Operation is permitted only on snapshots
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- SNAPSHOT_IS_MAPPED
  Snapshot that is mapped to a host cannot be deleted
- SNAPSHOT_HAS_ACTIVE_SYNC_JOB
  Snapshot is currently a target of an active sync job
  Troubleshooting: Please wait for sync job to complete
- SNAPSHOT_IS_CONSISTENT_ELCS
  If a mirrored volume is not consistent then its ELCS is protected and cannot be deleted.

Duplicating a Snapshot

Duplicates an existing snapshot.

```
snapshot_duplicate snapshot=SnapshotName [ name=SnapshotName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
snapshot	Object name	The name of the snapshot to duplicate.	Y	
name	Object name	Name of the new snapshot to be generated.	N	Automatically generated name.

This command duplicates an existing snapshot. The newly created snapshot is initially locked for changes and is associated with the master volume of the existing snapshot. The content of the newly created snapshot is identical to the content of the source snapshot.

It is useful to duplicate a snapshot before unlocking it for write operations. The duplicate snapshot can be used as a logical backup of the data in case the write operation caused logical data corruption.

Upon successful completion of the command, a new duplicate snapshot is created.

The duplicated snapshot is identical to the source snapshot. It has the same creation time and behaves as if it was created at the exact same moment that the source snapshot was created from the same master volume.

The duplicate snapshot's name is either automatically generated from its master volume's name or provided as a parameter. It can later be changed without altering its modification state.

A snapshot can be duplicated multiple times. A duplicated snapshot can be the source for further duplications.

Example:

```
snapshot_duplicate snapshot=DBVolume.snapshot1 name=DBVolume.snapshot1.copy
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	The master volume of the snapshot is mapped to a host or cluster associated with the user and the snapshot was created by the application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- MAX_VOLUMES_REACHED
  Maximum number of volumes already defined
- VOLUME_IS_NOT_A_SNAPSHOT
  Operation is permitted only on snapshots
- VOLUME_EXISTS
  Volume name already exists
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- VOLUME_BAD_PREFIX
  Volume name has a reserved prefix

Formatting a Snapshot

Formats a snapshot

```
snapshot_format snapshot=SnapshotName
```

Parameters:

Name	Type	Description	Mandatory	Default
snapshot	Object name	The snapshot to be formatted.	Y	

This command deletes the content of a snapshot while maintaining its mapping to the host. The format operation results with the following:

- The formatted snapshot is read-only
- The format operation has no impact on performance
- The formatted snapshot does not consume space
- Reading from the formatted snapshot always returns zeroes
- It can be overridden
- It can be deleted
- Its deletion priority can be changed

Example:

```
snapshot_format snapshot
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- SNAPSHOT_HAS_ACTIVE_SYNC_JOB
  Snapshot is currently a target of an active sync job
  Troubleshooting: Please wait for sync job to complete
- VOLUME_BAD_NAME
  Volume name does not exist
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- MAX_VOLUMES_REACHED
  Maximum number of volumes already defined
- SNAPSHOT_IS_FORMATTED
  Snapshot is formatted
- ELCS_CANNOT_BE_FORMATTED
  The snapshot is an ELCS and cannot be formatted.
- VOLUME_IS_NOT_A_SNAPSHOT
  Operation is permitted only on snapshots

Listing Snapshot Information

Lists snapshot information.

```
snapshot_list  vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	List of all the snapshots of this volume.	Y	

This command lists snapshot information for all the snapshots of a specified volume.

This command displays the following VAAI fields (available on the XML output format):

- enable_VAAI
- user_disabled_VAAI

This command displays the following snapshot format field (available on the XML output format):

- snapshot_format

Id	Name	Description	Default Position
name	Name		1
size	Size (GB)		2
size_MiB	Size (MiB)		
master_name	Master Name		3
cg_name	Consistency Group		4
pool_name	Pool		5
creator	Creator		6
capacity	Capacity (blocks)		
modified	Modified		
sg_name	Snapshot Group Name		
delete_priority	Deletion Priority		
locked	Locked		
serial	Serial Number		
snapshot_time	Snapshot Creation Time		
snapshot_time_on_master	Master Copy Creation Time		
snapshot_of	Snapshot of		
sg_snapshot_of	Snapshot of Snap Group		
wwn	WWN		
mirrored	Mirrored		
locked_by_pool	Locked by Pool		
used_capacity	Used Capacity (GB)		7
used_capacity_MiB	Used Capacity (MiB)		
short_lived_io	Short Live IO		

Id	Name	Description	Default Position
enable_VAAI	VAAI enabled		
user_disabled_VAAI	VAAI disabled by user		
snapshot_format	Snapshot Format		
flash_caching	Flash Caching State		
use_flash_caching_default	Use Flash Caching Default State		

Example:

```
snapshot_list vol=DBVolume
```

Output:

```
Name              Size (GB)  Master Name  Consistency Group  Pool
DBVolume.sp1      2508       DBVolume                        default
DBVolume.sp1.copy 2508       DBVolume                        default
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Restoring a Volume from a Snapshot

Restores a master volume or a snapshot from one of its associated snapshots.

```
snapshot_restore snapshot=SnapshotName [ target_snapshot=SnapshotName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
snapshot	Object name	Name of the snapshot with which to restore its master volume, or snapshot.	Y	
target_snapshot	Object name	Snapshot to be restored.	N	Restore the master volume.

This command restores the data of a master volume from one of its associated snapshots.

Issuing a restore command logically copies the data of the source snapshot onto its volume. The volume's data is therefore restored to the state that it was at the time that the snapshot was created. If the volume was resized after the snapshot was created, the restore operation resizes the volume back to its original size.

All the snapshots associated with the volume are left unchanged during a restore operation.

It is possible to snapshot the volume before restoring it, so that the generated snapshot can be used and the data is not lost.

It is possible to restore another snapshot (the target snapshot) from the source snapshot. The target snapshot must be a snapshot of the same volume as the source snapshot. The target snapshot's content and size will be identical to the source snapshot's content and size. The target snapshot's lock/unlock status will remain as it was.

Restoring a mirrored volume:

- Delete the mirror
- Restore the volume
- Re-establish the mirror

Note:

It is impossible to restore a volume while it is mirrored.

Example:

```
snapshot_restore snapshot=DBVolume.snapshot1
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	Both target and source are snapshots of the same master volume. This master volume is mapped to a host or cluster associated with the user, and the target snapshot was created by an application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_RESTORE_SNAPSHOT
  Are you sure you want to restore the volume from snapshot *Snapshot*?

Completion Codes:

- VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for this volume
- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_IS_NOT_A_SNAPSHOT

Operation is permitted only on snapshots

- NOT_ENOUGH_SPACE
  No space to allocate volume
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- VOLUME_HAS_MIRROR
  Mirror is defined for this volume
- VOLUME_LOCKED
  Volume is locked
- SNAPSHOTS_BELONG_TO_DIFFERENT_MASTERS
  Target snapshot and source snapshot should be snapshots of the same volume
- TARGET_SNAPSHOT_BAD_NAME
  Target snapshot name does not exist
- TARGET_SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Target snapshot is part of a Snapshot Group
- TARGET_SNAPSHOT_IS_MASTER
  Target snapshot is a master volume
- TARGET_SNAPSHOT_SAME_AS_SNAPSHOT
  Source snapshot cannot be the target snapshot

Chapter 6. Consistency Group Management

The following sections describe the XIV Command Line Interface (XCLI) for Consistency Group management. Other commands that are relevant to this topic are: Snapshotting a Consistency Group, Moving a Volume between Storage Pools , Moving Consistency Groups between Storage Pools .

- Volume Management
- Volume Snapshot Management
- Storage Pool Management

The sections are listed as follows:

- cg_add_vol(Adds a volume to a Consistency Group.)
- cg_create(Creates a Consistency Group.)
- cg_delete(Deletes a Consistency Group.)
- cg_list(Lists Consistency Groups.)
- cg_remove_vol(Removes a volume from a Consistency Group.)
- cg_rename(Renames Consistency Groups.)

The following commands are no longer in use:

- cg_restore (The command has been replaced by the snap_group_restore command)

Adding a Volume to a Consistency Group

Adds a volume to a Consistency Group.

```
cg_add_vol cg=CgName vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
cg	Object name	Name of a Consistency Group.	Y	
vol	Object name	Name of the volume to add.	Y	

This command adds a volume to a Consistency Group. The Consistency Group is capable of containing up to 128 volumes.

Requirements for successful command completion:

- The volume and Consistency Group have to be associated with the same pool.
- The volume is not already part of a Consistency Group.
- The volume can not be a snapshot.
- The Consistency Group has less than the max number of volumes (see above).

Adding a mirrored volume to a non-mirrored consistency group:

- Such an addition always succeeds and the volume will retain its mirroring settings.

Requirements for successful command completion for a mirrored consistency group:

- The command must be issued only on the master consistency group.
- The command can not be run during an initialization of the volume or the consistency group.
- The volume does not have any outstanding ad-hoc sync jobs.
- The volume has to be mirrored, and its following mirroring settings must be identical to those of the Consistency Group: mirroring type (e.g., synchronous), mirroring status, mirroring target, target pool, designation.
- In addition, for a mirrored Consistency Group that is defined as sync_best_effort (synchronous):
  - The synchronization status of both volume and Consistency Group has to be Synchronized.
- For a mirrored Consistency Group that is defined as async_interval (asynchronous):
  - The volume and Consistency Group must have the following identical settings and values: schedule, remote schedule, timestamp of the last_replicated snapshot.
  - Their both synchronization status is RPO_OK
- The link has to be up.

Adding a mirrored volume to a mirrored Consistency Group will also add the volume's peer to the Consistency Group's peer. Once added, the mirrored volume will be set the RPO of the mirrored Consistency Group.

The mirrored Consistency Group has one sync job for all pertinent mirrored volumes within the Consistency Group.

In case of acknowledgment time out:

- Whenever the command is issued on a mirrored CG Master - and the Master does not receive an acknowledgment from the Slave (until the command timed out or due to any unexpected failure), a completion code is returned (MIRROR_POSSIBLE_CONS_GROUP_MEMBERSHIP_MISMATCH).

If the command CG_ADD_VOLUME is issued on a mirrored CG Master - and the Master does not receive an acknowledgment from the Slave (until the command timed out or due to any unexpected failure), a new completion code will be returned (MIRROR_POSSIBLE_CONS_GROUP_MEMBERSHIP_MISMATCH - meaning that the member lists of the mirror Consistency Group peers might not be the same).

Example:

```
cg_add_vol cg=DBGroup vol=DBLog
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- CONS_GROUP_MIRROR_DESIGNATION_MISMATCH

Volume Mirror has different designation than Consistency Group Mirror. Are you sure you want to add that Volume to that CG?

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_IS_SLAVE
  Consistency Group is mirroring slave.
- MAX_VOLUMES_IN_CONS_GROUP_REACHED
  The maximum permitted number of volumes per consistency group is reached.
  Consistency Group contains maximum number of volumes.
- MAX_VOLUMES_IN_REMOTE_CONS_GROUP_REACHED
  The maximum permitted number of volumes per the remote consistency group is reached.
  Remote Consistency Group contains maximum number of volumes.
- MIRROR_HAS_SYNC_JOB
  Operation is not permitted on a mirror with active sync jobs
- MIRROR_IS_NOT_SYNCHRONIZED
  Mirror is not synchronized
- MIRROR_LAST_SYNC_TIMES_DIFFER
  All mirrors should have the same last sync time.
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds
- REMOTE_VOLUME_BAD_POOL
  Remote volume and remote Consistency Group belong to different Storage Pools
- REMOTE_VOLUME_BELONGS_TO_CONS_GROUP
  The remote volume belongs to a consistency group.
  Remote Volume belongs to a Consistency Group
- TARGET_NOT_CONNECTED
  There is currently no connection to the target system
- VOLUME_BAD_POOL
  Volume belongs to a different Storage Pool
- VOLUME_BELONGS_TO_CG
  Volume belongs to a Consistency Group
- VOLUME_DATA_MIGRATION_UNSYNCHRONIZED
  Data Migration has not completed to this volume
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots
- CONS_GROUP_MIRROR_SCHEDULE_MISMATCH
  Volumes under Consistency Group Mirror should have the same mirroring schedule.
- CONS_GROUP_MIRROR_TARGET_MISMATCH
  Volumes under Consistency Group Mirror should have the same mirroring Target.
- CONS_GROUP_MIRROR_ROLE_MISMATCH

Volumes under Consistency Group Mirror should have the same mirroring role.

- CONS_GROUP_MIRROR_ACTIVATION_MISMATCH
  Volumes under Consistency Group Mirror should have the same mirroring activation state.
- REMOTE_CONS_GROUP_MIRROR_SCHEDULE_MISMATCH
  Volumes under Consistency Group Mirror in remote machine should have identical mirroring schedule.
- CONS_GROUP_MIRROR_TYPE_MISMATCH
  Volumes under Consistency Group Mirror should have the same mirroring type.
- MIRROR_POSSIBLE_CONS_GROUP_MEMBERSHIP_MISMATCH
  Mirrored CG may contain different volumes on Master and Slave. This problem occurs whenever the cg_add_vol command results with the Master not receiving an acknowledgement from the Slave until the command timed out, or any other unexpected failure.
- REMOTE_CONS_GROUP_APPLICATION_CONSISTENCY_MISMATCH
  Application consistency of the volume doesn't match the state of other volumes in the group on the remote machine.
- CONS_GROUP_APPLICATION_CONSISTENCY_MISMATCH
  Application consistency of the volume doesn't match the state of other volumes in the group.

Creating Consistency Groups

Creates a Consistency Group.

```
cg_create cg=CgName  pool=PoolName
```

Parameters:

Name	Type	Description	Mandatory	Default
cg	Object name	Name of the Consistency Group.	Y	
pool	Object name	Storage Pool of the Consistency Group.	Y	

This command creates a Consistency Group. A Consistency Group is a group of volumes that can all be snapshotted at the same point in time. This is essential for snapshotting several volumes that are used by the same application or by applications that interact with each other in order to generate a consistent set of snapshots.

The name of the Consistency Group must be unique in the system. The system is capable of containing up to 256 consistency groups.

The Storage Pool of the Consistency Group must be specified.

The Consistency Group is initially empty, containing no volumes.

A Consistency Group always belongs to a specific Storage Pool. All the volumes in the Consistency Group belong to the same Storage Pool as the Consistency Group.

The Consistency Group can be mirrored as a whole (see Creating a Mirroring Definition).

Example:

```
cg_create pool=p_1 cg=DBgroup
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CONS_GROUP_NAME_EXISTS
  Consistency Group name already exists.
- MAX_CONS_GROUPS_REACHED
  Maximum number of Consistency Groups already defined.
- POOL_DOES_NOT_EXIST
  Storage Pool does not exist

Deleting a Consistency Group

Deletes a Consistency Group.

```
cg_delete cg=CgName
```

Parameters:

Name	Type	Description	Mandatory	Default
cg	Object name	Name of the Consistency Group to delete.	Y	

This command deletes a Consistency Group.

This command fails if:

- The Consistency Group is not empty (meaning that it still contains volumes).
- The Consistency Group is not mirrored (this requirement also applies for an empty consistency group).
- The Consistency Group is mirrored (even if empty).

All snapshot groups associated with the Consistency Group are disbanded, meaning that the snapshots contained in these snapshot groups become independent snapshots.

Example:

```
cg_delete cg=DBvolumes
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NOT_EMPTY
  This operation is only allowed on an empty Consistency Group.
- CONS_GROUP_HAS_MIRROR
  Consistency Group has mirroring defined for it.
  The mirror definition has to be removed.

Listing Consistency Groups

Lists Consistency Groups.

```
cg_list [ cg=CgName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
cg	Object name	Name of a Consistency Group.	N	All

This command lists select details for all Consistency Groups; if a Consistency Group name is specified, it is the only one to be listed.

Listed details include the following:

- Name
- Mirrored CG - indicates whether the Consistency Group is mirrored
  – Available values - Yes | No
- Mirror sync status - indicates the status of the mirroring
  – Available values - RPO_OK | RPO_Lagging
- CG role - the role of the peer
  – Available values - master | slave

Id	Name	Description	Default Position
name	Name		1
pool	Pool Name		2
mirrored	Mirrored		

Example:

```
cg_list cg=DBgroup
```

Output:

```
Name     Pool Name Mirrored
DBgroup  default   Yes
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Removing a Volume from a Consistency Group

Removes a volume from a Consistency Group.

```
cg_remove_vol vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to be removed.	Y	

This command removes a volume from a Consistency Group.

A Consistency Group's name is deduced from the volume name. A unique name is ensured because each volume belongs to only a single Consistency Group. Future snapshot groups created from this Consistency Group will not include a snapshot which is associated with the removed volume.

All the snapshots of the removed volume that were created as part of this Consistency Group remain associated with the Consistency Group and its snapshot groups. Therefore, if the user re-adds the volume to the Consistency Group, it will seem as is if the volume was never removed from the Consistency Group.

Following the volume removal:

- Corresponding peer volume will be removed from the peer CG
  - If the CG is mirrored, the mirroring definition of the removed volume is retained (based on the same settings as the CG from which it was removed)

- The peer volume is also removed from the peer CG
- The removed mirrored volume will be set the RPO of the mirrored CG from which it was removed
- Event is generated

This command succeeds even if the volume is not included in any Consistency Group.

Requirements for a successful command completion:
- The command can be issued only on the master
- The link has to be up
- The Consistency Group can't have ongoing sync jobs

In case of acknowledgment time out:
- Whenever the command is issued on a mirrored CG Master - and the Master does not receive an acknowledgment from the Slave (until the command timed out or due to any unexpected failure), a completion code is returned (MIRROR_POSSIBLE_CONS_GROUP_MEMBERSHIP_MISMATCH).

Example:

```
cg_remove_vol vol=DBLog
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_REMOVE_VOLUME_FROM_CONS_GROUP
  Are you sure you want to remove volume '*Volume*' from its consistency group?

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NOT_IN_CONS_GROUP
  Volume does not belong to a Consistency Group
- TARGET_NOT_CONNECTED
  There is currently no connection to the target system
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots
- CONS_GROUP_IS_SLAVE
  Consistency Group is mirroring slave.
- MIRROR_RETRY_OPERATION

There is an operation in progress on this mirror , please retry your request in a few seconds

Troubleshooting: Please retry the command in a few seconds

- MIRROR_HAS_SYNC_JOB

  Operation is not permitted on a mirror with active sync jobs
- MIRROR_POSSIBLE_CONS_GROUP_MEMBERSHIP_MISMATCH

  Mirrored CG may contain different volumes on Master and Slave. This problem occurs whenever the cg_add_vol command results with the Master not receiving an acknowledgement from the Slave until the command timed out, or any other unexpected failure.

Renaming Consistency Groups

Renames Consistency Groups.

```
cg_rename cg=CgName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
cg	Object name	The name of the Consistency Group to be renamed.	Y	
new_name	Object name	The new name of the Consistency Group.	Y	

This command renames a Consistency Group.

The new name of the Consistency Group must be unique in the system.

This command succeeds even if the new name is identical to the current name.

Example:

```
cg_rename cg=DBgroup new_name=DBvolumes
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CONS_GROUP_BAD_NAME

  Consistency Group name does not exist.

- CONS_GROUP_NAME_EXISTS
  Consistency Group name already exists.

Chapter 7. Snapshot Set Management

The following sections describe the XIV Command Line Interface (XCLI) for Snapshot Set management. Use the cg_snapshot_create command to create the snapshot group.

See also:

- Volume Management
- Volume Snapshot Management
- Consistency Group Management

The sections are listed as follows:

- cg_snapshots_create(Creates a snapshot group of a Consistency Group.)
- snap_group_change_priority(Changes the deletion priority of a snapshot group.)
- snap_group_delete(Deletes a snapshot group and all its snapshots.)
- snap_group_disband(Disbands a snapshot group into independent snapshots.)
- snap_group_duplicate(Duplicates an existing snapshot group.)
- snap_group_format(Formats a snapshot group)
- snap_group_list(Lists all snapshot groups or a specific one.)
- snap_group_lock(Locks a snapshot group by locking all its snapshot.)
- snap_group_rename(Renames a snapshot group.)
- snap_group_restore(Restores the master volumes of a Consistency Group, or a snapshot group from one of its associated snapshot groups.)
- snap_group_unlock(Unlocks a snapshot group by unlocking all its snapshots.)

Snapshotting a Consistency Group

Creates a snapshot group of a Consistency Group.

```
cg_snapshots_create
cg=CgName < [ snap_group=SnapshotGroupName ]
[ delete_priority=del_value ] > | <overwrite=SnapshotGroupName>
```

Parameters:

Name	Type	Description	Mandatory	Default
cg	Object name	Name of a Consistency Group.	Y	
snap_group	Object name	Name for the new snapshot group.	N	Automatically generated name.
delete_priority	Integer	The priority for deleting this volume when the system runs out of snapshot space.	N	1
overwrite	Object name	Existing snapshot group which is overwritten with current content.	N	

This command creates a consistent snapshot group from a Consistency Group, which includes a snapshot for each of the volumes contained in the Consistency Group.

Logically, this command is comprised of the following steps:

- Suspending all I/O activity on all the volumes in the group and waiting for all pending I/Os to complete
- Creating a snapshot for each of the volumes in the group
- Resuming I/O activity on all the volumes

The main advantage of using this command (as opposed to a manual procedure) is that all snapshots are taken at the same point in time, thus ensuring that they are consistent with each other.

The snapshots in the created snapshot group are consistent with respect to each other in the following manner:

- All snapshots are created synchronously at the same point in time.
- With respect to this point in time, all I/Os to the Consistency Group's volumes that were completed previously are recorded in the snapshot's image.
- All I/Os that were completed afterwards are not recorded in the snapshot's image.

All the snapshots in the snapshot group are also associated with the Consistency Group in addition to having their regular attributes.

The name of the snapshot group is either automatically generated or provided in the command line.

The delete priority of the snapshots in the snapshot group can also be provided (see Creating a Snapshot). The delete priority controls which snapshots or snapshot groups are deleted first when the system runs out of space for snapshots.

The `overwrite` option causes the current content of the Consistency Group to be copied into one of its existing snapshot groups (the argument of overwrite). The snapshots of the overwritten snapshot group keep the same SCSI serial number and same mapping, so hosts maintain a continuous mapping of the snapshots, without any need for a rescan or similar operation. The overwrite snapshot group must be an existing snapshot group of the given Consistency Group.

This command fails if no snapshot space is defined for the Storage Pool containing the Consistency Group.

This command fails if one or more of the volumes in the Consistency Group is a slave of a synchronous mirroring, and it is currently inconsistent due to either a re-synchronization or an initialization process.

Mirroring limitations:

- This command fails if the volume is a slave of an asynchronous mirroring coupling (either synchronous or asynchronous).
- This command fails if the volume is a slave of an inconsistent synchronous coupling.

Example:

```
cg_snapshots_create cg=DBgroup snap_group=DBbackupdaily
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	At least one of the volumes in the group is mapped to a host or cluster associated with the user. If a Snapshot Group overwrite is used, then the target Snapshot Group must be one created by a server administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- MAX_VOLUMES_REACHED
  Maximum number of volumes already defined
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- SNAPSHOT_GROUP_BAD_PREFIX
  Snapshot Group name has a reserved prefix.
- SNAPSHOT_GROUP_NAME_EXISTS
  Snapshot Group name already exists.
- CONS_GROUP_EMPTY
  Operation is not allowed on an empty Consistency Group.
- CONS_GROUP_MISMATCH
  Snapshot Group does not match Consistency Group volumes.
- OVERWRITE_SNAPSHOT_GROUP_DOES_NOT_BELONG_TO_GIVEN_GROUP
  Snapshot Group belongs to another Consistency Group.
- POOL_SNAPSHOT_LIMIT_REACHED
  The maximum number of snapshots is reached.
- VOLUME_IS_NOT_CONSISTENT_SLAVE
  Operation not allowed on slave volume that is not consistent.
- SNAPSHOT_GROUP_IS_INTERNAL
  Internal snapshots cannot be mapped, modified in any way or deleted.
- SNAPSHOT_GROUP_ILLEGAL_PRIORITY
  The Snapshot Group was given an illegal deletion priority.
  Allowed delete priorities of a Snapshot Group are integers between 1 and 4, inclusive.

Changing Snapshot Group Deletion Priority

Changes the deletion priority of a snapshot group.

```
snap_group_change_priority snap_group=SnapshotGroupName  delete_priority=del_value
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Name of the snapshot group whose delete_priority is to be changed.	Y	
delete_priority	Integer	Priority according to which this snapshot group is deleted.	Y	

This command changes the priority of the deletion of an existing snapshot group. Similarly to snapshots, the system determines which of the snapshot groups is deleted first when it runs out of snapshot storage, in accordance with the redirect-on-write mechanism. When the system runs out of space, it deletes the snapshot or snapshot group with the highest deletion priority, and among them the unmapped snapshots or snapshot groups, and among them the snapshot or snapshot group which was created first.

See Changing a Snapshot Deletion Priority for more details about the valid deletion priority values and their meaning.

Example:

```
snap_group_change_priority snap_group=DBbackup delete_priority=4
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	At least one of the volumes in the master Consistency Group is mapped to a host or cluster associated with the user and Snapshot Group was created by a server administrator
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- SNAPSHOT_ILLEGAL_PRIORITY
  Allowed delete priorities of a Snapshot are integers between 1 and 4, inclusive.
- SNAPSHOT_GROUP_IS_INTERNAL
  Internal snapshots cannot be mapped, modified in any way or deleted.

Deleting a Snapshot Group

Deletes a snapshot group and all its snapshots.

```
snap_group_delete snap_group=SnapGroupName
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Name of the snapshot group to be deleted.	Y	

This command deletes the snapshot group, as well as all of the snapshots that are contained in the snapshot group. You may refer to the documentation of Deleting a Snapshot for more information about deleting snapshots.

If one of the members of the snapshot group is mapped to a host, then the entire snapshot group cannot be deleted.

The command is inapplicable for a snapshot group that is still associated with a mirrored consistency group.

Example:

```
snap_group_delete snap_group=DBBackupweekly
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	At least one of the volumes in the master Consistency Group is mapped to a host or cluster associated with the user and Snapshot Group was created by a server administrator
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- SNAPSHOT_IS_MAPPED
  Snapshot that is mapped to a host cannot be deleted
- SNAPSHOT_HAS_ACTIVE_SYNC_JOB
  Snapshot is currently a target of an active sync job
  Troubleshooting: Please wait for sync job to complete

Disbanding a Snapshot Group

Disbands a snapshot group into independent snapshots.

```
snap_group_disband snap_group=SnapshotGroupName
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Snapshot group to be disbanded.	Y	

This command disbands the snapshot group into independent snapshots. After executing this command the snapshots can be individually deleted, restored, unlocked, duplicated and so on. The snapshot group does not exist anymore after this command. The snapshots retain the same names (snap_group_name.volumename).

The command is inapplicable for a snapshot group of a mirrored consistency group.

Example:

```
snap_group_disband snap_group=DBbackup_copy
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	At least one of the volumes in the master Consistency Group is mapped to a host or cluster associated with the user and Snapshot Group was created by a server administrator
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.

Duplicating a Snapshot Group

Duplicates an existing snapshot group.

```
snap_group_duplicate snap_group=SnapshotGroupName [ new_snap_group=NewName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Name of the snapshot group to be duplicated.	Y	
new_snap_group	Object name	Name of the newly generated snapshot group.	N	Autogenerated name.

This command duplicates the specified snapshot group. This is functionally equivalent to duplicating all the snapshots in the snapshot group using Duplicating a Snapshot and creating a new snapshot group that contains all the generated snapshots.

The name of the new snapshot group is either specified as a parameter or generated automatically.

You may refer to Duplicating a Snapshot for more details about the snapshot duplication operation.

Deletion priority:

- The deletion priority of the duplicated snapshots is 0.

Example:

```
snap_group_duplicate snap_group=DBbackup new_snap_group=DBbackup_copy
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	At least one of the volumes in the master Consistency Group is mapped to a host or cluster associated with the user and Snapshot Group was created by a server administrator
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- MAX_VOLUMES_REACHED
  Maximum number of volumes already defined
- SNAPSHOT_GROUP_NAME_EXISTS
  Snapshot Group name already exists.

Formatting a Snapshot Group

Formats a snapshot group

```
snap_group_format  snap_group=SnapshotGroupName
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	The snapshot group to be formatted.	Y	

This command deletes the content of a snapshot group while maintaining its snapshots mapping to the host. The format operation results with the following:

- The snapshot of the formatted snapshot group are read-only
- The format operation has no impact on performance
- The snapshot of the formatted snapshot group do not consume space
- Reading from the snapshot of the formatted snapshot group always returns zeroes
- They can be overridden
- They can be deleted
- Their deletion priority can be changed

Example:

```
snap_group_format snap_group
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_HAS_ACTIVE_SYNC_JOB
  Snapshot is currently a target of an active sync job
  Troubleshooting: Please wait for sync job to complete
- SNAPSHOT_GROUP_IS_FORMATTED
  Snapshot group is formatted.
- ELCS_GROUP_CANNOT_BE_FORMATTED
  The snapshot group is an ELCS and cannot be formatted.
- MAX_VOLUMES_REACHED

Maximum number of volumes already defined

- SNAPSHOT_GROUP_IS_INTERNAL
  Internal snapshots cannot be mapped, modified in any way or deleted.
- VOLUME_IS_NOT_A_SNAPSHOT
  Operation is permitted only on snapshots
- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.

Listing Snapshot Groups

Lists all snapshot groups or a specific one.

```
snap_group_list [ snap_group=SnapshotSetName | cg=CgName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Name of a specific snapshot group to be listed.	N	All snapshot groups.
cg	Object name	List all the snapshot groups of this Consistency Group.	N	All snapshot groups.

This command lists snapshot groups. When a snapshot group name is specified, then only that specific snapshot group is listed. When a Consistency Group name is specified, then the snapshot groups of this Consistency Group are listed.

This command displays the following snapshot group format field (available on the XML output format):

- snap_group_format

Id	Name	Description	Default Position
name	Name		1
cg	CG		2
snapshot_time	Snapshot Time		3
locked	Locked		
modified	Modified		
delete_priority	Deletion Priority		4
snap_group_format	Snapshot Group Format		

Example:

```
snap_group_list cg=DBvolumes
```

Output:

```
Name           CG         Snapshot Time       Deletion Priority
DBbackup       DBvolumes  2007-01-03 17:46:29 1
DBbackupdaily  DBvolumes  2007-01-03 17:49:36 1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- CONS_GROUP_DOES_NOT_EXIST
  Consistency Group name does not exist.
- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.

Locking a Snapshot Group

Locks a snapshot group by locking all its snapshot.

```
snap_group_lock snap_group=SnapshotSetName
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Name of the snapshot group to be locked.	Y	

This command locks the snapshot group by locking all its snapshots. This is functionally equivalent to locking all snapshots individually (through executing Locking a Volume on each snapshot). You may refer to the documentation of Locking a Volume for a description of locking behavior.

Example:

```
snap_group_lock snap_group=DBbackup
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	At least one of the volumes in the master Consistency Group is mapped to a host or cluster associated with the user and Snapshot Group was created by a server administrator
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- SNAPSHOT_GROUP_IS_INTERNAL
  Internal snapshots cannot be mapped, modified in any way or deleted.

Renaming a Snapshot Group

Renames a snapshot group.

```
snap_group_rename snap_group=SnapshotGroupName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Name of the snapshot group to be renamed.	Y	
new_name	Object name	New name for the snapshot group.	Y	

This command renames a snapshot group. The command is inapplicable for a snapshot group of a mirrored consistency group.

Example:

```
snap_group_rename snap_group=DBbackup new_name=DBBackupweekly
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	At least one of the volumes in the master Consistency Group is mapped to a host or cluster associated with the user and Snapshot Group was created by a server administrator
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- SNAPSHOT_GROUP_NAME_EXISTS
  Snapshot Group name already exists.

Restoring a Consistency Group from a Snapshot Group

Restores the master volumes of a Consistency Group, or a snapshot group from one of its associated snapshot groups.

```
snap_group_restore snap_group=SnapshotGroupName [ target_snap_group=SnapGroupName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Name of the snapshot group from which to restore its master volumes.	Y	
target_snap_group	Object name	Snapshot group to be restored.	N	

Using this command is equivalent to restoring all the volumes in the Consistency Group or all the snapshots in the target snapshot group from their snapshots in the snapshot group.

It is possible to restore a snapshot group from a snapshot group.

Requirements for a successful command completion:

- The Consistency Group or the target Snapshot Group must contain the exact same volumes that it contained when the snapshot group was generated.
  - Each volume that is added to the Consistency Group after the creation of the snapshot group must be removed from the Consistency Group before restoration is performed.
- The command is inapplicable for a snapshot group of a mirrored consistency group.

See Restoring a Volume from a Snapshot for more information about the restoring.

Example:

```
snap_group_restore snap_group=DBbackup_copy
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	Both target and source are snapshots groups of the same master Consistency Group, where at least one of the master volumes in this Consistency Group is mapped to a host or cluster associated with the user, and the target Snapshot Group was created by an application administrator.

User Category	Permission	Condition
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for this volume
- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- CONS_GROUP_MISMATCH
  Snapshot Group does not match Consistency Group volumes.
- NOT_ENOUGH_SPACE
  No space to allocate volume
- VOLUME_HAS_MIRROR
  Mirror is defined for this volume
- CONS_GROUP_HAS_MIRROR
  Consistency Group has mirroring defined for it.
  The mirror definition has to be removed.
- VOLUME_LOCKED
  Volume is locked
- TARGET_SNAPSHOT_GROUP_BAD_NAME
  Target Snapshot Group name does not exist.
- SNAPSHOT_GROUP_MISMATCH
  Snapshot Group does not match target Snapshot Group.
- TARGET_SNAPSHOT_GROUP_SAME_AS_SOURCE
  Target Snapshot Group is the same as Snapshot Group.

Unlocking a Snapshot Group

Unlocks a snapshot group by unlocking all its snapshots.

```
snap_group_unlock snap_group=SnapshotGroupName
```

Parameters:

Name	Type	Description	Mandatory	Default
snap_group	Object name	Name of the snapshot group to be unlocked.	Y	

This command unlocks a snapshot group by unlocking all its snapshots. This is functionally equivalent to executing Unlocking a Volume on each snapshot. You may refer to the documentation of Unlocking a Volume for a description of unlocking behavior.

Example:

```
snap_group_unlock snap_group=DBbackup
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	At least one of the volumes in the master Consistency Group is mapped to a host or cluster associated with the user and Snapshot Group was created by a server administrator
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- SNAPSHOT_GROUP_IS_INTERNAL
  Internal snapshots cannot be mapped, modified in any way or deleted.

Chapter 8. Storage Pool Management

The following sections describe the XIV Command Line Interface (XCLI) for Storage Pool management.

See also:

- Volume Management
- Volume Snapshot Management
- Consistency Group Management

The sections are listed as follows:

- cg_move(Moves a Consistency Group, all its volumes and all their snapshots and Snapshot Sets from one Storage Pool to another.)
- pool_change_config(Changes the lock behavior of the storage Pool. See a detailed description in .)
- pool_config_snapshots(Changes the Storage Pool snapshot settings.)
- pool_create(Creates a Storage Pool.)
- pool_delete(Deletes a Storage Pool.)
- pool_list(Lists all Storage Pools or the specified one.)
- pool_rename(Renames a specified Storage Pool.)
- pool_resize(Resizes a Storage Pool.)
- vol_move(Moves a volume and all its snapshot from one Storage Pool to another.)

Moving Consistency Groups between Storage Pools

Moves a Consistency Group, all its volumes and all their snapshots and Snapshot Sets from one Storage Pool to another.

```
cg_move cg=CgName pool=PoolName
```

Parameters:

Name	Type	Description	Mandatory	Default
cg	Object name	Name of the Consistency Group to move.	Y	
pool	Object name	Name of the Storage Pool to which to move.	Y	

This command moves a Consistency Group from one Storage Pool to another.

Requirements for successful command completion:

- Sufficient space on the target Pool
- If the CG is mirrored, it can only be moved to a Pool that is not thin-provisioned

Example:

```
cg_move cg=DBGroup pool=DBPool
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- POOL_DOES_NOT_EXIST
  Storage Pool does not exist
- NOT_ENOUGH_SPACE
  No space to allocate volume
- NOT_ENOUGH_HARD_SPACE
  No space to allocate for volume's current usage
- NOT_ENOUGH_SNAPSHOT_SPACE
  Snapshot usage will exceed snapshot limit

Changing Pool Limitation

Changes the lock behavior of the storage Pool. See a detailed description in .

```
pool_change_config pool=PoolName
lock_behavior=<read_only|no_io>
```

Parameters:

Name	Type	Description	Mandatory	Default
pool	Object name	Name of the Storage Pool.	Y	
lock_behavior	Enumeration	Sets whether and how the Pool is locked upon space depletion.	Y	

This command changes the Pool behavior when running out of thin provisioning space.

Example:

```
pool_change_config pool=VOL_BREED_None_0 lock_behavior=read_only
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- POOL_DOES_NOT_EXIST
  Storage Pool does not exist

Changing Pool Settings for Snapshots

Changes the Storage Pool snapshot settings.

```
pool_config_snapshots pool=PoolName [ protected_snapshot_priority=<0|1|2|3|4> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
pool	Object name	Name of the Storage Pool.	Y	

Name	Type	Description	Mandatory	Default
protected_snapshot_priority	Integer	Specifies a snapshot delete priority between 0 - 4; snapshots with a lower delete priority (i.e., higher number) than the specified value might be deleted by the system automatically to free space, before pausing mirroring, thus protecting snapshots with a priority equal or higher than the value. If for example the value is set to 3, the system will deactivate mirroring if not enough space can be freed even after the deletion of snapshots with delete priority 4. Snapshots with priority level 1, 2 and 3 will not be deleted. If the value is set to 4, the system will deactivate mirroring before deleting any snapshots. If the value is set to 0, the system can delete any snapshot regardless of deletion priority.	N	unchanged

This command changes the Storage Pool snapshot limitation policy.

The *create_last_consistent_snapshot* attribute (used for systems which have no space):

- If the value of the attribute is "no", no last consistent snapshot is generated.
- If value is changed while synchronizing, the existing snapshot is not deleted.

The protected_snapshot_priority attribute:

- Snapshots with a lower delete priority (i.e., higher number) than the specified value might be deleted by the system automatically, in order to free space, before pausing the mirroring, thus protecting snapshots with a priority equal or higher than the value.
- If, for example, the value is set to 3:
  - The system will deactivate mirroring if not enough space can be freed even after the deletion of snapshots with deletion priority of 4.
  - Snapshots with priority level 1, 2 and 3 will not be deleted.
- If the value is set to 4, the system will deactivate mirroring before deleting any of the snapshots.
- If the value is set to 0, the system can delete any snapshot regardless of deletion priority.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_CHANGE_THE_PROTECTED_LEVEL_OF_SNAPSHOTS

  Are you sure you want to change the protected level of snapshot in Storage Pool *Pool*? Note that in case of pool space depletion the system will delete protected snapshots only after deleting unprotected snapshots and internal asynchronous mirror snapshots
- ARE_YOU_SURE_YOU_WANT_TO_INCREASE_THE_PROTECTED_LEVEL_OF_EXISTING_SNAPSHOTS

  Are you sure you want to increase the protected level of snapshot in Storage Pool *Pool*? Note that the pool contains unprotected snapshots that will become protected after issuing this command. In case of pool space depletion the system will delete protected snapshots only after deleting unprotected snapshots and internal asynchronous mirror snapshots
- ARE_YOU_SURE_YOU_WANT_TO_DECREASE_THE_PROTECTED_LEVEL_OF_EXISTING_SNAPSHOTS

  Are you sure you want to decrease the protected level of snapshot in Storage Pool *Pool*? Note that the pool contains protected snapshots that will become unprotected after issuing this command.In case of pool space depletion the system will delete internal asynchronous mirror snapshots only after deleting unprotected snapshots

Completion Codes:

- POOL_DOES_NOT_EXIST

  Storage Pool does not exist
- SNAPSHOT_ILLEGAL_PRIORITY

  Allowed delete priorities of a Snapshot are integers between 1 and 4, inclusive.

Creating Storage Pools

Creates a Storage Pool.

```
pool_create pool=PoolName < size=GB | < hard_size=GB soft_size=GB > >
snapshot_size=GB [ lock_behavior=<read_only|no_io> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
pool	Object name	Name of the Storage Pool.	Y	
size	Positive integer	Size of the Storage Pool (in gigabytes).	N	
hard_size	Positive integer	Hard size of the Storage Pool (actual physical capacity).	N	

Name	Type	Description	Mandatory	Default
soft_size	Positive integer	Soft size of the Storage Pool. Soft_size cannot be less than hard_size.	N	
snapshot_size	Positive integer	Space allocated for snapshots.	Y	
lock_behavior	Enumeration	Sets whether and how the Pool is locked upon space depletion.	N	read_only

This command creates a Storage Pool. The name of the Storage Pool must be unique in the system. Upon creation, the Storage Pool is initially empty and does not contain volumes.

The size of the Storage Pool is specified as an integer multiple of 10^9 bytes, but the actual size of the created Storage Pool is rounded up to the nearest integer multiple of $16x2^{30}$ bytes. The Size parameter is used when hard size and soft size are identical (no thin provisioning). If only the size is specified, then hard_size and soft_size are identical to the size. Otherwise, a Storage Pool with thin provisioning is created.

The created Pool has the following values:

- create_last_consistent_snapshot=yes - meaning the volumes of this Pool can be mirrored
- protected_snapshot_priority=2 - managing the way last_consistent snapshot are preserved

When a Storage Pool is defined, the new Storage Pool's capacity is reduced from the system's free space (hard and soft). This operation fails if the system hard or soft free space does not have free capacity of at least the size of the new Storage Pool. The sum of the capacities of all the Storage Pools in the system, together with the free space, is always equal to the entire system capacity available for the user.

The system allows for the assignment of the entire available capacity to user created Storage Pools, while leaving the free space at zero size.

Both hard and soft sizes are subtracted from the free hard/soft space.

For thin provisioned Storage Pools, the lock_behavior parameter sets whether and how the Pool is locked upon space depletion. The Pool can be locked for write, or for both read and write.

Example:

```
pool_create pool=DBPool size=1000
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Disallowed	

Warnings:

- POOL_SNAPSHOT_SIZE_TOO_SMALL

  Snapshot size is very small. It will only allow snapshots of volumes which do no change. All other snapshots will be deleted immediately. Are you sure?

Completion Codes:

- POOL_NAME_EXISTS

  Storage Pool name already assigned to another Storage Pool
- MAX_POOLS_REACHED

  Maximum number of Storage Pools already defined
- NO_HARD_SPACE

  The system does not have enough free hard space for the requested Storage Pool hard size
- NO_SOFT_SPACE

  The system does not have enough free soft space for the requested Storage Pool soft size
- SOFT_SIZE_SMALLER_THAN_HARD_SIZE

  Soft size must be equal or larger than hard size
- HARD_SIZE_SMALLER_THAN_SNAPSHOT_SIZE

  Snapshot size must be equal or smaller than hard size
- NO_SPACE

  The system does not have enough free space for the requested Storage Pool size
- REACHED_POOL_MAX_HARD_CAPACITY

  Reached max pool hard capacity

Deleting a Storage Pool

Deletes a Storage Pool.

```
pool_delete pool=PoolName
```

Parameters:

Name	Type	Description	Mandatory	Default
pool	Object name	The name of the Storage Pool to delete.	Y	

This command deletes a Storage Pool.

This command fails if the Storage Pool is not empty, meaning that it still contains volumes.

The capacity of the deleted Storage Pool is added to the free space.

Example:

```
pool_delete pool=ERPPool
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_POOL
  Are you sure you want to delete Storage Pool *Pool*?

Completion Codes:

- POOL_DOES_NOT_EXIST
  Storage Pool does not exist
- POOL_HAS_CG
  Storage Pool has Consistency Groups defined
- POOL_IN_USE
  Storage Pool has volumes allocated in it

Listing Storage Pools

Lists all Storage Pools or the specified one.

```
pool_list [ pool=PoolName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
pool	Object name	Name of a Storage Pool.	N	All pools.

This command lists all Storage Pools.

When the `pool` parameter is provided, only the specified Storage Pool is listed.

Example:

```
pool_list
```

Output:

```
Name     Size (GB)  Empty Space (GB)
default  24292      9225
DBPool   1013       1013
```

Id	Name	Description	Default Position
name	Name		1
soft_size	Size (GB)		2
soft_size_MiB	Size (MiB)		
hard_size	Hard Size (GB)		7
hard_size_MiB	Hard Size (MiB)		
snapshot_size	Snap Size (GB)		5
snapshot_size_MiB	Snap Size (MiB)		
total_volume_size	Soft Vols (GB)		2
total_volume_size_MiB	Soft Vols (MiB)		
empty_space_soft	Soft Empty (GB)		6
empty_space_soft_MiB	Soft Empty (MiB)		
empty_space_hard	Hard Empty (GB)		10
empty_space_hard_MiB	Hard Empty (MiB)		
used_by_volumes	Hard Vols (GB)		8
used_by_volumes_MiB	Hard Vols (MiB)		
used_by_snapshots	Hard Snaps (GB)		9
used_by_snapshots_MiB	Hard Snaps (MiB)		
creator	Creator		
locked	Locked		8
lock_behavior	Lock Behavior		
create_last_consistent_snapshot	Create Last Consistent Snapshot		
protected_snapshot_priority	Protected Snapshots Priority		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Renaming a Storage Pool

Renames a specified Storage Pool.

```
pool_rename pool=PoolName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
pool	Object name	Name of the Storage Pool.	Y	

Name	Type	Description	Mandatory	Default
new_name	Object name	New name of the Storage Pool.	Y	

This command renames a Storage Pool.

The new name of the Storage Pool must be unique in the system.

This command succeeds even if the new name is identical to the current name.

Example:

```
pool_rename pool=DBPool new_name=ERPPool
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- POOL_DOES_NOT_EXIST
  Storage Pool does not exist
- POOL_NAME_EXISTS
  Storage Pool name already assigned to another Storage Pool

Resizing a Storage Pool

Resizes a Storage Pool.

```
pool_resize pool=PoolName [ size=GB | < hard_size=GB soft_size=GB > ]
[ snapshot_size=GB ]
```

Parameters:

Name	Type	Description	Mandatory	Default
pool	Object name	Name of the Storage Pool to resize.	Y	
size	Positive integer	New size of the Storage Pool (in gigabytes). Using this option specifies that the hard_size and the soft_size are identical.	N	

Name	Type	Description	Mandatory	Default
hard_size	Positive integer	Hard size of the Storage Pool (actual physical capacity).	N	
soft_size	Positive integer	Soft size of the Storage Pool (maximal size of capacity seen by the hosts, used for thin provisioning).	N	
snapshot_size	Integer	Sets a new value for the limit on snapshot capacity usage of the Storage Pool.	N	Leave unchanged.

This command resizes a Storage Pool. The command can either increase or decrease the Storage Pool size.

The new size of the Storage Pool is specified as an integer multiple of 10^9 bytes, but the actual size of the created Storage Pool is rounded up to the nearest integer multiple of $16x2^{30}$ bytes.

Capacity accounting is performed in respect to the free space.

You can either specify both hard_size and soft_size or to only specify size (which specifies that the hard_size and the soft_size are identical).

- When increasing a Storage Pool size, the command succeeds only if the free space holds enough free capacity to allow such an increase in size.
- When decreasing a Storage Pool size, the command succeeds only if the Storage Pool itself holds enough free capacity to allow such a reduction in size.
- If the new size equals the current size, the command succeeds without changes to the Storage Pool.

This command fails if either the current Storage Pool's size (hard or soft) cannot be decreased or if free space (hard or soft) cannot be decreased.

Resizing a Pool that stores asynchronous-mirrored volumes or consistency groups:

- The Pool's hard and soft size have to be identical.

Example:

```
pool_resize pool=DBPool size=1300
```

Output:

```
Command Executed Successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- POOL_SNAPSHOT_SIZE_TOO_SMALL

  Snapshot size is very small. It will only allow snapshots of volumes which do no change. All other snapshots will be deleted immediately. Are you sure?

Completion Codes:

- POOL_DOES_NOT_EXIST

  Storage Pool does not exist
- NO_SOFT_SPACE

  The system does not have enough free soft space for the requested Storage Pool soft size
- SOFT_SIZE_SMALLER_THAN_HARD_SIZE

  Soft size must be equal or larger than hard size
- HARD_SIZE_SMALLER_THAN_SNAPSHOT_SIZE

  Snapshot size must be equal or smaller than hard size
- POOL_SOFT_TOO_SMALL

  Requested soft size is smaller than the sum of sizes of volumes in the Storage Pool
- POOL_TOO_SMALL

  Storage Pool usage exceeds requested size
- POOL_HARD_TOO_SMALL

  Storage Pool usage exceeds requested hard size
- NO_SPACE

  The system does not have enough free space for the requested Storage Pool size
- NO_HARD_SPACE

  The system does not have enough free hard space for the requested Storage Pool hard size
- REACHED_POOL_MAX_HARD_CAPACITY

  Reached max pool hard capacity

Moving a Volume between Storage Pools

Moves a volume and all its snapshot from one Storage Pool to another.

```
vol_move vol=VolName pool=PoolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to move.	Y	
pool	Object name	Name of the Storage Pool to which to move.	Y	

This command moves a volume and all of its snapshots from one Storage Pool to another.

When moving a master volume from one Storage Pool to another, all of its snapshots are moved together with it to the destination Storage Pool.

This command fails when trying to move a snapshot of a volume on its own. This command can fail as a result of either a lack of soft or of hard space.

This command only succeeds if the destination Storage Pool has enough free storage capacity to accommodate the volume and its snapshots. The exact amount of storage capacity allocated from the destination Storage Pool is released at the source Storage Pool.

A volume which belongs to a Consistency Group cannot be moved without the entire Consistency Group. You may use Moving Consistency Groups between Storage Pools to move the Consistency Group itself from one Storage Pool to another.

A volume that is asynchronously mirrored can't be moved into a thin provisioning pool.

Example:

```
vol_move vol=DBLog pool=DBPool
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- POOL_DOES_NOT_EXIST
  Storage Pool does not exist
- NOT_ENOUGH_SPACE
  No space to allocate volume
- NOT_ENOUGH_HARD_SPACE
  No space to allocate for volume's current usage
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots
- VOLUME_BELONGS_TO_CG
  Volume belongs to a Consistency Group
- NOT_ENOUGH_SNAPSHOT_SPACE
  Snapshot usage will exceed snapshot limit

Chapter 9. System Management

The following sections describe the XIV Command Line Interface (XCLI) for system management.

The sections are listed as follows:

- cod_list(Displays current consumed capacity of the system.)
- config_get(Shows the values of configuration parameters.)
- config_set(Sets configuration parameters.)
- dns_test(Tests the DNS (Domain Naming Service).)
- help(Prints system help.)
- maintenance_urgency_list(Prints the current maintenance urgency of the system.)
- patch_script_add(Adds a patch script that will be run on system's module(s).)
- patch_script_delete(Deletes a patch script;.)
- patch_script_list(Lists patch_scripts.)
- patch_script_update(Updates a patch script that will be run on system's module(s);.)
- patch_script_get_result(Gets a patch script result;.)
- shutdown(Shuts down the system.)
- state_change(Changes the operational state of a system.)
- state_list(Shows the current operational state of the system.)
- system_capacity_list(Lists the system's capacities (both hard and soft).)
- time_list(Shows the current system time.)
- time_set(Sets the system's time in YYYY-MM-DD.HH:MM:SS format.)
- timezone_list(Lists all optional time zones.)
- timezone_set(Sets the time zone of the system.)
- upgrade_abort_ongoing(Aborts a system upgrade process.)
- upgrade_download(Initiates the downloading of a new software version.)
- upgrade_download_cancel(Cancels an upgrade download process.)
- upgrade_force_on(Forces the system to continue the upgrade process.)
- upgrade_get_status(Displays status of upgrade process.)
- upgrade_system(Upgrades the software version of the system.)
- upgrade_validate_prerequisites(Validates the ability to upgrade to a specified system version)
- version_get(Prints the current version of the system.)
- vpd_config_get(Shows the values of VPD parameters.)
- vpd_config_set(Sets the values of VPD parameters.)
- mm_config_get(Shows the values of Maintenance Module parameters.)
- mib_get(Displays the system's MIB file.)
- elicense_status_get(Retrieves the electronic license acceptance status.)
- elicense_blob_get(Retrieves a fragment of the electronic license file.)
- elicense_accept(Accept the electronic license agreement.)

The following commands are no longer in use:

- upgrade_download_status (The data will be incorporated in upgrade_get_status.)

Displaying Current Consumed Capacity of the System

Displays current consumed capacity of the system.

```
cod_list  [ name=ParamName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
name	String	Name of parameter to display.	N	All parameters

Id	Name	Description	Default Position
name	Name		1
value	Value		2

This command displays current consumed capacity of a given system.

Example:

```
cod_list
```

Output:

```
Name                   Value
---------------------- ----------------
consumed_capacity      1039
date                   2009-05-27
dst                    yes
machine_model          A14
machine_serial_number  MN00013
machine_type           2810
system_id              13
system_name            XIV MN00013a
time                   10:13:31
timezone               Asia/Jerusalem
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Printing Configuration Parameters

Shows the values of configuration parameters.

```
config_get [ name=ParamName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
name	String	Name of parameter to print.	N	All parameters.

Id	Name	Description	Default Position
name	Name		1
value	Value		2

This command shows the name and value of the specified configuration parameter or of all of them, if no parameter is provided.

The values of the following parameters can be shown:

- *dns_primary*- IP address of the master DNS server.
- *dns_secondary* - IP address of the slave DNS server.
- *email_reply_to_address* - Reply-to address to be used when sending emails. This is useful for troubleshooting errors in email addresses.
- *email_sender_address* - Email address used as the sender's address when sending email messages.
- *email_subject_format* - Controls the formatting of the email subject line. The tags {severity}, {description} and {system_name} can be used to insert the event's data. System default is "{severity}: {description}"
- *iscsi_name* - iSCSI initiator name. Used when configuring non-XIV system for Data Migration over iSCSI.
- *machine_model* -
- *machine_serial_number* -
- *machine_type* -
- *ntp_server* - IP address or DNS name of the NTP server.
- *snmp_community* -
- *snmp_contact* -
- *snmp_location* - SNMP location as shown in the SNMP MIB. (.1.3.6.1.2.1.1.4.0).
- *snmp_contact* - SNMP contact as shown in the SNMP MIB. (.1.3.6.1.2.1.1.4.0).
- *snmp_trap_community* -
- *support_center_port_type* -
- *system_id* - Unique system identifier (equivalent to a serial number).
- *system_name* -

Example:

```
config_get
```

Output:

```
Name                          Value
----------------------- ----------------------------------
email_sender_address    support@ibm.com
email_reply_to_address  storage@ibm.com
dns_primary             10.0.0.10
dns_secondary
iscsi_name              iqn.2005-10.com.xivstorage:010140
system_name             IBM Storage System
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Completion Codes:

- UNRECOGNIZED_CONFIG_PARAMETER
  Unrecognized configuration parameter: '*argument*'.
  Troubleshooting: Use a valid configuration parameter as an input.

Setting Configuration Parameters

Sets configuration parameters.

```
config_set name=ParamName value=ParamValue
```

Parameters:

Name	Type	Description	Mandatory	Default
name	String	Name of the parameter to set.	Y	
value	String	Value of the parameter.	Y	

This command sets the values of configuration parameters.

The values of the following parameters can be set:

- *dns_master* - IP address of the master DNS server.
- *dns_slave* - IP address of the slave DNS server.
- *email_sender_address* - Email address used as the sender's address when sending email messages. Once set, this parameter can not be set to a null value.
- *email_reply_to_address* - Reply-to address to be used when sending emails. This is useful for troubleshooting errors in email addresses.
- *system_name* - Name used as the sender's name when sending email messages.
- *defaultuser* - Default user to be used if no user is specified for the CLI. If null, a user must be specified.
- *snmp_sysname* - SNMP system name as shown in the SNMP MIB. (.1.3.6.1.2.1.1.5.0)
- *snmp_location* - SNMP location as shown in the SNMP MIB. (.1.3.6.1.2.1.1.6.0)
- *snmp_contact* - SNMP contact as shown in the SNMP MIB. (.1.3.6.1.2.1.1.4.0)
- *email_subject_format* - Controls the formatting of the email subject line. The tags {severity}, {description} and {system_name} can be used to insert the event's data. System default is "{severity}: {description}".
- *ntpserver* - IP address or DNS name of the NTP server.
- *snmp_community* - community used for SNMP queries of the system.
- *snmp_trap_community* - community used for SNMP traps sent by the system.

Example:

```
config_set name=dns_secondary value=10.0.0.119
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- UNRECOGNIZED_CONFIG_PARAMETER
  Unrecognized configuration parameter: '*argument*'.
  Troubleshooting: Use a valid configuration parameter as an input.
- READ_ONLY_CONFIG_PARAMETER
  Configuration parameter: '*argument*' is read-only.
  Troubleshooting: You cannot modify read-only parameters.

Testing the DNS

Tests the DNS (Domain Naming Service).

```
dns_test name=HostName
```

Parameters:

Name	Type	Description	Mandatory	Default
name		Name of the host to be resolved.	Y	

This command attempts to translate the DNS name into an IP address. Translation is attempted through each of the defined DNS servers.

This command fails if no DNS servers are defined. A failure of the translation from a name to an IP address is not considered a failure of the command.

The result of each defined DNS server is displayed.

Id	Name	Description	Default Position
name	Name		1
primary_ip	IP (Primary DNS)		2
secondary_ip	IP (Secondary DNS)		3

Example:

```
dns_test name=hermes.xiv
```

Output:

```
Name         IP (Primary DNS)   IP (Secondary DNS)
------------ ------------------ --------------------
hermes.xiv   212.143.102.243    Not Found
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- DNS_SERVER_NOT_DEFINED
  No DNS servers are defined

Printing Help

Prints system help.

```
help [ category=CategoryName | search=SearchString | command=CommandName ]
     [ format=<short|full> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
category	String	Category name.	N	
search	String	Search string.	N	
command	String	Command name.	N	
format	Enumeration	Output format for command help.	N	short.

This command prints the help as follows:

- No parameters - Lists all the commands with their short descriptions, grouped by categories.
- Category - Lists all the commands in the category, with their short descriptions.
- Search - Lists the short descriptions of all the commands in which the search string appears in their name or short description.
- Command with short output (default for command) - Prints the command name and short description.
- Command with full output (default when used in XIV-internal mode) - Prints the command name, short description, syntax, list of parameters and their description, types and default values. If output is table, prints all possible table columns.

Example:

```
help category=volume
```

Output:

```
Category  Name       Description

volume    vol_by_id  Prints the volume name given its SCSI
                     serial number

volume    vol_copy   Copies a source Volume onto a target Volume.

volume    vol_create Creates a new volume.

volume    vol_delete Deletes a Volume

volume    vol_format Formats a Volume.

volume    vol_list   Lists all Volumes, or a specific one.

volume    vol_lock   Locks a Volume, so that it is read-only.

volume    vol_rename Renames a Volume

volume    vol_resize Resize a Volume

volume    vol_unlock Unlocks a Volume, so that it is no longer read-only,
                     and can be written to.
```

Id	Name	Description	Default Position
category	Category		1
name	Name		2
access_control	Access Control		
syntax	Syntax		
fields	Fields		
description	Description		3
example	Example		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Printing the Current Maintenance Urgency

Prints the current maintenance urgency of the system.

```
maintenance_urgency_list
```

This command prints the current maintenance urgency of the system.

Example:

```
maintenance_urgency_list
```

Output:

```
maintenance_urgency = "NONE"
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Adding a Patch Script that will be Run on System's Modules

Adds a patch script that will be run on system's module(s).

```
patch_script_add tar_file=TarFile name=Name exe_file=ExeFile [ module=<all|module_no(1-15(format:/4/5/6/)> ]
    [ type=<data|interface|specific|none> ] [ version=Version ] [ persistence=<yes|no> ]
    [ run_option=<Always|Once|none> ] [ parameters=(p1,p2,p3....p10) ] [ enabled=<yes|no> ]
    [ description=Description ] [ priority=Priority ] [ activate_now=<yes|no> ] [ events_trigger=EventCode ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module	String	Module numbers that it should execute on. (Default of all).	N	"All"
type	Enumeration	Module types (data/interface) that it should execute on. (Default of specific) (user can give either that or arg #2)	N	"Specific"
name	String	elemant Script name.	Y	
exe_file	String	Executed Script name.	Y	
tar_file	String	Script tar loaded file.	Y	
version	String	Script version.	N	None
persistence	Boolean	Script persistence.	N	"yes"
run_option	Enumeration	Script run option: Always, Once.	N	"Once"
parameters	String	Patch script parameters devide by " ".	N	None
enabled	Boolean	User enabling/disabling the patch script.	N	yes

Name	Type	Description	Mandatory	Default
activate_now	Boolean	User activates now the patch script. (only in once script)	N	no
description	String	Script description.	N	None
priority	Integer	Script priority.	N	1
events_trigger		Events code that trigger the script	N	None

Adds a patch script that will be run on system's module(s).

Example:

```
xcli -u -c XIV1 patch_script_add module=1,2,3
   tar_file=upgrade_script.tar exe_file=upgrade_script.sh version=10.2
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- PATCH_SCRIPT_BAD_NAME
  Patch script bad name.
- PATCH_SCRIPT_ALREADY_EXISTS
  Patch script already exists.
- FAILED_TO_DISTRIBUTION_PATCH_SCRIPT
  Failed to distribute patch script.
- PATCH_SCRIPT_SIGNATURE_IS_NOT_VERIFIED
  The patch script signature is not verified.
- MAX_PATCH_SCRIPT_REACHED
  Exceed max patch script objects.

Deletes a Patch Script

Deletes a patch script;.

```
patch_script_delete name=Name
```

Parameters:

Name	Type	Description	Mandatory	Default
name	String	Script name.	Y	

Delets a patch script.

Example:

```
xcli  -u -c XIV1 patch_script_delete name=upgrade_script
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- PATCH_SCRIPT_DOESNT_EXIST
  Patch script doesnt exist.
- FAILED_TO_DISTRIBUTION_PATCH_SCRIPT
  Failed to distribute patch script.
- PATCH_SCRIPT_BAD_NAME
  Patch script bad name.

Listing Patch Scripts

Lists patch_scripts.

```
patch_script_list
```

Lists patch scripts.

Example:

```
patch script_list
```

Output:

Id	Name	Description	Default Position
name	Name		1
tar_file	Tar_file		2
exe_file	Exe_file		3
module	Module		4
persistence	Persistence		5
run_option	Run_option		6
type	Type		7
version	Version		8
parameters	Parameters		9

Id	Name	Description	Default Position
enabled	Enabled		10
description	Description		11
priority	Priority		12
activate_now	Activate_now		13

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Updating a Patch Script that will be Run on Systems Modules

Updates a patch script that will be run on system's module(s);.

```
patch_script_update name=Name [ module=<all|module_no(1-15(format:/4/5/6/)> ]
    [ type=<data|interface|specific|none> ] [ version=Version ] [ persistence=<yes|no> ]
    [ run_option=<Always|Once|none> ] [ parameters=(p1,p2,p3....p10) ] [ enabled=<yes|no> ]
    [ description=Description ] [ priority=Priority ] [ activate_now=<yes|no> ] [ events_trigger=EventCode ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module	String	Module numbers that it should execute on. (Default of all).	N	"All"
type	Enumeration	Module types (data/interface) that it should execute on. (Default of specific) (user can give either that or arg #2)	N	"Specific"
name	String	Element Script name.	Y	
persistence	Boolean	Script persistence.	N	"yes"
run_option	Enumeration	Script run option: Always, Once.	N	"Once"
parameters	String	Patch script parameters devide by " ".	N	None
enabled	Boolean	User enabling/disabling the patch script.	N	yes
activate_now	Boolean	User activates now the patch script. (only in once script)	N	no
version	String	Script version.	N	None

Name	Type	Description	Mandatory	Default
description	String	Script description.	N	None
priority	Integer	Script priority.	N	1
events_trigger		Events code that trigger the script	N	None

Updates a patch script that will be run on system's module(s).

Example:

```
xcli  -u -c XIV1 patch_script_update module=1,2,3 name=upgrade_script
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- PATCH_SCRIPT_BAD_NAME
  Patch script bad name.
- PATCH_SCRIPT_DOESNT_EXIST
  Patch script doesnt exist.
- FAILED_TO_DISTRIBUTION_PATCH_SCRIPT
  Failed to distribute patch script.

Gets a Patch Script Result

Gets a patch script result;.

```
patch_script_get_result name=Name module_no=Module
```

Parameters:

Name	Type	Description	Mandatory	Default
module_no	Integer	Module numbers that it we should get the script result.	Y	
name	String	elemant Script name.	Y	

Gets a patch script result.

Id	Name	Description	Default Position
index	Index		1
line	Line		2

Example:

```
xcli  -u -c XIV1 patch_script_get_result module_no=1 name=test1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- PATCH_SCRIPT_DOESNT_EXIST
  Patch script doesnt exist.

Shutting Down

Shuts down the system.

```
shutdown [ emergency=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
emergency	Enumeration	Sets the system to shut down within a timeout even if some of the disks could not be saved, much like in an emergency shutdown performed when the system loses power.	N	no

This command shuts down the system.

The system stops serving hosts, de-stages all information to disks and then turns itself off. If the "emergency" option is specified, the system shuts down within the timeout period.

NOTE: USING THIS OPTION MAY CAUSE DATA LOSS.

Example:

```
shutdown
```

Output:

```
Command Executed Successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_SHUT_DOWN
  Are you sure you want to shut down the machine and all its components?

Completion Codes:

- COMMAND_IS_NOT_VALID_IN_CURRENT_SYSTEM_STATE
  The requested command cannot be invoked in the current system state
- SYSTEM_UPGRADE_CANNOT_BE_CANCELED
  Upgrade is already underway and cannot be canceled.
- SYSTEM_UPGRADE_CANCELED_BECAUSE_OF_NODE_FAILURE_DURING_UPGRADE
  Last upgrade was canceled because a node failed while the upgrade process was running
- HOT_UPGRADE_IS_NOT_ONGOING
  Hot upgrade is not currently ongoing
- SYSTEM_UPGRADE_NOT_RUNNING
  Upgrade is not underway
- FIRMWARE_UPGRADE_IN_PROGRESS
  Operation was disallowed since one or more modules are upgrading their firmware.
  Troubleshooting: Contact support

Changing the Operational State

Changes the operational state of a system.

```
state_change target_state=<shell|on>
```

Parameters:

Name	Type	Description	Mandatory	Default
target_state	Enumeration	The operational state after the command is executed.	Y	

This command changes the system's states. The systems' states can be transitioned as follows:

- Maintenance to On
- On to Shell
- Maintenance to Shell

The command can also run on the booting state after a power on (but not booting after a reboot) and effectively change the target state in that situation. Other operational state changes can be achieved through the following:

- On to Maintenance - using the Reboot command
- Any state to Off - using the Shutdown command
- Shell to Any - implemented via scripts, as the CLI is not active in shell

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Warnings:

- INITIALIZING_MODULES_WILL_FAIL_ARE_YOU_SURE
  Module is initializing. Moving to ON will cause it to fail. Are you sure you want move to ON state?
- ARE_YOU_SURE_YOU_WANT_TO_SHUT_DOWN
  Are you sure you want to shut down the machine and all its components?

Completion Codes:

- COMMAND_IS_NOT_VALID_IN_CURRENT_SYSTEM_STATE
  The requested command cannot be invoked in the current system state
- FIRMWARE_UPGRADE_IN_PROGRESS
  Operation was disallowed since one or more modules are upgrading their firmware.
  Troubleshooting: Contact support

Listing Operational State

Shows the current operational state of the system.

```
state_list
```

This command shows the current operational state of the system.

Id	Name	Description	Default Position
category	Category		1
value	Value		2

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Showing System Capacity, Free Space and Spares

Lists the system's capacities (both hard and soft).

```
system_capacity_list
```

This command shows the various types of hard and soft system capacities, free space and spare capacities.

Id	Name	Description	Default Position
soft	Soft		1
hard	Hard		2
max_pool_size	Max_Pool_Size		3
free_hard	Free Hard		4
free_soft	Free Soft		5
spare_modules	Spare Modules		6
spare_disks	Spare Disks		7
target_spare_modules	Target Spare Modules		8
target_spare_disks	Target Spare Disks		9
soft_MiB	Soft (MiB)		
hard_MiB	Hard (MiB)		
free_hard_MiB	Free Hard (MiB)		
free_soft_MiB	Free Soft (MiB)		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Showing the Current Time

Shows the current system time.

```
time_list
```

This command shows the current time, date and time zone.

Id	Name	Description	Default Position
time	Time		1
date	Date		2
timezone	Time Zone		3
dst	Daylight Saving Time		4

Example:

```
time_list
```

Output:

```
Time       Date         Time Zone        Daylight Saving Time
---------- ------------ ---------------- --------------------
10:09:47   2008-02-19   Asia/Jerusalem   no
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Setting the System's Time

Sets the system's time in YYYY-MM-DD.HH:MM:SS format.

```
time_set time=Timestamp
```

Parameters:

Name	Type	Description	Mandatory	Default
time		New current time.	Y	

This command sets the system's time.

Example:

```
time_set time=2006-05-04.03:02:01
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- SYSTEM_TIME_NOT_CHANGED
  System time was not changed
  Troubleshooting: Please try again.
- BAD_TIMESTAMP

Timestamp cannot be deciphered

Listing Optional Time Zones

Lists all optional time zones.

```
timezone_list
```

This command lists the optional time zones.

Standard POSIX time zones are used. http://www.timeanddate.com/worldclock/ provides a full description of all time zones.

Id	Name	Description	Default Position
name	Timezone		1

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Setting the Time Zone

Sets the time zone of the system.

```
timezone_set timezone=TimeZone
```

Parameters:

Name	Type	Description	Mandatory	Default
timezone	String	New time zone of the system.	Y	

This command sets the new time zone of the system. See Listing Optional Time Zones for a complete list of optional time zones.

Standard POSIX time zones are used. http://www.timeanddate.com/worldclock/ provides a full description of all time zones.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- BAD_TIMEZONE_NAME
  Timezone is not recognized by the system

Aborting the Upgrade to a New Software Version

Aborts a system upgrade process.

```
upgrade_abort_ongoing
```

This command aborts the upgrade process of a new software version. In case that I/O are not stopped, the command aborts the upgrade and returns the system to full operation.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- HOT_UPGRADE_IS_NOT_ONGOING
  Hot upgrade is not currently ongoing

Initiating Download of a New Software Version

Initiates the downloading of a new software version.

```
upgrade_download version=Version interface_type=<laptop|management|maintenance|vpn>
[ repository_ip=DownloadServer ]
```

Parameters:

Name	Type	Description	Mandatory	Default
version	String	Version number of the new software to be downloaded.	Y	
interface_type	Enumeration	Type of IP interface where the repository IP resides.	Y	
repository_ip		Network server used as the source for the new version.	N	

This command initiates the downloading of a new software version.

The command only fails if there is another download process in effect. All other failures are reported asynchronously in upgrade_status command.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- SYSTEM_UPGRADE_IS_ALREADY_RUNNING
  Upgrade is already running
- NO_ACTIVE_PORTS_OF_SPECIFIED_ROLE
  None of the ports of the specified role is active.
- UPGRADE_DOWNLOAD_COULD_NOT_BE_STARTED
  Failed starting upgrade download of an unknown reason.
- REPOSITORY_IP_MUST_BE_SUPPLIED_FOR_DOWNLOAD
  Repository IP must be supplied for download if the interface type is Management or VPN.
- NO_PORTS_OF_SPECIFIED_ROLE
  The system does not have any ports of the specified roles.
- PORT_ROLE_IS_INVALID
  Specified port role is invalid.

Canceling an Upgrade Download Process

Cancels an upgrade download process.

```
upgrade_download_cancel
```

This command cancels an upgrade download process.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- SYSTEM_UPGRADE_CANNOT_BE_CANCELED
  Upgrade is already underway and cannot be canceled.
- SYSTEM_UPGRADE_NOT_RUNNING
  Upgrade is not underway

Forcing a Continuation of the Upgrade Process

Forces the system to continue the upgrade process.

```
upgrade_force_on
```

This command forces the system to continue the upgrade process.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_SHUT_DOWN
  Are you sure you want to shut down the machine and all its components?

Completion Codes:

- COMMAND_IS_NOT_VALID_IN_CURRENT_SYSTEM_STATE
  The requested command cannot be invoked in the current system state
- SYSTEM_UPGRADE_NOT_RUNNING
  Upgrade is not underway
- SYSTEM_UPGRADE_CANNOT_BE_CANCELED
  Upgrade is already underway and cannot be canceled.
- HOT_UPGRADE_IS_NOT_ONGOING
  Hot upgrade is not currently ongoing
- SYSTEM_UPGRADE_CANCELED_BECAUSE_OF_NODE_FAILURE_DURING_UPGRADE
  Last upgrade was canceled because a node failed while the upgrade process was running

Displaying Status of Upgrade Process

Displays status of upgrade process.

```
upgrade_get_status
```

The output of this command displays the status of the upgrade process. The status can be any of the following:

- Downloading - the upgrade package
- Ready for upgrade
- Preparing
- Finalizing upgrade (after the I/Os resumes)

Additional upgrade-related values:

- Requires a reboot
- Update is required

- The number of times the system attempted to stop I/Os
- Time to the next retry
- Abort reason (in case the upgrade was aborted)
- Failed to communication with server
- Server does not have the required software version
- No upgrade path from the current version to the new version
- The new version is a downgrade
- Download done
- Limitations on the upgrade (for example: upgrade to this version is not allowed if data migration is in progress, or if mirroring of a primary volume is defined as mandatory).

In addition, once the download is complete, then a message is displayed on screen, telling whether the upgrade would be hot (no I/O interrupted) or cold (interrupting I/Os).

Example:

```
upgrade_get_status
```

Output:

```
Name                       Value
-------------------------- ---------------------------------------
io_stopping_attempts_num   -1
is_restart_needed          Unknown
last_upgrade_result        System has never performed an upgrade
last_upgrade_start_time
seconds_for_next_attempt   -1
upgrade_state              Upgrade Not Underway
upgrade_substate           NO_UPGRADE
was_firmware_updated       Unknown
```

Id	Name	Description	Default Position
name	Name		1
value	Value		2

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Upgrading a System

Upgrades the software version of the system.

```
upgrade_system upgrade_type=<hot|cold|utilities_only> [ allow_downtime=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
upgrade_type	Enumeration	The type can can be "hot" (for hot upgrade), "cold" (for cold upgrade), and "utilities_only" (for warm upgrade). If the requested upgrade type is "cold", another argument has to be supplied: "allow_downtime" with the value of "yes".	Y	
allow_downtime	Boolean	If the requested upgrade type is "cold", this argument has with the value of "yes".	N	no

This command upgrades the software version of the system.

The command fails whenever:

- The download has not been initiated
- The download has not been completed
- A specific module or disk has failed - in this case, the upgrade operation stops in maintenance mode ("safemode").

Upgrade is not allowed (to some versions) whenever:

- There are active data migration processes.
- The system contains a volume that is mirrored and set to primary.

Both cases return UPGRADE_CAN_NOT_START.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- SYSTEM_UPGRADE_NOT_FINISHED_DOWNLOADING

  System cannot switch to new version until the new version is downloaded to all modules of the system.

  Troubleshooting: Make sure that all nodes finished downloading the new software version
- PRE_UPGRADE_VALIDATIONS_ALREADY_RUNNING

Pre-upgrade validations cannot be invoked since the system is already in the process of performing those validations

- NO_LIVE_ADMIN_SERVER_FOUND

  Could not invoke pre-upgrade script because no module can run cli commands
- UPGRADE_RELATED_SCRIPT_ALREADY_RUNNING

  Pre-upgrade or post-upgrade script cannot be invoked since an upgrade related script is currently running
- SYSTEM_UPGRADE_COLD_UPGRADE_WHEN_DOWNTIME_DISALLOWED

  Cold upgrade was requested but system downtime was not allowed

  Troubleshooting: Specify another upgrade type, or allow downtime with the proper argument
- SYSTEM_UPGRADE_INCOMPATIBLE_UPGRADE_TYPE_SPECIFIED

  The specified upgrade type specified is incompatible with the kind of change imposed by the new version's files

  Troubleshooting: Specify the correct upgrade type

Validating the Prerequisites of an Upgrade to a New Software Version

Validates the ability to upgrade to a specified system version

```
upgrade_validate_prerequisites [ upgrade_type=<hot|cold|utilities_only> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
upgrade_type	Enumeration	The type can can be "hot" (for hot upgrade), "cold" (for cold upgrade), and "utilities_only" (for warm upgrade).	N	hot

This command runs the prerequisites validation script of the upgrade, and returns its result.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- PRE_UPGRADE_VALIDATIONS_ALREADY_RUNNING

  Pre-upgrade validations cannot be invoked since the system is already in the process of performing those validations
- UPGRADE_RELATED_SCRIPT_ALREADY_RUNNING

  Pre-upgrade or post-upgrade script cannot be invoked since an upgrade related script is currently running
- SYSTEM_UPGRADE_NOT_FINISHED_DOWNLOADING

System cannot switch to new version until the new version is downloaded to all modules of the system.

Troubleshooting: Make sure that all nodes finished downloading the new software version

- PRE_UPGRADE_VALIDATION_FAILED
- NO_LIVE_ADMIN_SERVER_FOUND

  Could not invoke pre-upgrade script because no module can run cli commands

Printing the Current System Version

Prints the current version of the system.

```
version_get
```

This command prints the current version of the system.

Id	Name	Description	Default Position
system_version	Version		1

Example:

```
version_get
```

Output:

```
Version
10.2
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Showing Values of VPD Parameters.

Shows the values of VPD parameters.

```
vpd_config_get  [ name=ParamName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
name	String	Name of the parameter to print.	N	All parameters.

Id	Name	Description	Default Position
name	Name		1
value	Value		2

Shows the values of VPD parameters. See Setting VPD Parameters for a full list of available settings.

Example:

```
vpd_config_get name=site.city
```

Output:

```
Name        Value
----------- --------
site.city   Gotham
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Setting VPD Parameters

Sets the values of VPD parameters.

```
vpd_config_set  name=ParamName value=ParamValue
```

Parameters:

Name	Type	Description	Mandatory	Default
name	String	Name of the parameter to set.	Y	
value	String	Value of the parameter.	Y	

This command sets the following values of VPD parameters, where only the `name` is mandatory.:

- customer.name
- customer.primary_contact.calling_hours
- customer.primary_contact.email
- customer.primary_contact.mobile_phone
- customer.primary_contact.name
- customer.primary_contact.office_phone
- customer.primary_contact.time_zone
- customer.secondary_contact.calling_hours

- customer.secondary_contact.email
- customer.secondary_contact.mobile_phone
- customer.secondary_contact.name
- customer.secondary_contact.office_phone
- customer.secondary_contact.time_zone
- hardware_info.hw_ats_monitoring
- hardware_info.hw_ats_type
- hardware_info.hw_cable_bundle
- hardware_info.hw_door
- hardware_info.hw_patch_panel
- hardware_info.hw_patch_panel_label
- hardware_info.hw_power_cable_config
- hardware_info.hw_rack_type
- hardware_info.hw_rps
- interface_config.model
- machine_model
- machine_type
- main_ibm_contact.calling_hours
- main_ibm_contact.email
- main_ibm_contact.mobile_phone
- main_ibm_contact.name
- main_ibm_contact.office_phone
- main_ibm_contact.time_zone
- non_mutable_vpd_info.original_flashed_version
- non_mutable_vpd_info.original_flashing_date
- disk_size
- remote_support.customer_contact.calling_hours
- remote_support.customer_contact.email
- remote_support.customer_contact.mobile_phone
- remote_support.customer_contact.name
- remote_support.customer_contact.office_phone
- remote_support.customer_contact.time_zone
- remote_support.modem_phone_number
- remote_support.primary_ibm_ip
- remote_support.secondary_ibm_ip
- remote_support.special_instructions
- remote_support.vpn_ip_1
- remote_support.vpn_ip_2
- site.building_location
- site.city site.country
- site.name
- site.postal_code
- site.state
- site.street_address
- system_info.sys_ec_level

- system_info.sys_hw_level

Example:

```
vpd_config_set name= value=
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Showing Values of Maintenance Module Parameters.

Shows the values of Maintenance Module parameters.

```
mm_config_get  [ name=ParamName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
name	String	Name of the parameter to print.	N	All parameters.

Id	Name	Description	Default Position
name	Name		1
value	Value		2

Shows the values of Maintenance Module parameters. See Setting Maintenance Module Parameters for a full list of available settings.

Example:

```
mm_config_get name=mm_mutable_info.should_run_package_daemon
```

Output:

```
Name                                       Value
------------------------------------------ -------
mm_mutable_info.should_run_package_daemon   yes
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Disallowed	

Displaying the System's MIB File

Displays the system's MIB file.

```
mib_get [ save_to_disk=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
save_to_disk	Boolean	Indicates if to save the MIB file under /local/scratch on the interface modules	N	no

Displays the system's MIB file.

Id	Name	Description	Default Position
index	Index		1
line	Line		2

Example:

```
xcli  -u -c XIV1 mib_get
```

Output:

```
Line
Index   Line
------- ----------------------------------------------
1       -- -*- SNMP -*- mode for Emacs
2       XIV-MIB DEFINITIONS ::= BEGIN
3
4       IMPORTS
5           MODULE-IDENTITY, OBJECT-TYPE,
6               NOTIFICATION-TYPE,
7               Gauge32, Integer32   FROM SNMPv2-SMI
...
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- CANNOT_READ_FROM_FILE
  Cannot read from file '*Filename*'
  Troubleshooting: Contact support

Retrieves the Electronic License Acceptance Status

Retrieves the electronic license acceptance status.

```
elicense_status_get
```

Retrieves the electronic license acceptance status.

Example:

```
xcli -u -c XIV1 elicense_status_get
```

Output:

```
Status
----------
Accepted
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Retrieving a Fragment of the Electronic License File

Retrieves a fragment of the electronic license file.

```
elicense_blob_get beg=Number size=Number
```

Parameters:

Name	Type	Description	Mandatory	Default
beg	Positive integer	Beginning of fragment in bytes.	Y	
size	Positive integer	Length of fragment in bytes. Maximum length allowed is 1000000	Y	

Retrieves a fragment of the electronic license file.

Example:

```
xcli -u -c Nextra1 elicense_blob_get beg=0 size=20
```

Output:

```
          <file_size value="1300473"/>
          <fragment value="425a68393141592653 59ba94ca1106dd587f84fe"/>
          <fragment_size value="20"/>
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Completion Codes:

- CANNOT_READ_FROM_FILE
  Cannot read from file '*Filename*'
  Troubleshooting: Contact support

Accept the Electronic License Agreement

Accept the electronic license agreement.

```
elicense_accept version=Version [ approver_name=UserName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
version	String	The electronic license version	Y	
approver_name	String	The approver name	N	none

Accept the electronic license agreement.

Example:

```
xcli -u -c XIV1 elicense_accept version approver_name
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- ELICENSE_INCOMPATIBLE_VERSION
  The accepted version of the Electronic license dose not match the current version
  Troubleshooting: Please retrieve the current electronic license version and accept it
- ELICENSE_ALLREADY_ACCEPTED
  Electronic license already accepted
  Troubleshooting: You do not need to accept the electronic license
- ELICENSE_DISABLED
  Electronic license check is disabled
  Troubleshooting: You do not need to accept the electronic license

Chapter 10. Remote Target Connectivity

The following sections describe the XIV Command Line Interface (XCLI) for defining remote target connectivity.

The sections are listed as follows:

- target_change_connection_threshold(Setting a threshold for link disruption that lasts more than a specified duration)
- target_config_sync_rates(Changes the target's mirroring configuration.)
- target_connectivity_activate(Activates connectivity between a port on the local storage system and a port on a remote target.)
- target_connectivity_deactivate(Deactivates connectivity between a port on the local storage system and a port on a remote target.)
- target_connectivity_define(Defines connectivity between a port on the local storage system and a port on a remote target.)
- target_connectivity_delete(Deletes connectivity between a port on the local storage system and a port on a remote target.)
- target_connectivity_list(Lists all the connectivity definitions of a remote target.)
- target_define(Defines a new remote target for remote mirroring or data migration.)
- target_delete(Deletes the definition of a specified remote target.)
- target_list(Lists a specified remote target definition, or all the target definitions.)
- target_mirroring_allow(Allows remote mirroring operations initiated from the remote target.)
- target_port_activate(Activates a port of a remote target.)
- target_port_add(Adds a port to a remote target.)
- target_port_deactivate(Deactivates a port of a remote target.)
- target_port_delete(Deletes a port from a specified remote target.)
- target_port_list(List all ports of a target.)
- target_rename(Renames a remote target.)
- target_update(Updates the target's configuration.)
- target_connectivity_threshold_set(Sets a threshold for link disruption that lasts more than a specified duration)
- target_connectivity_threshold_get(Lists the set threshold for link disruption that lasts more than a specified duration)

The following commands are no longer in use:

- target_connectivity_test (Connectivity is reported in the target_connectivity_list command.)
- target_portset_create (Port Sets are no longer in use in this version. Ports are associated directly with targets.)
- target_portset_rename (Port Sets are no longer in use in this version. Ports are associated directly with targets.)
- target_portset_delete (Port Sets are no longer in use in this version. Ports are associated directly with targets.)
- target_portset_port_add (Port sets are no longer used. Use target_port_add instead.)
- target_portset_port_delete (Port sets are not in use. Use target_port_delete.)
- target_portset_port_activate (Port sets are not in use any more. Use target_port_activate instead.)
- target_portset_port_deactivate (Portsets are not in use any more. Use target_port_deactivate.)

- target_portset_list (Port Sets are no longer in use in this version. Ports are associated directly with targets.)

Setting a Threshold for Link Disruption Duration that Triggers an Event

Setting a threshold for link disruption that lasts more than a specified duration

```
target_change_connection_threshold target=TargetName [ duration=duration ]
```

Parameters:

Name	Type	Description	Mandatory	Default
duration	Integer	Duration for link down that will trigger an event	N	30
target	Object name	Target name	Y	

Sets the duration for a link disruption that will trigger an event

Example:

```
target_change_connection_threshold target duration
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- TARGET_INVALID_CONNECTION_DURATION_THRESHOLD
  Target connection duration threshold should be in [1,1000000] range

Updating the Target Mirroring Configuration

Changes the target's mirroring configuration.

```
target_config_sync_rates target=TargetName [ max_initialization_rate=MaxInitializationRate ]
[ max_syncjob_rate=MaxSyncjobRate ] [ max_resync_rate=MaxResyncRate ]
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	The updated target.	Y	

Name	Type	Description	Mandatory	Default
max_initialization_rate	Positive integer	Specifies the maximum rate for initial synchronization. Cannot be larger than max_syncjob_rate.	N	Unchanged
max_syncjob_rate	Positive integer	Specifies the default maximum rate for sync job synchronization. Cannot be larger than max_resync_rate.	N	Unchanged
max_resync_rate	Positive integer	Specifies the maximum rate for re-synchronization	N	Unchanged

This command changes the system ID of the remote target. The synchronization rate units are Megabytes per second. The default rates are: 30 MB/s for initialization rate, 100 MB/s for resync rate. The default system_id is the value that is set with the config_set command.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME

  Target name does not exist
- TARGET_ILLEGAL_RATE_VALUES

  max init rate should be smaller or equal to max sync job rate. max sync job rate should not be greater than max resync rate.

Activating Connectivity to a Remote Target

Activates connectivity between a port on the local storage system and a port on a remote target.

```
target_connectivity_activate target=TargetName
      < ipaddress=IPaddress local_ipinterface=IPInterface > | <
      fcaddress=wwwpn local_port=PortId >
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target of the connectivity definition.	Y	

Name	Type	Description	Mandatory	Default
ipaddress		IP address of the port on the remote target (iSCSI targets only).	N	
local_ipinterface	Object name	Local IP interface to be connected to the remote port (iSCSI only)	N	
fcaddress		FC address of the port on the remote target (FC targets only).	N	
local_port		Port identifier.	N	

This command activates connectivity after it has been deactivated, if required.

Each connectivity definition can be either active or in-active. The system does not use an inactive connectivity definition. Target Connectivity is active by default.

This command has no effect if the connectivity is already active.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- CONNECTIVITY_NOT_DEFINED
  Remote port is not connected through this local port
- COMPONENT_IS_NOT_AN_FC_PORT
  Component must specify an FC port
- COMMAND_NOT_ALLOWED_ON_MANAGEMENT_INTERFACE
  Operation is not allowed on Management IP Interface
- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist
- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target
- BAD_LOCAL_IP_PORT
  An ID of a local IP port must be specified

Deactivating Connectivity to a Remote Target

Deactivates connectivity between a port on the local storage system and a port on a remote target.

```
target_connectivity_deactivate target=TargetName
< ipaddress=IPaddress local_ipinterface=IPInterface > |
< fcaddress=wwpn  local_port=PortId >
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target of the connectivity definition.	Y	
ipaddress		IP address of the port on the remote target (iSCSI targets only).	N	
local_ipinterface	Object name	Local IP interface that is connected to the remote port (iSCSI only).	N	
fcaddress		FC address of the port on the remote target (FC targets only).	N	
local_port		Port identifier.	N	

This command deactivates connectivity.

Each connectivity definition can be either active or inactive. The system does not use an inactive connectivity definition. Target Connectivity is active by default. Connectivity can be reactivated using Activating Connectivity to a Remote Target.

This command has no effect if the connectivity is already deactivated.

Example:

```
target_connectivity_deactivate
target=Nextra2 local_module=101
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- COMMAND_NOT_ALLOWED_ON_MANAGEMENT_INTERFACE
  Operation is not allowed on Management IP Interface
- CONNECTIVITY_NOT_DEFINED
  Remote port is not connected through this local port
- COMPONENT_IS_NOT_AN_FC_PORT
  Component must specify an FC port
- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target
- BAD_LOCAL_IP_PORT
  An ID of a local IP port must be specified
- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist

Defining Connectivity to a Remote Target

Defines connectivity between a port on the local storage system and a port on a remote target.

```
target_connectivity_define target=TargetName
< ipaddress=IPaddress local_ipinterface=IPInterface > |
< fcaddress=wwpn local_port=ComponentId >
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target of the connectivity definition.	Y	
ipaddress		IP address of the port on the remote target (iSCSI targets only).	N	
local_ipinterface	Object name	Local IP interface to be connected to the remote port (iSCSI only).	N	
fcaddress		FC address of the port on the remote target (FC targets only).	N	
local_port		FC port (FC only).	N	

This command defines connectivity between a port on the local storage system and a port on a remote target.

Connectivity between a local and a target storage system is defined between a specific port on a local storage system and a port on the target storage system.

Each connectivity definition can be either active or inactive. The system does not use an inactive connectivity definition. Target Connectivity is active by default. An option is provided to de-activate

(target_connectivity_deactivate) and then re-activate (target_connectivity_activate) it, if required. Target Connectivity can be deleted (Deleting Connectivity to a Remote Target) and a list of Target Connectivity definitions (Listing Target Connectivity Definitions) can be displayed.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- CONN_EXISTS
  Remote port is already connected through this local port
- MAX_CONNECTIONS_REACHED
  Maximum number of connections already defined
- MAX_ISCSI_CONNECTIONS_PER_MODULE_REACHED
  Maximal number of iSCSI connectivities already defined for that module.
- COMPONENT_IS_NOT_AN_FC_PORT
  Component must specify an FC port
- BAD_LOCAL_IP_PORT
  An ID of a local IP port must be specified
- COMMAND_NOT_ALLOWED_ON_MANAGEMENT_INTERFACE
  Operation is not allowed on Management IP Interface
- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist
- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target
- MAX_ISCSI_CONNECTIONS_PER_MODULE_REACHED
  Maximal number of iSCSI connectivities already defined for that module.

Deleting Connectivity to a Remote Target

Deletes connectivity between a port on the local storage system and a port on a remote target.

```
target_connectivity_delete target=TargetName
< ipaddress=IPaddress local_ipinterface=IPInterface > |
< fcaddress=wwpn local_port=ComponentId >
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target of the connectivity definition.	Y	

Name	Type	Description	Mandatory	Default
ipaddress		IP address of the port on the remote target (iSCSI targets only).	N	
local_ipinterface	Object name	Local IP interface that is connected to the remote port (iSCSI only).	N	
fcaddress		FC address of the port on the remote target (FC targets only).	N	
local_port		Port number on the local module (FC only).	N	

This command deletes a Target Connectivity definition. Only a previously defined connectivity definition can be deleted.

Example:

```
target_connectivity_delete
target=XIV2 local_module=101
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- COMMAND_NOT_ALLOWED_ON_MANAGEMENT_INTERFACE
  Operation is not allowed on Management IP Interface
- CONNECTIVITY_NOT_DEFINED
  Remote port is not connected through this local port
- COMPONENT_IS_NOT_AN_FC_PORT
  Component must specify an FC port
- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target
- BAD_LOCAL_IP_PORT

An ID of a local IP port must be specified

- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist

Listing Target Connectivity Definitions

Lists all the connectivity definitions of a remote target.

```
target_connectivity_list [ target=TargetName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Target name that is listed.	N	All targets

This command lists a specified remote target connectivity definition or all the target definitions.

Id	Name	Description	Default Position
target_name	Target Name		1
remote_port_address	Remote Port		2
local_fc_port	FC Port		3
local_ip_port	IP Interface		4
active	Active		5
up	Up		6

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Defining a Remote Target

Defines a new remote target for remote mirroring or data migration.

```
target_define target=TargetName  protocol=<FC|iSCSI> [ iscsi_name=iSCSIName ]
[ xiv_features=<yes|no> ]  [ system_id=SystemId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Local name of the remote target.	Y	

Name	Type	Description	Mandatory	Default
protocol	Enumeration	FC (Fiber Channel) or iSCSI, depending on the communication protocol supported by the remote host.	Y	
iscsi_name	iSCSI initiator name	iSCSI name of the remote target. This field is mandatory for iSCSI hosts.	N	
system_id	String	ID of the remote system. Should be the same as the output of Printing Configuration Parameters of the *system_id* variable on the remote system.	N	
xiv_features	Boolean	Defines the remote system as an XIV system. Non-XIV systems are used only for data migration.	N	Yes

This command defines the communication topology between a local storage system and a remote storage system in order to enable various features, such as remote mirroring. The local storage system can write to or read from the remote storage system or allow the target storage system to write to or read from it.

The first step when defining a new Target Connectivity is to specify the name of the remote storage system and the protocol used to communicate with it. There are two possible protocols: Fiber Channel (FC) and iSCSI. Each remote target is available through only one of these protocols.

This step only defines the remote system object. No connectivity definitions are defined yet and no communications are performed yet.

Note:

Once you have defined a remote target, the only way to change its protocol type is to delete the remote target and define it again.

Example:

```
target_define target=Nextra2 protocol=FC
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	

User Category	Permission	Condition
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- MAX_TARGETS_REACHED
  Maximum number of targets already defined
- TARGET_NAME_EXISTS
  Target name is already assigned to another target
- TARGET_ISCSI_MUST_HAVE_A_NAME
  iSCSI Target must have an iscsi_name
- ISCSI_NAME_NOT_ALLOWED_FOR_FC
  FC Target does not have an iscsi_name
- TARGET_BAD_SCSI_TYPE
  Target SCSI type does not exist

Deleting a Remote Target

Deletes the definition of a specified remote target.

```
target_delete target=TargetName
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Target that is deleted.	Y	

This command deletes an existing target. A target that contains port definitions cannot be deleted. A target with remote mirroring or Data Migration definitions cannot be deleted.

Example:

```
target_delete target=Nextra2
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- TARGET_HAS_PORTS
  Ports are defined for this target
- TARGET_HAS_ASSOCIATIONS
  Remote volumes are defined on this target

Listing Remote Targets

Lists a specified remote target definition, or all the target definitions.

```
target_list [ target=TargetName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Target name that is listed.	N	All targets

This command lists a specified remote target definition, or all the target definitions. The following is listed for each target: port groups, ports, active/inactive status for each port, and the following mirroring-related values - max initialization rate, max resync rate, and max sync job rate.

Id	Name	Description	Default Position
name	Name		1
scsi_type	SCSI Type		2
connected	Connected		3
xiv_target	XIV Target		
iscsi_name	iSCSI Name		
system_id	System ID		
num_ports	Number of Ports		
creator	Creator		
max_initialization_rate	Max Initialization Rate		4
max_resync_rate	Max Resync Rate		5
max_syncjob_rate	Max Syncjob Rate		6
connectivity_lost_event_threshold	Connection Threshold		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Allowing Remote Mirroring Access

Allows remote mirroring operations initiated from the remote target.

```
target_mirroring_allow target=TargetName
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target name.	Y	

This command is performed on a local storage system in order to allow the target storage system permission to read, write, view, create volumes and define existing volumes as slaves. This command is used when allowing remote mirroring operations. Otherwise, the target storage system cannot access the local storage system. This command also allows a remote target to read and write through the SCSI interface.

Once mirroring is allowed, this permission cannot be revoked.

This operation should also be run on the target storage system so that it gives permission to the local storage system to access it.

Note:

This step must be performed before mirroring is defined (mirror_create).

Example:

```
target_mirroring_allow target=Nextra2
```

Output:

```
Command Executed Successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- TARGET_BAD_TYPE
  Target machine is not XIV machine

Activating a Port

Activates a port of a remote target.

```
target_port_activate target=TargetName < ipaddress=IPaddress | fcaddress=wwpn >
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target of the port.	Y	
ipaddress		IP address of the port on the remote target (iSCSI targets only).	N	
fcaddress		FC address of the port on the remote target (FC targets only).	N	

This command activates a port of a remote target.

Each port in a remote system can be configured as either active or inactive. The system does not use an inactive port. After a port is defined, it is active by default. This command reactivates a port if it was de-activated (by using target_port_deactivate).

This command has no effect, if the port is already active.

Example:

```
target_port_activate
target=Nextra2 fcaddress=10:00:00:17:38:27:ec:11
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target
- TARGET_BAD_PORT_STATE
  Port is already in requested activation state
- TARGET_BAD_NAME

Target name does not exist

Adding a New Port to a Remote Target

Adds a port to a remote target.

```
target_port_add target=TargetName < ipaddress=IPaddress | fcaddress=wwpn >
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target to which to add the port.	Y	
ipaddress		IP address of the port on the remote target (for iSCSI type targets only).	N	
fcaddress		FC address of the remote port (for FC type targets only).	N	

This command adds a new port to a specified target. A port can be either FC or iSCSI, and its type must conform to the remote target's communication protocol type.

Specify the IP address or the FC address according to communication protocol of the target.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- PORT_EXISTS
  Port is already defined
- MAX_PORTS_REACHED
  Maximum number of ports already defined in the system
- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target

Deactivating a Port

Deactivates a port of a remote target.

```
target_port_deactivate target=TargetName
            < ipaddress=IPaddress | fcaddress=wwpn >
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target of the port.	Y	
ipaddress		IP address of the port on the remote target (iSCSI targets only).	N	
fcaddress		FC address of the port on the remote target (FC targets only).	N	

This command deactivates a port.

Each port in a remote system can be configured as either active or in-active. The system does not use an inactive port. After a port is defined, it is active by default. To re-activate a port use Activating a Port.

Example:

```
target_port_deactivate
target=XIV2
fcaddress=10:00:00:17:38:27:ec:11
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target
- TARGET_BAD_PORT_STATE
  Port is already in requested activation state

Deleting a Port from a Remote System

Deletes a port from a specified remote target.

```
target_port_delete target=TargetName < ipaddress=IPaddress | fcaddress=wwpn >
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Remote target from which the port is that is deleted.	Y	
ipaddress		IP address of the port (for iSCSI targets only).	N	
fcaddress		FC address of the remote port (for FC targets only).	N	

This command deletes a port from a specified remote target.

Example:

```
target_port_delete
target=Nextra2
fcaddress=10:00:00:17:38:27:ec:11
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target
- TARGET_PORT_HAS_CONNECTIVITY
  Port has connectivity defined to it

Listing the Ports of a Remote Target

List all ports of a target.

```
target_port_list  [ target=TargetName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Target for which all ports should be listed.	N	All systems

Lists all ports of a remote target.

Id	Name	Description	Default Position
target_name	Target Name		1
scsi_type	Port Type		2
active	Active		3
fc_wwpn	WWPN		4
iscsi_ip_addr	iSCSI Address		5
iscsi_ip_port	iSCSI Port		6

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Renaming a Remote Target

Renames a remote target.

```
target_rename target=TargetName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Target that is renamed.	Y	
new_name	Object name	New name of the target.	Y	

This command renames an existing target.

Example:

```
target_rename target=Nextra2 new_name=Nextra-DRP
```

Output:

```
Command Executed Successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist
- TARGET_NAME_EXISTS
  Target name is already assigned to another target

Updating the Target Configuration

Updates the target's configuration.

```
target_update target=TargetName system_id=SystemId
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Target to be updated.	Y	
system_id	String	ID of the remote system. Should be the same as the output of Printing Configuration Parameters of the *system_id* variable on the remote system.	Y	

This command changes the system ID of the remote target.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- TARGET_BAD_NAME
  Target name does not exist

Setting a threshold for target connectivity

Sets a threshold for link disruption that lasts more than a specified duration

```
target_connectivity_threshold_set target=targetName [ duration=duration ]
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Target name	Y	[None, unchanged]
duration	Positive integer	Duration for link down that will trigger an event (seconds)	N	30

See functional spec

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Obtaining the threshold for target connectivity

Lists the set threshold for link disruption that lasts more than a specified duration

```
target_connectivity_threshold_get [ target=targetName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
target	Object name	Target name	Y	

See functional spec

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Disallowed	

Chapter 11. Remote Mirroring

The following sections describe the XIV Command Line Interface (XCLI) for remote mirroring. Other command that are relevant to this topic is: Setting a Threshold for Link Disruption Duration that Triggers an Event.

The sections are listed as follows:

- mirror_cancel_snapshot(Cancels all Snapshot Mirrors ('ad-hoc' sync jobs) of a specified master volume or a master consistency group, that have not run yet.)
- mirror_create_snapshot(Creates a Snapshot Mirror. In synchronous replication, takes a snapshot of the source peer (Master) and the target peer (Slave) at exactly the same time. In asynchronous replication, the command establishes a process that takes a point-in-time snapshot of the source peer (Master) and synchronizes that point-in-time with the Slave. The process will set a new sync-job to copy the differences between that snapshot and the most recent snapshot that is guaranteed to be synchronized with the target peer.)
- mirror_activate(Activates mirroring for a defined mirror coupling.)
- mirror_change_rpo(Changing Local/Remote RPO for a mirror relation)
- mirror_change_designation(Changes the designation of mirroring peers - from Primary to Secondary, and from Secondary to Primary.)
- mirror_change_remote_schedule(Changes the replication schedule of a remote Slave peer.)
- mirror_change_role(Changes the role of a local mirroring peer between Master and Slave)
- mirror_change_schedule(Changes the replication schedule for peers on the local system.)
- mirror_create(Creates remote mirroring coupling.)
- mirror_deactivate(Deactivates mirroring for a defined mirror coupling.)
- mirror_delete(Deletes a remote mirroring coupling definition.)
- mirror_list(Lists the status and configuration of mirroring couplings)
- mirror_statistics_get(The command presents statistics that are automatically gathered by the system on past sync jobs corresponding to a specified mirrored volume or consistency job.)
- mirror_switch_roles(Switches roles between master and slave volumes.)
- rpo_thresholds_get(Listing system RPO related thresholds, that once crossed will trigger the creation of a corresponding event)
- rpo_thresholds_set(Setting system RPO related thresholds, that once crossed will trigger the creation of a corresponding event)
- schedule_change(Changes the interval of a schedule.)
- schedule_create(Defines a schedule for replication.)
- schedule_delete(Deletes a schedule for replication.)
- schedule_list(Lists the schedule properties for the specified coupling.)
- schedule_rename(Renames a schedule object.)
- sync_job_list(Lists the status of queued and running sync jobs for asynchronous couplings)

The following commands are no longer in use:

- mirror_change_config (Command is no longer in use in this version. Parameter create_last_consistent_snapshot is associated directly with pools)
- sync_rates_set (Command is no longer in use in this version. Supplanted by command target_config_sync_rates.)

Canceling a Snapshot Mirror (Ad Hoc Sync Job)

Cancels all Snapshot Mirrors ('ad-hoc' sync jobs) of a specified master volume or a master consistency group, that have not run yet.

```
mirror_cancel_snapshot <vol=volumeName | cg=CgName>
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the (local) master volume whose non-started snapshot mirrors should be cancelled	N	
cg	Object name	Name of the (local) master Consistency Group whose non-started snapshot mirrors should be cancelled	N	

This command cancels all snapshot mirrors (ad-hoc sync jobs) for a specific master volume, or a master Consistecy Group. Only sync jobs that haven't started are cancelled. The command does not delete the snapshots themselves.

Upon running the command:

- A warning message is presented to the user for confirmation.
- An event is generated.
- Non-started snapshot mirrors are cancelled.

The command fails under the following conditions:

- The command is issued on a slave volume or Consistency Group.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	The volume is mapped to a host or a cluster associated with the user. If a snapshot overwrite is used, the target snapshot must be one created by a server administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_CANCEL_SNAPSHOT_MIRRORS_FOR_THE_VOLUME
  Are you sure you want to delete snapshot mirrors for *Volume*?
- ARE_YOU_SURE_YOU_WANT_TO_CANCEL_SNAPSHOT_MIRRORS_FOR_THE_CONSISTENCY_GROUP

Are you sure you want to delete snapshot mirrors for *Consistency Group*?

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- LOCAL_PEER_IS_NOT_MASTER
  Local peer is not the master
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds

Creating a Snapshot Mirror (Ad Hoc Sync Job)

Creates a Snapshot Mirror. In synchronous replication, takes a snapshot of the source peer (Master) and the target peer (Slave) at exactly the same time. In asynchronous replication, the command establishes a process that takes a point-in-time snapshot of the source peer (Master) and synchronizes that point-in-time with the Slave. The process will set a new sync-job to copy the differences between that snapshot and the most recent snapshot that is guaranteed to be synchronized with the target peer.

```
mirror_create_snapshot <vol=volumeName | cg=CgName>
    name=SnapshotName
    [ delete_priority=del_value ] slave_name=SnapshotName
    [ slave_delete_priority=del_value ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to snapshot.	N	
cg	Object name	Local Master CG name.	N	
name	Object name	Name of the new snapshot.	Y	
delete_priority	Integer	The deletion priority of the volume's snapshot.	N	1
slave_name	Object name	Name of the new snapshot on the slave.	Y	
slave_delete_priority	Integer	The deletion priority of the slave volume's snapshot.	N	1

This command synchronizes the Slave with the Master.

- In synchronous mirroring - the command takes a snapshot of the source peer (Master) and the target peer (Slave) at exactly the same time.
- In asynchronous mirroring - the command establishes a process that takes a point-in-time snapshot of the source peer (Master) and synchronizes it with the Slave. The process sets a new sync-job that copies the differences between the point-in-time snapshot and the most recent snapshot that is guaranteed to be synchronized with the target peer.

Prerequisite (for both synchronous and asynchronous mirroring):

- The coupling has to be operational.

Multiple Snapshot Mirrors:

- Multiple snapshot mirrors can be issued; each mandates the creation of a corresponding sync job
- Corresponding sync jobs are queued one after each other

Prioritization of sync-jobs:

- The snapshot mirror delays the execution of an interval-based mirror if it is running upon arrival of a new interval.
- The snapshot mirror does not, however, cancel the creation of the interval-based sync job. The interval-based mirror will be calculated based on the differences between the most_recent snapshot and the last snapshot mirror.

Precedence of the last snapshot mirror over the last_replicated snapshot:

- The last_replicated snapshot of the Master will be updated to reflect the completed snapshot mirror. Following the completion of the snapshot mirror, its snapshot is duplicated and the duplicate is named last_replicated (the previous last_replicated snapshot is deleted).

Cancelling a snapshot mirror:

- The administrator has the ability to cancel snapshot mirrors that have not yet started.

IMPORTANT: The snapshots created concurrently on the Master and Slave are identical.

The snapshot mirror results with the following:

- On the Slave - a snapshot is taken on the slave, named last_replicated
- On the Master - the pertinent snapshot that is mirrored onto the slave is also named last_replicated

These two last_replicated snapshots are different and denoted" master" and "slave" accordingly.

The outcome for the synchronous mirroring:

- The Master blocks host I/O for the duration of creating the snapshots
- The Master completes synchronizing pending writes
- A snapshot of the Master and Slave is taken
- The Master no longer blocks host I/O
- An event is generated

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	The volume is mapped to a host or a cluster associated with the user. If a snapshot overwrite is used, the target snapshot must be one created by a server administrator.

User Category	Permission	Condition
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CONS_GROUP_MISMATCH
  Snapshot Group does not match Consistency Group volumes.
- CONS_GROUP_EMPTY
  Operation is not allowed on an empty Consistency Group.
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- LOCAL_PEER_IS_NOT_MASTER
  Local peer is not the master
- MIRROR_IS_NOT_SYNCHRONIZED
  Mirror is not synchronized
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds
- MIRROR_IS_NON_OPERATIONAL
  Mirror is non-operational
- MAX_VOLUMES_REACHED
  Maximum number of volumes already defined
- OPERATION_NOT_ALLOWED_ON_LOOPBACK
  Requested operation is not allowed on loopback target
- OVERWRITE_SNAPSHOT_BAD_NAME
  Snapshot name does not exist
- OVERWRITE_SNAPSHOT_GROUP_DOES_NOT_BELONG_TO_GIVEN_GROUP
  Snapshot Group belongs to another Consistency Group.
- POOL_SNAPSHOT_LIMIT_REACHED
  The maximum number of snapshots is reached.
- REMOTE_MAX_VOLUMES_REACHED
  Maximum number of volumes already defined on remote machine
- REMOTE_MAX_SNAPSHOTS_FOR_VOLUME_REACHED
  Maximal number of snapshots per volume is already reached on a remote whose version is not 10.2.4.
- REMOTE_VOLUME_IS_MASTER
  Volume on remote machine is currently defined as Master
- REMOTE_SNAPSHOT_NAME_EXISTS
  A Snapshot Group with this name already exists on the remote peer.
  Remote snapshot name already exists
- REMOTE_SNAPSHOT_ILLEGAL_PRIORITY
  The Snapshot Group on the remote peer was given an illegal deletion priority.
  Allowed delete priorities of a Snapshot are integers between 1 and 4, inclusive.

- REMOTE_SNAPSHOT_GROUP_NAME_EXISTS
  Remote Snapshot Group name already exists
- REMOTE_SNAPSHOT_GROUP_ILLEGAL_PRIORITY
  Allowed delete priorities of a Snapshot Group are integers between 1 and 4, inclusive.
- REMOTE_SNAPSHOT_GROUP_BAD_PREFIX
  Remote Snapshot Group name has a reserved prefix.
- REMOTE_SNAPSHOT_BAD_PREFIX
  Remote snapshot name has a reserved prefix
- SNAPSHOT_ILLEGAL_PRIORITY
  Allowed delete priorities of a Snapshot are integers between 1 and 4, inclusive.
- SNAPSHOT_IS_INTERNAL
  Internal snapshots cannot be mapped, modified or deleted.
- SNAPSHOT_GROUP_IS_INTERNAL
  Internal snapshots cannot be mapped, modified in any way or deleted.
- SNAPSHOT_GROUP_NAME_EXISTS
  Snapshot Group name already exists.
- SNAPSHOT_GROUP_ILLEGAL_PRIORITY
  The Snapshot Group was given an illegal deletion priority.
  Allowed delete priorities of a Snapshot Group are integers between 1 and 4, inclusive.
- SNAPSHOT_GROUP_BAD_NAME
  Snapshot Group name does not exist.
- SNAPSHOT_GROUP_BAD_PREFIX
  Snapshot Group name has a reserved prefix.
- SNAPSHOT_IS_PART_OF_SNAPSHOT_GROUP
  Snapshot is part of a Snapshot Group
- SYNCHED_SNAPSHOTS_NOT_SUPPORTED_IN_TARGET
  Synchronized Snapshot capability is not supported by the Mirror's Target.
- VOLUME_BAD_PREFIX
  Volume name has a reserved prefix
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- VOLUME_DATA_MIGRATION_UNSYNCHRONIZED
  Data Migration has not completed to this volume
- VOLUME_EXISTS
  Volume name already exists
- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots

Activating Mirroring

Activates mirroring for a defined mirror coupling.

```
mirror_activate < vol=VolName | cg=CgName >
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Master volume.	N	
cg	Object name	Master CG name or a list of master CGs	N	

This command activates the coupling - either volumes or Consistency Groups - and switches it to Active state.

Requirements for a successful command completion:

- The specified target must exist
- The specified target must be mirrored
- The specified target is a volume that does not belong to a Consistency Group, or a Consistency Group
- The specified target is not a Master
- A Standby state was explicitly set by issuing the mirror_deactivate command on the same peer

Note:

If the new activation state is the same as the existing state nothing is done and a success code is returned.

The mirroring can't be activated:

- If the time stamps of the last_replicated snapshots on the Master and the Slave do not match.
- If the command is issued on a Master that did not receive acknowledgement from the Slave following a cg_add_volume - or - cg_remove_volume command (until that command timed out or due to any unexpected failure), the command will fail and a new completion code will be returned (MIRROR_CONS_GROUP_MEMBERSHIP_MISMATCH - meaning that the member lists of the mirror consistency group peers are not the same).
- If the command is issued on a Master that did not receive acknowledgement from the Slave following a vol_resize command (until that command timed out or due to any unexpected failure), the command will fail and a new completion code will be returned (MIRROR_SIZE_MISMATCH - meaning that The sizes of the mirror volume peers are not the same).

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist

- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- LOCAL_PEER_IS_NOT_MASTER
  Local peer is not the master
- MIRROR_CONFIGURATION_ERROR
  Mirror local configuration does not match remote configuration
- REMOTE_MAX_VOLUMES_REACHED
  Maximum number of volumes already defined on remote machine
- SYNC_ALREADY_ACTIVE
  Synchronization is already active
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- MIRROR_CAN_NOT_BE_ACTIVATED
  Mirroring cannot be activated because state cannot be established
  Troubleshooting: Delete and recreate mirror
- MIRROR_CONS_GROUP_MEMBERSHIP_MISMATCH
  Mirrored CG contains different volumes on Master and Slave. This problem occurs whenever the cg_add_vol or cg_remove_vol commands were previously issued and the Master did not receive an acknowledgement from the Slave until the command timed out, or any other unexpected failure.
- MIRROR_SIZE_MISMATCH
  Slave volume and Master Volume sizes are different
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds

Changing the RPO for Local/Remote System

Changing Local/Remote RPO for a mirror relation

```
mirror_change_rpo  <vol=volName | cg=cgName> [ rpo=rpo ] [ remote_rpo=rpo ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local volume name. Must be specified if the command concerns a volume.	N	
cg	Object name	CG name on the local system	N	
remote_rpo	Integer	RPO on remote system	N	[Unchanged]
rpo	Integer	RPO on local system	N	[Unchanged]

This command changes the Local/Remote RPO for a mirror.

- The command must be run on the Master.
- The RPO must be greater than the interval.
- The link has to be up.

Example:

```
mirror_change_rpo vol=volname rpo=100
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- ASYNC_MIRROR_REMOTE_RPO_TOO_SHORT
  Specified Remote RPO is too short.
- ASYNC_MIRROR_RPO_TOO_LONG
  Specified RPO is too long.
- TARGET_NOT_CONNECTED
  There is currently no connection to the target system
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- ASYNC_MIRROR_RPO_TOO_SHORT
  Specified RPO is too short.
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- INTERVAL_SHOULD_BE_SHORTER_THAN_RPO
  Schedule interval must me shorter that RPO.
  The newly defined schedule has to be shorther than the RPO.
- ASYNC_MIRROR_REMOTE_RPO_TOO_LONG
  Specified Remote RPO is too long.
- LOCAL_IS_SLAVE
  Local mirror peer is not the master
- SYNC_MIRROR_HAS_NO_RPO
  Synchronous Mirror does not have an RPO.

Changing a the Mirroring Peers' Designation

Changes the designation of mirroring peers - from Primary to Secondary, and from Secondary to Primary.

```
mirror_change_designation < vol=VolumeName | cg=CgName >
[ new_designation=<Primary|Secondary> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Master volume name.	N	
cg	Object name	Master CG name.	N	
new_designation	Enumeration	The new designation of the peer If not specified, the command will act as a toggle - changing the designation of the peers between Primary and Secondary.	N	none

This command changes the designation of the mirroring peers – from Primary to Secondary, and from Secondary to Primary. The command is issued on the Master peer and affects both peers. The coupling has to be operational.

The designation change implied by this command reflects a decision to reset the designation of the mirroring peers, in contrast with the operational role – which is denoted by the Master/Slave title.

There is no obligation to issue the command with a specification of the new designation. In case that the new designation is not specified, the command will switch the designations of both peers from their current value. The Primary will change to a Secondary, and the Secondary will change to a Primary.

Example:

```
mirror_change_designation cg=reggie13_cg new_designation=Secondary
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- LOCAL_PEER_IS_NOT_MASTER
  Local peer is not the master
- MIRROR_DESIGNATION_NOT_SUPPORTED_BY_TARGET
  Mirror role designation is not supported by the Mirror's Target.
- MIRROR_IS_NON_OPERATIONAL
  Mirror is non-operational
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.

Changing a Mirroring Schedule for Remote Slave Peers

Changes the replication schedule of a remote Slave peer.

```
mirror_change_remote_schedule < vol=VolName |
cg=CgName > remote_schedule=Schedule
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local master volume name	N	
cg	Object name	Local master CG name	N	
remote_schedule	Object name	A reference to a remote schedule that should be set for the remote slave peer (which corresponds with the Master specified in the command)	Y	

This command changes the replication schedule of an asynchronous coupling in order to make it effective after the role of a specified remote Slave peer is changed to Master.

Prerequisites:

- The coupling must be ASYNC_INTERVAL.

Following the command execution:

- The system displays a warning
- If the command is approved, it is executed

- An event is generated
- New sync jobs are generated according to the updated schedule
- Existing sync jobs are not affected (i.e. they run according to the previous schedule)

Requirements for a successful command completion:
- The specified target exists
- The specified target is mirrored
- The specified target is not a volume that belongs to a mirrored Consistency Group
- The specified target is of sync type ASYNC_INTERVAL
- The specified target is a Master
- The link is up

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:
- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- REMOTE_VOLUME_IS_MASTER
  Volume on remote machine is currently defined as Master
- REMOTE_CONS_GROUP_IS_MASTER
  Remote Consistency Group is defined as Master
- SCHEDULE_DOES_NOT_EXIST
  Specified Schedule does not exist
- SYNC_MIRROR_DOES_NOT_USE_SCHEDULE
  Definition of Synchronous Mirror does not require a Schedule object to be specified.
- TARGET_NOT_CONNECTED
  There is currently no connection to the target system
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- INTERVAL_SHOULD_BE_SHORTER_THAN_RPO
  Schedule interval must me shorter that RPO.
  The newly defined schedule has to be shorther than the RPO.

Changing the Roles of a Mirrored Volume

Changes the role of a local mirroring peer between Master and Slave

```
mirror_change_role <vol=VolName | cg=CgName>
  [ new_role=<Master|Slave> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local volume name. Must be specified if the command concerns a volume.	N	
cg	Object name	CG name Must be specified if the command concerns a CG.	N	
new_role	Enumeration	Role name of the peer If not specified, the command will act as a toggle - changing the role of the peer between Master and Slave.	N	none

This command changes the role of the local peer from master to slave or from slave to master when the coupling is non-operational. It is assumed that the command will be issued on both peers of the coupling before the coupling becomes operational again, so that upon reconnection there will still be one master and one slave.

When the command is applied to the master:

- The command can be issued only if the activation state is Standby.
- The command can't be issued during the Initialization phase.

Changing the roles in synchronous mirroring:

- When applied on the master:
  - All changes made to the master since the last time the peers were synchronized will be reverted to their original value. The master ceases serving host requests, and is set to accept replication from the other peer as a slave. If the command was issued during link unavailability, a most_updated snapshot of the peer will be taken to capture the most recent changed that haven't yet been replicated to the other peer.
  - A warning is displayed: ⌂Are you sure to change master to slave⌂
  - An event is generated
  - The Master will cease accepting host requests
  - Unsynchronized data at the demoted Master is recorded in most updated snapshot
  - The demoted Master reverts to last_replicated snapshot
  - Completion of process is recorded in log o Mirroring state is standby
- When applied on the slave:

– The slave will become a master, start accepting requests from hosts, and upon explicit activation will start replicating to the other peer (the original master).
– If the slave volume has a last_consistent snapshot, it means that the mirroring was broken in the middle of the synchronization process and the slave could be inconsistent.
  - In this case, the administrator must choose whether to use the most_updated version, which might be inconsistent, or the last_consistent snapshot.
  - Reverting the volume to the last_consistent snapshot can only be performed by deleting the mirroring, reverting the volume and creating a new mirroring definition.
  - Either way, if a last_consistent snapshot exists, a most-updated snapshot is created, keeping a copy of the information at the time of the role change.

Changing the roles in asynchronous mirroring:

- When applied on the master:
  – Upon successful issuance of the command on the master, the master will be reverted to the image recorded on the last_replicated snapshot of the mirror, will cease accepting host requests, and will be set to accept replication from the other peer as a slave.
- When applied on the slave:
  – A warning is presented: ⌂Are you sure to change slave to master⌂
  – An event is generated
  – The new Master will cease accepting replication requests from the previous Master, and will revert to the last_replicated snapshot
  – The new Master starts accepting host requests
  – The new Master establishes asynchronous interval-based Sync Job process, based on schedule
  – Completion of process is recorded in log
  – Mirroring state is standby
  – Explicit activation of mirroring is required

Requirements for a successful command completion:

- The command can’t be issued on the master during the Initialization phase
- The command can't be issued in Change Tracking state
- The activation state is Standby
- The command can be applied on a volume only if the volume is not part of a mirrored CG; if the CG is mirrored – the command will return an error and fail
- The command can be issued on the Slave, not during initialization

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- SOME_DATA_WILL_BE_LOST_ARE_YOU_SURE
  Are you sure you want the mirror's local peer to become Slave and loose data that was not replicated?
- ARE_YOU_SURE_YOU_WANT_TO_CHANGE_A_PEER_WITH_LCS_TO_MASTER

Are you sure you want the mirror's local peer to become Master? The local peer has a last-consistent snapshot

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- MIRROR_IS_INITIAL
  Operation is not permitted during the Initialization phase.
- MIRROR_IS_ACTIVE
  Remote mirroring is currently active
- VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for this volume
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds
- MIRROR_HAS_NO_SYNCHED_SNAPSHOT
  Mirror does not have a synchronized Snapshot.
- MASTER_CANNOT_BE_DEMOTED
  Master cannot be demoted to Slave role, Peer status mismatch

Changing a Mirroring Schedule for Local Peers

Changes the replication schedule for peers on the local system.

```
mirror_change_schedule < vol=VolName |
cg=CgName > schedule=Schedule
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Volume name on the local system.	N	
cg	Object name	CG name on the local system	N	
schedule	Object name	A reference to a mirroring schedule	Y	

This command changes the replication schedule for a peer on the local system. The new scheduling will become effective only if the peer is set as Master.

Prerequisites:

- The coupling must be ASYNC_INTERVAL.
- The Schedule's interval has to be shorter than the corresponding mirror's RPO.

The command fails under the following conditions:

- The specified target does not exist
- The specified target is non-mirrored
- The specified target is a volume that belongs to a mirrored Consistency Group
- The specified target synchronization type is not ASYNC_INTERVAL

Setting a scheduling reference:

- The system displays the following warning: ⌂Are you sure to change schedule⌂.
- An event is generated
- New sync jobs will be generated according to updated schedule. A running sync job is unaffected.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- SCHEDULE_DOES_NOT_EXIST
  Specified Schedule does not exist
- SYNC_MIRROR_DOES_NOT_USE_SCHEDULE
  Definition of Synchronous Mirror does not require a Schedule object to be specified.
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- INTERVAL_SHOULD_BE_SHORTER_THAN_RPO
  Schedule interval must me shorter that RPO.
  The newly defined schedule has to be shorther than the RPO.

Creating a Mirroring Definition

Creates remote mirroring coupling.

```
mirror_create < vol=VolName slave_vol=SlaveVolumeName
[ create_slave=<Yes|No> [ remote_pool=RemotePoolName ] ]
[ init_type=<online|offline> ] > | <cg=CgName slave_cg=SlaveCgName>
[ type=<SYNC_BEST_EFFORT|ASYNC_INTERVAL> ]
target=TargetName [ rpo=rpo [ remote_rpo=rpo ]
schedule=Schedule remote_schedule=Schedule ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local volume to be mirrored (the master).	N	
slave_vol	Object name	Name of the slave volume on the remote storage system.	N	
create_slave	Boolean	Determines whether to create a new Slave volume or to use an existing one.	N	no
remote_pool	Object name	The Storage Pool on the remote system. Relevant only if creating a slave.	N	
cg	Object name	Local Consistency Group (cg) to be mirrored (the master).	N	
slave_cg	Object name	Name of the slave cg on the remote storage system.	N	
type	Enumeration	Name of replication type	N	SYNC_BEST_EFFORT
target	Object name	Remote target to contain the slave volume.	Y	
rpo	Positive integer	Mirror Recovery Point Objective value for Master. Ranges from 30 to 86400 seconds (i.e., up to 24 hours) Applies and mandatory to asynchronous mirroring only.	N	[None]

Name	Type	Description	Mandatory	Default
remote_rpo	Positive integer	Mirror Recovery Point Objective value when remote peer becomes Master Applies and mandatory to asynchronous mirroring only.	N	[Master RPO]
schedule	Object name	A reference to a schedule object Applies and mandatory to asynchronous mirroring only.	N	[None]
remote_schedule	Object name	A reference to a schedule object on the remote machine. Applies and mandatory to asynchronous mirroring only.	N	[None]
init_type	Enumeration	Specifies the method requested to initialize the Slave mirror.	N	[none]

Mirroring is the process of ensuring that both peers contain identical data at all times. This command defines a new mirroring coupling between a master and a slave peers.

The command supports the creation of an asynchronous mirroring coupling. Asynchronous mirroring is based on schedule-driven replication. The system also offers a predefined schedule object with a non-user-configurable interval of 20 seconds, named min_interval.

Creating a mirroring coupling, an existing master peer is specified together with a slave peer. Upon creation the coupling is not active and the user needs to activate it explicitly in order to start the replication. This slave either already exists or it is created by this command. Using an existing slave is allowed only if it is formatted. If the slave already exists, the command receives its name along with the remote system name. If it is created by this command, the input parameters specify the remote storage system name, the name of the slave that is created and the Storage Pool that will contain the newly created slave.

Mirroring is created in the Standby state. The mirroring coupling must then be activated in order to start the Initialization process, which copies the data from the master to the slave.

A storage system can have multiple mirroring definitions between pairs of peers on various remote systems. However, when the peers are Consistency Groups, all the volumes included in a specific Consistency Group must be mirrored between only one pair of storage systems. Therefore, when a volume peer on a storage system (for example: A) has a mirroring relationship with a volume on a remote storage system (for example: B), any other volume in the same Consistency Group on storage system A can only be defined in a remote mirroring relationship with a volume on storage system B. The same goes for volumes from storage system B to A. In addition, the mirrored CG has one sync job for all pertinent mirrored volumes within the CG.

The command supports the creation of an asynchronous mirroring coupling. Asynchronous mirroring is based on schedule-driven replication. The system also offers a predefined schedule object with a non-user-configurable interval of 20 seconds, named min_interval. The mirrored CG has one sync job for all pertinent mirrored volumes within the CG.

Issuing the command on a Consistency Group, the Consistency Group has to be empty.

The command fails if it finds conflicting mirroring snapshots (that were not removed during the deletion of a previous mirroring definition).

Initialization type:

- The online option - specifies over-the-wire initialization, or in other words employs an inter-site link to replicate to the Slave the Master peer's initial state, starting once the mirror is first activated (mirror_activate). During initialization the mirror status will be *Initialization*.
- The offline option - specifies that initialization of the Slave peer will not be done by replicating the Master's initial image, but rather through offline creation of a replica - e.g., by restoring to the Slave a mirror image that is backed up on the Master).
- The default value: online.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- ASYNC_MIRROR_MISSING_RPO
  Definition of Asynchronous Mirror requires RPO to be specified.
- ASYNC_MIRROR_REMOTE_RPO_TOO_LONG
  Specified Remote RPO is too long.
- ASYNC_MIRROR_REMOTE_RPO_TOO_SHORT
  Specified Remote RPO is too short.
- ASYNC_MIRROR_RPO_TOO_SHORT
  Specified RPO is too short.
- ASYNC_MIRROR_RPO_TOO_LONG
  Specified RPO is too long.
- ASYNC_NOT_SUPPORTED_IN_TARGET
  Asynchronous Mirror is not supported by specified Target.
- BAD_REMOTE_VOLUME_NAME
  Slave volume name does not exist
- BAD_REMOTE_VOLUME_SIZE
  Master and slave volumes contain a different number of blocks
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_HAS_MIRROR
  Consistency Group has mirroring defined for it.

The mirror definition has to be removed.

- CONS_GROUP_MIRRORING_NOT_SUPPORTED_IN_TARGET
  Consistency Group mirroring is not supported by target machine.
- INTERVAL_SHOULD_BE_SHORTER_THAN_RPO
  Schedule interval must me shorter that RPO.
  The newly defined schedule has to be shorther than the RPO.
- MAX_MIRRORS_REACHED
  Maximum number of mirrors already defined
- NOT_ENOUGH_SPACE_ON_REMOTE_MACHINE
  Not enough free space to set requested size of slave volume
- NO_ASYNC_IN_THIN_PROVISIONED_POOL
  Thin provisioned Pool cannot contain Volumes with Asynchronous Mirroring
- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_IS_MASTER
  Local volume is already defined as a master volume
- VOLUME_IS_SLAVE
  Volume is defined as a slave volume
- REMOTE_VOLUME_EXISTS
  Slave volume name already exists and cannot be created
- REMOTE_MAX_VOLUMES_REACHED
  Maximum number of volumes already defined on remote machine
- REMOTE_MAX_MIRRORS_REACHED
  Maximum number of mirrors already defined on remote machine
- VOLUME_BAD_PREFIX
  Volume name has a reserved prefix
- REMOTE_POOL_DOES_NOT_EXIST
  Pool does not exist on remote machine
- REMOTE_POOL_NOT_SPECIFIED
  A Pool on remote machine must be specified when a slave volume is to be created
- REMOTE_TARGET_NOT_CONNECTED
  There is currently no connection from the target system
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots
- REMOTE_VOLUME_IS_SNAPSHOT
  Slave volume is a snapshot
- TARGET_BAD_NAME
  Target name does not exist
- TARGET_BAD_TYPE
  Target machine is not XIV machine
- TARGET_NO_ACCESS
  No access permissions to slave machine
- TARGET_NOT_CONNECTED
  There is currently no connection to the target system
- REMOTE_VOLUME_LOCKED

Slave volume is locked
- REMOTE_VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for slave volume
- VOLUME_DATA_MIGRATION_UNSYNCHRONIZED
  Data Migration has not completed to this volume
- TIMEOUT
  Remote operation did not complete in time
- VOLUME_HAS_MIRRORING_SNAPSHOTS
  Volume has snapshots created by previous mirroring process.
- SLAVE_VOLUME_NOT_FORMATTED
  Slave volume is not formatted
- TARGET_DOES_NOT_ACCEPT_XIV_COMMANDS
  Target system does not accept XIV management commands
- SYNC_MIRROR_HAS_NO_RPO
  Synchronous Mirror does not have an RPO.
- SYNC_MIRROR_CANNOT_BE_SET_AN_OFFLINE_INIT_TYPE
  Offline init type is supported for Asynchronous mirroring only.
- REMOTE_CONS_GROUP_IS_MIRRORED
  Remote Consistency Group has mirroring defined for it.
- REMOTE_SCHEDULE_DOES_NOT_EXIST
  Specified Schedule does not exist on remote machine
- SCHEDULE_DOES_NOT_EXIST
  Specified Schedule does not exist
- REMOTE_CONS_GROUP_BAD_NAME
  Remote Consistency Group name does not exist
  Remote Consistency Group name does not exist.
- REMOTE_VOLUME_IS_MASTER
  Volume on remote machine is currently defined as Master
- REMOTE_VOLUME_IS_SLAVE
  Slave volume is already defined as a slave volume
- REMOTE_MAX_MIRROR_CAPACITY_REACHED
  Maximum capacity for mirrored volumes already defined on remote machine
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds
- MIRRORING_INCOMPATIBLE_TARGET_VERSION
  Mirroring is not supported between the system versions of the specified peers.
- NO_OFFLINE_INIT_TYPE_WITH_SLAVE_CREATION
  New Volume will be created as slave. Offline init meaningless.
- ASYNC_WITH_OFFLINE_INIT_NOT_SUPPORTED_IN_TARGET
  Asynchronous Mirror with offline initialization option is not supported by the specified Target.
- VOLUME_SIZE_ABOVE_LIMIT
  Volume size specified is above limit
- REMOTE_VOLUME_SIZE_ABOVE_LIMIT
  Volume size specified is above limit of remote machine

- INVALID_SLICE_OFFSET
  Slice number out of range

Deactivating Mirroring

Deactivates mirroring for a defined mirror coupling.

```
mirror_deactivate  < vol=<VolName [ ,VolName... ] > |
cg=CgName >
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Master volume name or a list of master volumes.	N	
cg	Object name	Master CG name or a list of master CGs	N	

This command deactivates a coupling and switches it to an Inactive state. While in the Inactive state, only the master volume is updated. This is in contrast to the Active state, where the slave volume is updated together with the master volume.

If the mirroring is already inactive, this command has no effect and a success code is returned.

If more than one volume is specified, mirroring on all the volumes is deactivated. Furthermore, the deactivation of all the volumes is performed as an atomic operation, so that the slave volumes remain consistent with each other.

Deactivating a Consistency Group:

- Deactivating a Consistency Group affects all of its volumes

Note:

- The command can't be issued on the Slave.

The command fails under the following conditions:

- The specified target does not exist
- The specified target is non-mirrored
- The specified target is a volume that belongs to a Consistency Group (in such a case, you have to deactivate the entire Consistency Group)
- Some of the specified targets are masters and some are slaves
  - The command can be applied at each time to either master[s] or slave[s], but not both
- The target is slave, yet the link is up.
- If multiple volumes are specified in the command and some are already part of an inactive mirror, the command will fail for all mirrors, including those that were active. The relevant completion code is: SYNC_ALREADY_INACTIVE.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	

User Category	Permission	Condition
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- LOCAL_PEER_IS_NOT_MASTER
  Local peer is not the master
- SYNC_ALREADY_INACTIVE
  Synchronization is already inactive
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds

Deleting a Remote Mirroring Definition

Deletes a remote mirroring coupling definition.

```
mirror_delete < vol=VolName | cg=CgName > [ force_on_slave=<Yes|No> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local Master volume name.	N	
cg	Object name	Local Master CG name.	N	
force_on_slave	Boolean	Forces the deletion of the remote mirroring coupling definition even of a slave. Deleting a remote mirroring definition can be forced on the Slave peer only when in Initialization phase.	N	no

This command deletes the definition of a remote mirroring coupling.

When a coupling is initially created or after it is deactivated, it is in *Standby* mode. Only a Standby coupling can be deleted. The command can only be issued on the Master.

After the remote mirroring is deleted, both peers are configured as *None*, meaning that they are no longer configured as either a master or a slave.

Note:

Only the remote mirroring coupling definition is deleted. The volumes themselves are not deleted, nor their snapshots.

The local object specified in the *vol* parameter, must be a master.

to delete the remote mirroring coupling, the communication has to function. If there is no communication, mirroring is only deleted on the master, and a configuration error appears on the slave once the communication resumes.

Command outcome:

- Event is generated
- Overall coupling statistics are captured
- Outstanding pertinent Sync Jobs are deleted
- Completion of process is recorded in log

Deleting the mirroring definition when the link is down:

- When the link is down, this command only deletes the mirroring definition on the Master.
- To delete the mirroring definition from the slave:
  - Run the mirror_change_role command to turn the Slave into the Master
  - Run mirror_delete

The force_on_slave parameter:

- The parameter force_on_slave can be issued by a user only if mirroring is in initialization (in any other mode the role can be changed to Master and the peer mirror can be deleted.).

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_CG_MIRRORING

  Are you sure you want to delete the mirroring relationships of the CG and of all volumes in the CG?

Completion Codes:

- VOLUME_BAD_NAME

  Volume name does not exist

- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- LOCAL_PEER_IS_NOT_MASTER
  Local peer is not the master
- MIRROR_IS_ACTIVE
  Remote mirroring is currently active
- FORCE_DELETE_NOT_ALLOWED_ON_MASTER
  Only slave mirrors need to be forced to be deleted
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds
  Troubleshooting: Please retry the command in a few seconds
- MIRROR_IS_NOT_INITIALIZING
  Operation is permitted only during the Initialization phase.

Viewing Mirroring Status

Lists the status and configuration of mirroring couplings

```
mirror_list [ vol=VolName | cg=CgName | < [ scope=<cg|volume> ]
[ sync_type=<sync_best_effort|async_interval> ] > ]
```

Parameters:

Name	Type	Description	Mandatory	Default
sync_type	Enumeration	List type - SYNC_BEST_EFFORT, ASYNC_INTERVAL, or All (if no parameter is specified)	N	All (if no parameter is specified)
scope	Enumeration	List type - [all mirrors,] all volumes, all CGs	N	All (if no param is specified)
vol	Object name	Local volume name.	N	[none]
cg	Object name	Local CG name.	N	[none]

This command shows current configuration and status for the remote mirroring of volumes or consistency groups. Size/part/time to synchronize are unknown if this is the slave and connection is broken.

The following default parameters are shown:

- Name
- Mirror Type (sync_best_effort, async_interval)

- Mirror Object (CG, Volume)
- Role (Master, Slave)
- Remote System (target name)
- Remote Peer (volume name)
- Active (Yes, No)
- Status (Initializing, Synchronized, Unsynchronized, Consistent, Inconsistent, RPO OK, RPO Lagging, Change Tracking)
- Link Up (Yes, No)

The following optional parameters can be listed by explicitly specifying the proper columns:

- Designation (Primary, Secondary)
- Estimated Sync Time (estimated time to synchronization in seconds)
- Size To Synchronize (size to synchronize in MB)
- Operational (Yes, No)
- Sync Progress (sync progress in %)
- Mirror Error (why mirroring is deactivated: No_Error, Configuration_Error, Secondary_Pool_Exhausted, Master_Pool_Exhausted, No_Thin_Provisioning_Resources)
- Schedule Name (schedule name)
- Last replicated Snapshot Time (yyyy-mm-dd hh:mm:ss)
- Specified RPO (value in h:mm:ss format)

The following deactivation reasons can be read from the output list (available only in XML output format):

- INACTIVE_USER - No_Error
- INACTIVE_SECONDARY_LOCKED - Secondary_Pool_Exhausted
- INACTIVE_POOL_EXHAUSTED - Master_Pool_Exhausted
- INACTIVE_VOL_SIZE_MISMATCH - Remote_And_Local_Volume_Size_Mismatch
- INACTIVE_CONS_GROUP_MEMBERSHIP_MISMATCH - Cons_Group_Membership_Mismatch
- INACTIVE_POSSIBLE_VOL_SIZE_MISMATCH - Possible_Remote_And_Local_Volume_Size_Mismatch
- INACTIVE_POSSIBLE_CONS_GROUP_MEMBERSHIP_MISMATCH - Possible_Cons_Group_Membership_Mismatch
- INACTIVE_THIN_PROVISIONING - No_Thin_Provisioning_Resources
- INACTIVE_PEER_STATUS_MISMATCH - Peer_Status_Mismatch
- INACTIVE_UPGRADE - Temporarily_Deactivated_For_Upgrade

Id	Name	Description	Default Position
local_peer_name	Name		1
mirror_object	Mirror Object		3
designation	Designation		
current_role	Role		4
target_name	Remote System		5
remote_peer_name	Remote Peer		6
active	Active		7
sync_state	Status		8
connected	Link Up		9
size_to_synchronize	Size To Sync (MB)		

Id	Name	Description	Default Position
operational	Operational		
sync_progress	Sync Progress (%)		
mirror_error	Mirror Error	No Error, Secondary pool exhausted, Configuration error or No thin provisioning resources	
sync_type	Mirror Type		2
schedule_name	Schedule Name		
last_replicated_snapshot_time	Last Replicated		
specified_rpo	RPO		
remote_rpo	Remote RPO		
application_consistent	App Consistency		

Output:

```
<command id="0">
<administrator>
    <command>
        <changes_session_id value="1288716489394201:1:1288903896317961:1"/>
        <code value="SUCCESS"/>
        <last_change_index value="32289"/>
        <status value="0"/>
        <status_str value="Command completed successfully"/>
        <return>
            <mirror id="100777">
                <id value="100777"/>
                <creator value=""/>
                <creator_category value="none"/>
                <local_peer_id value="100776"/>
                <local_peer_name value="SYNC_vol_5"/>
                <schedule_name value=""/>
                <designation value="Secondary"/>
                <current_role value="Slave"/>
                <remote_mirror_id value="100872"/>
                <remote_peer_name value="SYNC_vol_4"/>
                <target_id value="100707"/>
                <target_name value="SYNC_target_2"/>
                <sync_type value="sync_best_effort"/>
                <sync_state value="Consistent"/>
                <active value="yes"/>
                <connected value="yes"/>
                <operational value="yes"/>
                <sync_progress value="100"/>
                <size_to_synchronize value="-1"/>
                <estimated_sync_time value="0"/>
                <mirror_error value="No_Error"/>
                <mirror_object value="Volume"/>
                <specified_rpo value=""/>
                <remote_rpo value=""/>
                <last_replicated_snapshot_time value=""/>
                <init_type value="online"/>
            </mirror>
        </return>
    </command>
</administrator>
<aserver status="DELIVERY_SUCCESSFUL"/>
</command>
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Obtaining Statistics On Past Sync Jobs

The command presents statistics that are automatically gathered by the system on past sync jobs corresponding to a specified mirrored volume or consistency job.

```
mirror_statistics_get <vol=VolName | cg=CgName>
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local volume name.	N	
cg	Object name	Local CG name.	N	

The command presents statistics that are automatically gathered by the system on past sync jobs corresponding to a specified mirrored volume or consistency job. This information includes:

- Date and time created
- Date and time started to run
- Date and time finished
- Job size (MB)

Either a volume or cg must be specified.

Id	Name	Description	Default Position
created_at	Created		1
started_at	Started		2
finished_at	Finished		3
job_size	Job Size (MB)		4
duration	Job Duration (Sec)		5
avg_sync_rate	Average Sync Rate (MB/sec)		6

Example:

```
mirror_statistics_get vol=volName
```

Output:

```
<job id="143">
                <avg_sync_rate value="22.3333"/>
                <created_at value="2011-03-22 11:19:30"/>
                <duration value="6"/>
                <finished_at value="2011-03-22 11:19:36"/>
                <job_size value="134"/>
                <started_at value="2011-03-22 11:19:30"/>
            </job>
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- MIRROR_HAS_NO_STATISTICS
  Job statistics were not collected for this Mirror.
- LOCAL_IS_SLAVE
  Local mirror peer is not the master
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- SYNC_MIRROR_HAS_NO_STATISTICS
  Job statistics do not exist for Synchronous Mirror.

Switching Roles between Master and Slave

Switches roles between master and slave volumes.

```
mirror_switch_roles <vol=VolName | cg=CgName>
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local volume name.	N	
cg	Object name	Local CG name	N	

This command switches between the roles of the master and the slave volumes.

The command can only be issued if coupling is operational and only on the master. Also, for synchronous mirroring it can only be issued when the coupling is synchronized; for asynchronous mirroring it can only be issued if there are no outstanding sync jobs and the volume and its last_replicated snapshot are identical.

Following the execution of the command:

- The volume that was previously the master becomes the slave
- The volume that was previously the slave becomes the master

Before this command switches roles, the system stops accepting new writes to the local volume. With synchronous mirrors the system will perform all pending writes, and only after all pending writes have been committed, the roles are switched.

After the command is executed, the coupling is deactivated and the user has to activate it in order to restart synchronization. It is advised to create a snapshot before deactivating the coupling in order to enable recovery from logical errors due to incorrect server configurations.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_MIRROR
  Local volume does not have remote mirroring definitions
- CONS_GROUP_BAD_NAME
  Consistency Group name does not exist.
- CONS_GROUP_NO_MIRROR
  Local consistency group does not have remote mirroring definitions
- LOCAL_PEER_IS_NOT_MASTER
  Local peer is not the master
- MIRROR_IS_NOT_SYNCHRONIZED
  Mirror is not synchronized
- VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for this volume
- REMOTE_TARGET_NOT_CONNECTED
  There is currently no connection from the target system
- VOLUME_BELONGS_TO_MIRRORED_CONS_GROUP
  Volume mirror is part of consistency group mirror.
- MIRROR_HAS_SYNC_JOB
  Operation is not permitted on a mirror with active sync jobs
- MIRROR_RETRY_OPERATION
  There is an operation in progress on this mirror , please retry your request in a few seconds

Troubleshooting: Please retry the command in a few seconds

- MIRROR_MASTER_DIFFERS_FROM_SLAVE

  Mirror master was written to after the last replicated snapshot was taken

Retrieving RPO Threshold

Listing system RPO related thresholds, that once crossed will trigger the creation of a corresponding event

```
rpo_thresholds_get
```

This command lists the system's RPO-related thresholds, that once crossed will trigger the creation of a corresponding event.

Id	Name	Description	Default Position
increase_percentage	Increase Percentage		1
increase_absolute	Increase Absolute		2

Example:

```
rpo_thresholds_get
```

Output:

```
Increase Percentage   Increase Absolute
--------------------- -------------------
100                   3600
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Setting RPO Threshold

Setting system RPO related thresholds, that once crossed will trigger the creation of a corresponding event

```
rpo_thresholds_set  [ increase_percentage=percentage ] [ increase_absolute=absolute ]
```

Parameters:

Name	Type	Description	Mandatory	Default
increase_percentage	Integer	threshold for RPO increase beyond which an event should be created	N	none

Name	Type	Description	Mandatory	Default
increase_absolute	Integer	threshold for RPO increase beyond which an event should be created	N	none

Setting system RPO related thresholds, that once crossed will trigger the creation of a corresponding event

Example:

```
rpo_thresholds_set increase_percentage=percentage
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- INVALID_RPO_THRESHOLD_PERCENTAGE
  Values should be in [1,10000] range
- INVALID_RPO_THRESHOLD_ABSOLUTE
  Values should be in [1,1000000] range

Changes the Interval For a Schedule

Changes the interval of a schedule.

```
schedule_change schedule=schedule interval=<hh:mm [ :ss ] >
```

Parameters:

Name	Type	Description	Mandatory	Default
schedule	Object name	The name of the schedule.	Y	
interval		A value that indicates the interval for asynchronous mirroring	Y	

This command updates the schedule definition. Such definition can be referenced to when specifying asynchronous mirroring couplings.

Limitation:

- Schedule must be one of the following: 00:00:30, 00:01, 00:02, 00:05, 00:10, 00:15, 00:30, 01:00, 02:00, 03:00, 06:00, 08:00, 12:00.
- A predefined schedule can't be changed.

Outcome:

- If the update command is issued on a schedule that is not referenced by any object, a confirmation message will be presented to the user
- If the update command is issued on a schedule that is referenced to by an object (e.g., mirroring couplings), a warning message will be presented to the user.
- Sync jobs that are running will not be affected.
- Future Sync jobs will be scheduled based on the new schedule settings

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_UPDATE_THE_SCHEDULE
  Are you sure you want to update this schedule? This change will effect all mirrors using that schedule.

Completion Codes:

- SCHEDULE_DOES_NOT_EXIST
  Specified Schedule does not exist
- BAD_SCHEDULE_TIME_FORMAT
  Time format for Schedule is HH:MM[:SS]
- ILLEGAL_INTERVAL
  Specified interval value is not supported.
- SCHEDULE_CAN_NOT_BE_UPDATED
  Specified Schedule cannot be updated
- INTERVAL_SCHEDULE_REQUIRES_ONLY_ONE_INTERVAL
  Multiple times should not be defined for Interval Schedule

Creating a Schedule Object

Defines a schedule for replication.

```
schedule_create schedule=Schedule [ interval=<hh:mm [ :ss ] > ] [ type=<manual | interval> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
schedule	Object name	The name of the schedule	Y	

Name	Type	Description	Mandatory	Default
interval		A value that indicates the interval for asynchronous mirroring	N	00:10[:00]
type	Enumeration	A value that indicates the schedule type for asynchronous mirroring. Can be Manual or Interval	N	interval

This command creates a schedule definition. Schedules can be referenced to when specifying asynchronous mirroring couplings.

Limitations:

- Schedule must be one of the following: 00:00:30, 00:01, 00:02, 00:05, 00:10, 00:15, 00:30, 01:00, 02:00, 03:00, 06:00, 08:00, 12:00.
- The system features a predefined schedule object with a non-user-configurable interval of 20 seconds, named min_interval.

The Type parameter:

- Prior to the introduction of this parameter, each asynchronous mirror could be configured with an automatic schedule whose interval specified how often a replication point and a corresponding replication process (sync job) should be automatically created. It was also possible to instruct the system to create a manual replication point and a corresponding sync job for a mirror using a dedicated XCLI command (mirror_create_snapshot). Finally, a single predefined schedule named 'Never' with no interval settings was provided for mirrors that only required manual sync job creation. Introducing this parameter, it is also possible to define multiple custom, user-configurable manual schedules. The creation of consistent, identical replication points for all mirrors set with such schedule as well as corresponding sync jobs can be triggered using a dedicated new XCLI command (schedule_create_tick) specifying the schedule name as an argument. This facilitates external/scripted replication control for mirrors sharing the same schedule, without requiring them to be interval-based.
- The type Interval specifies that synchronization jobs for a mirror assigned the schedule will be triggered automatically based on the specified interval; the type Manual specifies that synchronization jobs for a mirror assigned the schedule can be triggered by the command schedule_create_tick
- Once set - the schedule type cannot be changed

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SCHEDULE_EXISTS
  Schedule name exists
- BAD_SCHEDULE_TIME_FORMAT
  Time format for Schedule is HH:MM[:SS]

- MAX_SYNC_SCHEDULES_REACHED
  Maximal number of schedule objects has been reached
- ILLEGAL_INTERVAL
  Specified interval value is not supported.
- INTERVAL_SCHEDULE_REQUIRES_ONLY_ONE_INTERVAL
  Multiple times should not be defined for Interval Schedule

Deletes a Schedule Object

Deletes a schedule for replication.

```
schedule_delete schedule=Schedule
```

Parameters:

Name	Type	Description	Mandatory	Default
schedule	Object name	The name of the schedule to be deleted.	Y	

This command deletes a schedule definition.

The command can be issued successfully only if the schedule specified is not referenced by a mirror coupling, or if it is not a pre-defined schedule (min_interval).

Outcome:

- Command will delete the schedule specified

Example:

```
schedule_delete schedule=hourly
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SCHEDULE_IS_ASSIGNED
  Specified Schedule is currently assigned to a mirror
- SCHEDULE_CAN_NOT_BE_DELETED
  Specified Schedule cannot be deleted

- SCHEDULE_DOES_NOT_EXIST
  Specified Schedule does not exist

Listing a Schedule Object

Lists the schedule properties for the specified coupling.

```
schedule_list [ schedule=Schedule ]
```

Parameters:

Name	Type	Description	Mandatory	Default
schedule	Object name	The name of the schedule.	N	All

The following default parameters are listed:
- Name
- Interval

The following optional parameters can be listed:
- Predefined (is the schedule a predefined object)
- Last Tick (last timestamp the schedule was fired)

Id	Name	Description	Default Position
name	Name		1
interval	Interval		2
predefined	Predefined		

Example:

```
schedule_list
```

Output:

```
Name           Interval
never
min_interval   00:00:20
ASYNC_None_3   00:02:00
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Renaming a Schedule Object

Renames a schedule object.

```
schedule_rename schedule=Schedule new_name=Schedule
```

Parameters:

Name	Type	Description	Mandatory	Default
schedule	Object name	The current name of the schedule.	Y	
new_name	Object name	The new name for the schedule.	Y	

This command renames the schedule. It is not possible to rename a predefined schedule.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- SCHEDULE_DOES_NOT_EXIST
  Specified Schedule does not exist
- SCHEDULE_NAME_EXISTS
  New Schedule name already exists
- SCHEDULE_CAN_NOT_BE_UPDATED
  Specified Schedule cannot be updated

Viewing Sync Job Status

Lists the status of queued and running sync jobs for asynchronous couplings

```
sync_job_list       [ vol=VolName | cg=CgName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local volume name.	N	[none]
cg	Object name	Local CG name.	N	[none]

This command shows status of queued and running sync jobs for asynchronous couplings.

The following parameters are displayed:

- Mirroring coupling (volume/CG)

- Job state: initialization, pending, running, complete
- Type: interval-initiated, Snapshot Mirror, initialization, initializing validate
- Schedule - name of the referenced schedule object
- Interval length (if applicable)
- Job size
- Job progress
- Date created
- Time created
- Date started to run
- Time started to run

Id	Name	Description	Default Position
job_object	Job Object		1
mirror_peer	Local Peer		2
source_snap	Source		3
target_snap	Target		4
job_state	State		5
part_of_cg_job	Part of CG		6
validate	Snapshot Validation		
job_type	Job Type		7
created_at	Created		
started_at	Started		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Chapter 12. Data Migration

The following sections describe the XIV Command Line Interface (XCLI) for data migration.

The sections are listed as follows:

- dm_activate(Activates the Data Migration process.)
- dm_deactivate(Deactivates the Data Migration process.)
- dm_define(Defines a Data Migration configuration.)
- dm_delete(Deletes the Data Migration process.)
- dm_list(Lists Data Migration configuration and status.)
- dm_test(Tests the Data Migration configuration.)

Activating Data Migration

Activates the Data Migration process.

```
dm_activate vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Destination volume for Data Migration activation.	Y	

This command activates the Data Migration process. This is either an initial activation or an activation after de-activation.

Upon activation the Data Migration is tested in the same way as when using Testing the Data Migration Definition and this command fails if the Data Migration test fails.

This command has no effect if the process is already active.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_DM
  Local volume does not have Data Migration definitions
- TARGET_NOT_CONNECTED

There is currently no connection to the target system
- REMOTE_VOLUME_NO_LUN
  Remote volume's LUN is unavailable
- REMOTE_VOLUME_NO_READ_ACCESS
  Remote volume cannot be read
- REMOTE_VOLUME_NO_WRITE_ACCESS
  Remote volume is write protected
- BAD_REMOTE_VOLUME_SIZE
  Master and slave volumes contain a different number of blocks

Deactivating Data Migration

Deactivates the Data Migration process.

```
dm_deactivate vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Local volume for Data Migration deactivation.	Y	

This command deactivates the process of Data Migration. Hosts are not served while the Data Migration process is in-active.

This command has no effect if the Data Migration is already inactive.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DEACTIVATE_DATA_MIGRATION
  Deactivation will stop all applications, data migration can be deleted if it is done

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_DM
  Local volume does not have Data Migration definitions

Defining Data Migration Configuration

Defines a Data Migration configuration.

```
dm_define vol=VolName target=TargetName lun=SourceLUN
 source_updating=<yes|no> [ create_vol=<yes|no> ] [ pool=PoolName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Data Migration destination volume on the local system.	Y	
target	Object name	Remote system containing the source volume.	Y	
lun	Integer	LUN of the source volume.	Y	
source_updating	Boolean	Specifies whether to use source volume updating.	Y	
create_vol	Boolean	A Boolean that determines whether to create a new volume or to use an existing one.	N	No
pool	Object name	Name of the Storage Pool to contain the volume. Used only when creating a volume. Mandatory when creating a volume.	N	

This command defines a Data Migration relationship between a local volume and a remote volume. This definition defines that the local volume should reflect the remote volume.

After this configuration has been defined, it can be tested using the Testing the Data Migration Definition command and then activated using the Activating Data Migration command. After this activation, hosts can read and write to this volume, and these operations are reflected on the remote volume.

The remote volume may be inaccessible at the time that the command is executed. In this case, the definition is only used when Data Migration is tested.

The local system acts as a host to the remote system. The remote system should be configured to make the remote volume accessible to the local system through the specified LUN.

If *source updating* is specified, each write to the local volume is reflected as a write to the remote volume. Otherwise, writes on the local volume are not reflected and the remote volume is not changed.

The local volume must be formatted.

If *create_vol* is specified as `yes`, the volume is created. In this case the size of the newly created volume is identical to the size of the source volume. When creating a volume, a pool name must be specified. Creating a volume fails if there is no connectivity to the target since the volume's size is unknown.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- TARGET_BAD_NAME
  Target name does not exist
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots
- VOLUME_HAS_MIRROR
  Mirror is defined for this volume
- VOLUME_BELONGS_TO_CG
  Volume belongs to a Consistency Group
- VOLUME_HAS_DATA_MIGRATION
  Data Migration is defined for this volume
- VOLUME_HAS_SNAPSHOTS
  Volume has snapshots
- VOLUME_NOT_FORMATTED
  Local volume is not formatted
- TOO_MANY_MIRRORS
  Maximum number of remote volumes (mirror/migration) is already defined
  Troubleshooting: Delete remote mirrors or Data Migration objects
- VOLUME_EXISTS
  Volume name already exists
- POOL_DOES_NOT_EXIST
  Storage Pool does not exist
- VOLUME_BAD_PREFIX
  Volume name has a reserved prefix
- NOT_ENOUGH_SPACE
  No space to allocate volume
- NOT_ENOUGH_HARD_SPACE
  No space to allocate for volume's current usage
- MAX_VOLUMES_REACHED
  Maximum number of volumes already defined
- ILLEGAL_VOLUME_SIZE
  Illegal volume size

- REMOTE_VOLUME_NO_LUN
  Remote volume's LUN is unavailable
- TARGET_NOT_CONNECTED
  There is currently no connection to the target system
- VOLUME_CANNOT_HAVE_ZERO_SIZE
  Volume size cannot be zero
- ILLEGAL_LUN
  LUN is out of range
- TARGET_IS_MIRRORING
  Target machine is defined only for remote mirroring
- NO_ONLINE_MIGRATION_WITHOUT_SOURCE_UPDATING
  Data Migration without automatic migration must be defined as source-updating
- MIGRATION_ALREADY_DEFINED_FOR_LUN
  Data Migration is already defined from lun *LUN* of target '*Target*'

Deleting the Data Migration Process

Deletes the Data Migration process.

```
dm_delete vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Volume name for deleting the Data Migration process.	Y	

This command deletes the Data Migration configuration and stops the Data Migration process.

This command can only be executed if the Data Migration has reached the state of synchronization.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_DM
  Local volume does not have Data Migration definitions
- DM_IS_NOT_SYNCHRONIZED
  Data Migration process has not been completed

Listing Data Migration Statuses

Lists Data Migration configuration and status.

```
dm_list [ vol=VolName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Name of the volume to be listed.	N	All Data Migration volumes.

This command lists all the Data Migration configuration and statuses, including the following:

- Volume name
- Target name
- LUN
- Volume size (GB)
- Migration completed (GB)
- Migration activation (active/inactive)
- Migration status (synchronized, unsynchronized)
- Migration remaining (GB)
- Migration remaining (%)
- Estimated time to completion

Id	Name	Description	Default Position
local_volume_name	Local Volume		1
target_name	Remote System		2
remote_volume_lun	Remote LUN		3
active	Active		4
sync_state	Status		5
connected	Target Connected		6
size_to_synchronize	Size To Sync (MB)		
operational	Operational		
sync_progress	Sync Progress (%)		
start_migration_automatically	Start Data Migration Automatically		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Testing the Data Migration Definition

Tests the Data Migration configuration.

```
dm_test vol=VolName
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Destination volume for Data Migration testing.	Y	

This command tests the Data Migration configuration. Completion codes indicate the types of test failures that may occur. Once a test is successful, then Data Migration can be activated.

If source updating is not defined for this Data Migration, writing is not tested.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- VOLUME_NO_DM
  Local volume does not have Data Migration definitions
- TARGET_NOT_CONNECTED
  There is currently no connection to the target system
- REMOTE_VOLUME_NO_LUN
  Remote volume's LUN is unavailable
- REMOTE_VOLUME_NO_READ_ACCESS
  Remote volume cannot be read
- REMOTE_VOLUME_NO_WRITE_ACCESS
  Remote volume is write protected
- BAD_REMOTE_VOLUME_SIZE
  Master and slave volumes contain a different number of blocks

Chapter 13. Event Handling

The following sections describe the XIV Command Line Interface (XCLI) for event handling, including listing events, filtering and sending notifications.

The sections are listed as follows:

- custom_event(Generates a custom event.)
- dest_define(Defines a new destination for event notifications.)
- dest_delete(Deletes an event notification destination.)
- dest_list(Lists event notification destinations.)
- dest_rename(Renames an event notification destination.)
- dest_test(Sends a test message to an event notification destination.)
- dest_update(Updates a destination.)
- destgroup_add_dest(Adding an event notification destination to a destination group.)
- destgroup_create(Creates an event notification destinations group.)
- destgroup_delete(Deletes an event notification destination group.)
- destgroup_list(Lists destination groups.)
- destgroup_remove_dest(Removes an event notification destination from a destination group.)
- destgroup_rename(Renames an event notification destination group.)
- event_clear(Clears alerting events.)
- event_list(Lists system events.)
- event_list_uncleared(Lists uncleared alerting events.)
- event_redefine_threshold(Redefines the threshold of a parameterized event.)
- event_threshold_list(Lists event thresholds)
- mm_event(Generates a mm event.)
- rule_activate(Activates an event notification rule.)
- rule_create(Creates an event notification rule.)
- rule_deactivate(Deactivates an event notification rule.)
- rule_delete(Deletes an event notification rule.)
- rule_list(Lists event notification rules.)
- rule_rename(Renames an event notification rule.)
- rule_update(Updates an event notification rule.)
- smsgw_define(Defines an SMS gateway.)
- smsgw_delete(Deletes an SMS gateway.)
- smsgw_list(Lists SMS gateways.)
- smsgw_prioritize(Sets the priorities of the SMS gateways for sending SMS messages.)
- smsgw_rename(Renames an SMS gateway.)
- smsgw_update(Updates an SMS gateway.)
- smtpgw_define(Defines an SMTP gateway.)
- smtpgw_delete(Deletes a specified SMTP gateway.)
- smtpgw_list(Lists SMTP gateways.)
- smtpgw_prioritize(Sets the priority of which SMTP gateway should be used to send emails.)
- smtpgw_rename(Renames an SMTP gateway.)

- smtpgw_update(Updates the configuration of an SMTP gateway.)

Generating a Custom Event

Generates a custom event.

```
custom_event description=Description
[ severity=<INFORMATIONAL|WARNING|MINOR|MAJOR|CRITICAL> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
description	String	Description of the event.	Y	
severity		Severity of the event.	N	Informational

This command generates a custom event. This can be used for either generating an event from a user application or host side software, or in order to test the event notifications procedures.

Example:

```
custom_event description="Test started"
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Defining a New Event Notification Destination

Defines a new destination for event notifications.

```
dest_define dest=DestName
type=<SNMP|EMAIL|SMS>
< snmp_manager=SNMPManager | email_address=email |
<area_code=number number=number> | user=UserName>
[ smtpgws=<SMTPGW1 [,SMTPGW2 ] ... | ALL> | smsgws=<SMSGW1 [ ,SMSGW2 ] ... | ALL> ]
[ heartbeat_test_hour=HH:MM
[ heartbeat_test_days=< [ sun ] [ ,mon ] [ ,tue ] [ ,wed ] [ ,thu ] [ ,fri ] [ ,sat ] > ] ]
```

Parameters:

Name	Type	Description	Mandatory	Default
dest	Object name	Destination name.	Y	

Name	Type	Description	Mandatory	Default
type	Enumeration	Destination type for event notifications, which can be email, SMS or SNMP.	Y	
snmp_manager		IP address or DNS name of the SNMP manager.	N	
email_address		Email address.	N	
smtpgws	Object name	List of SMTP gateways to be used.	N	ALL (all gateways).
area_code		Area code of the cellular number for SMS notification. Use digits, '-' or '.'	N	
number		Cellular number for SMS notification. Use digits, '-' or '.'	N	
smsgws	Object name	SMS gateways to be used for this destination.	N	ALL (all gateways).
user	Object name	User name, where the user's email or phone are used.	N	
heartbeat_test_hour		Hour for periodic heartbeat testing in the format HH:MM	N	No heartbeat
heartbeat_test_days		List of days for heartbeat testing: a comma-separated list of 3-letter day names (such as "Mon,Fri")	N	No heartbeat

This command defines a destination for event notifications. There are three types of destinations: email, SMS and SNMP.

- *Email* destinations are used for sending notifications via email. When defining a new destination of type Email, either the email address of the recipient must be specified in *email_address* or the user name must be specified in *user* (in this case the email address of that user is used).
- *SMS* destinations are used for sending notifications via SMS to cellular phones. When defining a new destination of type SMS, either the cellular phone number of the destination must be specified in *number* or the user name must be specified in *user* (in this case the cellular phone number of that user is used). To allow correct formatting, this number should be separated into the area code and the local number.
- *SNMP* destination are used for sending notifications by SNMP traps to SNMP managers. When defining a new destination of type SNMP, the IP address of the SNMP manager should be specified.

By default, when sending an email notification, all SMTP gateways specified in Prioritizing SMTP Gateways are used, according to the order specified in that command. It is possible to define that sending emails to a specific destination will use specific SMTP gateway or gateways. This is done by specifying the smtpgws parameter.

The same logic applies to sending SMS messages. By default, SMS gateways specified in Prioritizing SMS Gateways are used, according to the order specified in this command. It is possible to define that a sending messages to a specific SMS destination will be done through specific SMS gateway or gateways.

Example:

```
dest_define dest=adminemail type=EMAIL
email_address=storageadmin@yourcompany.com
```

Output:

```
Command executed successfully.
```

Example:

```
dest_define dest=monitoringserver type=SNMP
snmp_manager=10.170.68.111
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- DEST_MAX_REACHED
  Maximum number of destinations already defined
- DEST_NAME_ALREADY_EXISTS
  Destination name already exists
- DEST_NAME_IS_DESTGROUP_NAME
  Destination name already exists as a destination group name
- EMAIL_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have an email address
- GATEWAY_NAME_APPEARS_TWICE
  Gateway name appears twice in the list
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist
- SMSGWS_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have SMS gateways

- SMTPGWS_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have SMTP gateways
- SNMP_MANAGER_MUST_BE_SPECIFIED_FOR_DEST_TYPE
  Destination must have an SNMP manager
- SNMP_MANAGER_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have an SNMP manager
- NO_SMS_GATEWAYS_ARE_DEFINED
  An SMS Destination cannot be defined if no SMS gateways are defined
- NO_SMTP_GATEWAYS_ARE_DEFINED
  An email destination cannot be defined if no SMTP gateways are defined
- USER_EMAIL_ADDRESS_IS_NOT_DEFINED
  User's email address is not defined
- USER_PHONE_NUMBER_IS_NOT_DEFINED
  User's phone number is not defined
- USER_NAME_DOES_NOT_EXIST
  User name does not exist
- INTERNAL_DESTS_CANNOT_REFER_TO_USERS
  Internal destinations cannot refer to users
- DAY_APPEARS_TWICE
  The day '*Day*' appears twice on the list.
  Troubleshooting: Each day must appear at most once.

Deleting a Destination

Deletes an event notification destination.

```
dest_delete dest=DestName
```

Parameters:

Name	Type	Description	Mandatory	Default
dest	Object name	Name of destination to be deleted.	Y	

The command deletes an event notification destination.

Destinations that are part of a destination group or used by a rule cannot be deleted.

Destinations cannot be deleted while there are uncleared alerting events.

Example:

```
dest_delete dest=itmanager
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_DESTINATION
  Are you sure you want to delete destination *Destination*?

Completion Codes:

- DEST_NAME_DOES_NOT_EXIST
  Destination name does not exist
- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- DEST_IS_PART_OF_DESTGROUP
  Destination is part of a destination group and hence cannot be deleted
- DEST_APPEARS_IN_RULE
  Destination appears in a rule
  Troubleshooting: To delete the destination, first delete the rule.

Listing Event Notification Destinations

Lists event notification destinations.

```
dest_list [ dest=DestName ] [ type=<SNMP|EMAIL|SMS> ] [ internal=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
dest	Object name	Destinations to be listed.	N	All destinations.
type	Enumeration	Filter only destinations of the specified type.	N	All types.
internal	Enumeration	Filter destinations by their internal XIV attribute.	N	no

This command lists the configuration of all defined destinations, or of a specific destination.

Id	Name	Description	Default Position
name	Name		1
type	Type		2
email_address	Email Address		3

Id	Name	Description	Default Position
area_code	Area Code		4
number	Phone Number		5
snmp_manager	SNMP Manager		6
gateways	Gateways		
user	User		7
heartbeat_test_days	Heartbeat Days		
heartbeat_test_hour	Heartbeat Time		
creator	Creator		

Example:

```
dest_list
```

Output:

```
Name              Type  Email Address                Phone Number  Gateways
storagemanager    EMAIL storageadmin@yourcompany.com               all
monitoringserver  SNMP
```

Access Control:

User Category	Permission	Condition
Storage administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Application administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Read-only users	Conditionally Allowed	Only the technician can run this command with the internal parameter
Technicians	Allowed	

Renaming a Destination

Renames an event notification destination.

```
dest_rename dest=DestName new_name=NewDestName
```

Parameters:

Name	Type	Description	Mandatory	Default
dest	Object name	Destination to be renamed.	Y	
new_name	Object name	New name of the destination.	Y	

This command renames an event notification destination.

Example:

```
dest_rename dest=adminemail new_name=storagemanager
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- DEST_NAME_DOES_NOT_EXIST
  Destination name does not exist
- DEST_NAME_IS_DESTGROUP_NAME
  Destination name already exists as a destination group name
- DEST_NAME_ALREADY_EXISTS
  Destination name already exists

Testing a Destination

Sends a test message to an event notification destination.

```
dest_test dest=DestName management_ip=IPAdress [ smtpgw=SMTPGatewayName ]
[ smsgw=SMSGatewayName ] [ internal=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
dest	Object name	Name of destination to be tested.	Y	
management_ip		Management IP used for sending the event notification.	Y	
smtpgw	Object name	SMTP Gateway to be tested.	N	Default system choice.
smsgw	Object name	SMS Gateway to be tested.	N	Default system choice.

Name	Type	Description	Mandatory	Default
internal	Boolean	Must be specified for XIV-internal destinations	N	no

This command tests a destination by sending a test message, SMS or SNMP trap. Note that a successful return code from this command does not ensure notification delivery.

For SNMP, email and SMS the system may fail to detect some of the problems.

For email messages, the SMTP gateway to be used should be specified (the destination is only tested through that gateway). The same applies to SMS, so that both the SMS gateways and the SMTP gateways should be specified.

Access Control:

User Category	Permission	Condition
Storage administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Application administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- DEST_NAME_DOES_NOT_EXIST
  Destination name does not exist
- DEST_TEST_NOT_PERFORMED_SYSTEM_BUSY
  Test of destination '*Destination Name*' not performed because the system is busy
  Troubleshooting: Please wait a few seconds and try again
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist
- SMSGWS_MUST_BE_SPECIFIED_FOR_DEST_TYPE
  Destination must have SMS gateways
- SMSGWS_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have SMS gateways
- SMTPGWS_MUST_BE_SPECIFIED_FOR_DEST_TYPE
  Destination must have SMTP gateways
- SMTPGWS_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have SMTP gateways
- DEST_TEST_FAILED
  Test of destination '*Destination Name*' failed
- SYSTEM_HAS_NO_SUCH_EXTERNAL_IP
  The system has no such external IP address
- MODULE_CANNOT_SEND_MESSAGES
  Selected module cannot send messages

Troubleshooting: Contact support

- ONLY_TECHNICIAN_CAN_REFER_TO_INTERNAL_EVENT_OBJECTS
  Only technician can refer to internal event objects

Updating an Event Notification Destination

Updates a destination.

```
dest_update dest=DestName
   [ snmp_manager=SNMPManager ] [ email_address=email ]
 [ smtpgws=<SMTPGW1[,SMTPGW2]...|ALL> ] [ area_code=number ]
 [ number=number ]  [ smsgws=<SMSGW1[,SMSGW2]...|ALL> ]
 [ user=UserName ] [ heartbeat_test_hour=HH:MM ]
       [ heartbeat_test_days=<[sun][,mon][,tue][,wed][,thu][,fri][,sat]> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
dest	Object name	Destination name.	Y	
snmp_manager		IP address or DNS name of the SNMP manager.	N	Keep unchanged.
email_address		Email address.	N	Keep unchanged.
smtpgws	Object name	List of SMTP gateways to be used.	N	Keep unchanged.
area_code		Area code of the cellular number for SMS notification.	N	Keep unchanged.
number		Cellular number for SMS notification.	N	Keep unchanged.
smsgws	Object name	SMS gateways to be used.	N	Keep unchanged.
user	Object name	User name, where the user's email or phone are used.	N	Keep unchanged.
heartbeat_test_hour		Hour for periodic heartbeat testing	N	Keep unchanged.
heartbeat_test_days		List of days for heartbeat testing	N	Keep unchanged.

This command updates a destination. The parameters of this command are identical to the Defining a New Event Notification Destination command, except that the destination type cannot be changed. All relevant fields must be specified (not only the ones that are being changed).

Example:

```
dest_update dest=storagemanager
                    email_address=admin@yourcompany.com
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- DEST_NAME_DOES_NOT_EXIST
  Destination name does not exist
- AREA_CODE_MUST_BE_SPECIFIED_FOR_DEST_TYPE
  Destination must have an area code
- AREA_CODE_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have an area code
- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- EMAIL_MUST_BE_SPECIFIED_FOR_DEST_TYPE
  Destination must have an email address
- EMAIL_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have an email address
- GATEWAY_NAME_APPEARS_TWICE
  Gateway name appears twice in the list
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist
- NUMBER_MUST_BE_SPECIFIED_FOR_DEST_TYPE
  Destination must have a number
- NUMBER_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have a number
- SMSGWS_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have SMS gateways
- SNMP_MANAGER_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have an SNMP manager
- NO_SMTP_GATEWAYS_ARE_DEFINED
  An email destination cannot be defined if no SMTP gateways are defined
- DEST_CANNOT_HAVE_A_USER_AND_AN_EMAIL_ADDRESS
  Destination cannot simultaneously have an email address and refer to a user
- DEST_CANNOT_HAVE_A_USER_AND_A_PHONE_NUMBER
  Destination cannot simultaneously have a phone number address and refer to a user
- USER_PHONE_NUMBER_IS_NOT_DEFINED
  User's phone number is not defined
- USER_NAME_DOES_NOT_EXIST
  User name does not exist
- INTERNAL_DESTS_CANNOT_REFER_TO_USERS

Internal destinations cannot refer to users
- DEST_HEARTBEAT_DAYS_BUT_NO_HOUR
  Destination heartbeat days specified with no heartbeat hour
- SNMP_DESTS_CANNOT_REFER_TO_USERS
  SNMP destinations cannot refer to users
- USER_EMAIL_ADDRESS_IS_NOT_DEFINED
  User's email address is not defined
- SMTPGWS_NOT_ALLOWED_FOR_DEST_TYPE
  Destination cannot have SMTP gateways
- DAY_APPEARS_TWICE
  The day '*Day*' appears twice on the list.
  Troubleshooting: Each day must appear at most once.
- SNMP_MANAGER_MUST_BE_SPECIFIED_FOR_DEST_TYPE
  Destination must have an SNMP manager
- NO_SMS_GATEWAYS_ARE_DEFINED
  An SMS Destination cannot be defined if no SMS gateways are defined

Adding a Destination to a Destination Group

Adding an event notification destination to a destination group.

```
destgroup_add_dest destgroup=GroupName dest=DestName
```

Parameters:

Name	Type	Description	Mandatory	Default
destgroup	Object name	Destination group name to which to add the destination.	Y	
dest	Object name	Destination to be added to the group.	Y	

This command adds a destination to a destination group.

The command fails if the destination group already contains the destination.

The command cannot be executed while there are uncleared alerting events.

Example:

```
destgroup_add_dest destgroup=alladmins dest=john
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- DESTGROUP_NAME_DOES_NOT_EXIST
  Destination group name does not exist
- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- DEST_NAME_DOES_NOT_EXIST
  Destination name does not exist
- DESTGROUP_MAX_DESTS_REACHED
  Maximum number of destinations already defined in destination groups
- DESTGROUP_ALREADY_INCLUDES_DEST
  Destination group already includes destination name

Creating a Destination Group

Creates an event notification destinations group.

```
destgroup_create destgroup=GroupName
```

Parameters:

Name	Type	Description	Mandatory	Default
destgroup	Object name	Destination group name.	Y	

This command creates a destination group. A destination group is simply a group of destinations, which is utilized by rules to send notifications to the entire group without specifying all the destinations for each rule. You can also add or remove destinations from the group, which eliminates the need to change the configuration of each rule separately.

A destination group is empty when it is created. To add a destination to a destination group, use Adding a Destination to a Destination Group.

Example:

```
destgroup_create destgroup=alladmins
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- DESTGROUP_MAX_REACHED
  Maximum number of destination groups already defined
- DESTGROUP_NAME_ALREADY_EXISTS
  Destination group name already exists
- DESTGROUP_NAME_IS_DEST_NAME
  Destination group name already exists as a destination name

Deleting a Destination Group

Deletes an event notification destination group.

```
destgroup_delete destgroup=GroupName
```

Parameters:

Name	Type	Description	Mandatory	Default
destgroup	Object name	Name of destination group to be deleted.	Y	

This command deletes an event notification destination group.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_DESTINATION_GROUP
  Are you sure you want to delete destination group *Destination Group*?

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- DESTGROUP_APPEARS_IN_RULE
  Destination Group appears in a Rule
  Troubleshooting: To delete the destination group, first delete the rule.
- DESTGROUP_NAME_DOES_NOT_EXIST
  Destination group name does not exist

Listing Destination Groups

Lists destination groups.

```
destgroup_list [ destgroup=GroupName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
destgroup	Object name	Destination group to be listed.	N	All groups.

This command lists all destination groups or a specific one. All the destinations are listed for each destination group.

Id	Name	Description	Default Position
name	Name		1
dests	Destinations		2
creator	Creator		

Example:

```
destgroup_list
```

Output:

```
Name     Destinations
itstaff  john,michael,linda,monitoringserver
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Removing a Destination from Destination Group

Removes an event notification destination from a destination group.

```
destgroup_remove_dest destgroup=GroupName dest=DestName
```

Parameters:

Name	Type	Description	Mandatory	Default
destgroup	Object name	Group name.	Y	
dest	Object name	Destination to be removed from the group.	Y	

This command removes an event notification destination from a destination group.

This command cannot be executed while there are uncleared alerting events.

Example:

```
destgroup_remove_dest destgroup=alladmins dest=john
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- DESTGROUP_NAME_DOES_NOT_EXIST
  Destination group name does not exist
- DEST_NAME_DOES_NOT_EXIST
  Destination name does not exist
- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- DESTGROUP_DOES_NOT_INCLUDE_DEST
  Destination group does not include destination name

Renaming a Destination Group

Renames an event notification destination group.

```
destgroup_rename destgroup=GroupName new_name=NewGroupName
```

Parameters:

Name	Type	Description	Mandatory	Default
destgroup	Object name	Destination group to be renamed.	Y	
new_name	Object name	New name of the destination group.	Y	

This command renames an event notification destination group.

This command can not be executed while there are uncleared alerting events.

Example:

```
destgroup_rename destgroup=alladmins new_name=itstaff
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- DESTGROUP_NAME_DOES_NOT_EXIST
  Destination group name does not exist
- DESTGROUP_NAME_ALREADY_EXISTS
  Destination group name already exists
- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- DESTGROUP_NAME_IS_DEST_NAME
  Destination group name already exists as a destination name

Clearing Alerting Events

Clears alerting events.

```
event_clear event_id=EventId [ all_preceding=<yes|no> ] [ internal=<yes|no|all> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
event_id	Positive integer	ID number of the event to clear.	Y	
all_preceding	Boolean	Clears all events preceding the specified event.	N	no.
internal	Boolean	Clears XIV-internal events.	N	no

This command clears alerting events.

In order to ensure that an event was indeed received, an event notification may be sent repeatedly until it is cleared by a CLI command or the GUI. Such events are called *alerting* events. An event is defined as *alerting* if at the time of the event's generation it was matched by an *alerting* rule, meaning a rule that has either snooze or escalation definitions.

Notifications for the alerting event are sent until it is cleared by this command. The clearing operation does not imply that the problem has been solved. It only implies that the event has been noted by the relevant person who takes responsibility for fixing the problem.

A user may either clear a specific event or clear all alerting events.

Example:

```
event_clear event_id=87
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Application administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- ONLY_TECHNICIAN_CAN_REFER_TO_INTERNAL_EVENT_OBJECTS
  Only technician can refer to internal event objects

Listing Events

Lists system events.

```
event_list [ max_events=MaxEventsToList ]
     [ after=<TimeStamp> ]
     [ before=<TimeStamp> ]
     [ min_severity=<INFORMATIONAL|WARNING|MINOR|MAJOR|CRITICAL> ]
     [ alerting=<yes|no|all> ]
     [ cleared=<yes|no|all> ]
     [ code=EventCode ]
     [ object_type=<cons_group|destgroup|dest|dm|host|map|
       mirror|pool|rule|smsgw|smtpgw|target|volume|
       cluster|ip_interface|ldap_conf|meta_data_object|
       sync_schedule|user|user_group|ldap_server|modules_status,...> ]
     [ internal=<yes|no|all> ]
     [ beg=BeginIndex ] [ end=EndIndex ]
     [ count_all=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
max_events	Positive integer	Maximum number of events to list.	N	300.
after		Earliest time/date.	N	no filter.
before		Latest time/date.	N	no filter.
min_severity	Enumeration	Minimum severity.	N	no filter.
alerting	Boolean	Filter alerting events.	N	no filter.
cleared	Boolean	Filter cleared events.	N	no filter.
code		Filter by a specific event code.	N	no filter.
object_type	Enumeration	Filter events by the type of the related system object.	N	no filter.
internal	Boolean	Filter XIV internal events.	N	no filter.
beg	Integer	Index of the first event to list. If negative, then counts from the end.	N	1.
end	Integer	Index of the last event to list (not inclusive). If negative, then counts from the end.	N	last event + 1.
count_all	Boolean	If yes, it scans all the events between beg and end for computing the number of events meeting the criteria.	N	no.

This command lists system events according to specified criteria, such as minimum severity, event type and so on. The event list displays the following information for each event: timestamp, severity, code, user and description.

Events are listed and sorted by time of creation, where the latest events are listed last. Events are listed by default in their user-readable textual form. Alternatively, the XCLI option for comma separated values can be used to generate output that can serve as input for other applications.

The syntax for the `before` and `after` fields is as follows: `Y-M-D[.[h[:m[:s]]]]`, where the ranges are as follows:

- Y - year (four digit)
- M - month (1-12)
- D - day (1-31)
- h - hour (0-23, with 0 as default)
- m - minute (0-59, with 0 as default)
- s - second (0-59, with 0 as default)

Note:

The year, month and day are separated by dashes, while the optional hour, minute and second are separated by colons.

Id	Name	Description	Default Position
timestamp	Timestamp		1
severity	Severity		2
code	Code		3
user_name	User		4
description	Description		5
index	Index		
alerting	Alerting		
cleared	Cleared		
tshooting	Trouble Shooting		

Example:

```
event_list max_events=10
```

Output:

```
Timestamp             Severity        Code
2009-05-12 15:10:16   Informational   START_WORK
2009-05-12 15:16:11   Informational   POOL_CREATE
2009-05-12 15:16:22   Critical        WOULD_BE_EMERGENCY_SHUTDOWN
2009-05-12 15:16:23   Informational   VOLUME_CREATE

Additional output fields
(lines are broken to fit the page width of this Guide):

User              Description
                  System has entered ON state.
xiv_development   Storage Pool of size 171GB was created with name
                  'p1_m'.
                  An emergency shutdown has been detected, but UPS control
                  is disabled.
xiv_development   Volume was created with name 'master' and size 17GB in
                  Storage Pool with name 'p1_m'.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Application administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Read-only users	Conditionally Allowed	Only the technician can run this command with the internal parameter
Technicians	Allowed	

Completion Codes:

- UNRECOGNIZED_EVENT_CODE
  '*String*' is not a recognized event code
  Troubleshooting: Consult the manual for the list of event codes
- CANNOT_READ_EVENTS
  Cannot read events.
  Troubleshooting: Contact support

Listing Uncleared Alerting Events

Lists uncleared alerting events.

```
event_list_uncleared
```

This command lists uncleared alerting events.

Example:

```
event_list_uncleared
```

Output:

```
Index   Code            Severity
------- --------------- ---------------
318     VOLUME_CREATE   Informational
666     VOLUME_DELETE   Informational
```

Id	Name	Description	Default Position
index	Index		1
code	Code		2
severity	Severity		3

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Setting the Threshold for Events Notification

Redefines the threshold of a parameterized event.

```
event_redefine_threshold code=EventCode
                         severity=<INFORMATIONAL|WARNING|MINOR|MAJOR|CRITICAL|NONE>
                         threshold=<ThresholdValue|NONE>
```

Parameters:

Name	Type	Description	Mandatory	Default
code		Event code.	Y	
severity	Enumeration	Severity.	Y	
threshold	Integer	Threshold value, or NONE to indicate that an event with this severity is not created.	Y	

This command redefines the threshold of a parameterized event.

This command can be applied to parameterized events, that is events that are triggered when a certain parameter crosses a certain threshold. Using this command the user can change the threshold for event notification. Furthermore, multiple thresholds can be defined using multiple invocations of this command, one for each event severity. When the relevant parameter crosses a threshold, an event with the matching severity is created.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	

User Category	Permission	Condition
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- EVENT_DOES_NOT_HAVE_THRESHOLDS
  Event does not have thresholds
- EVENT_THRESHOLD_IS_ILLEGAL
  Illegal value for event threshold
  Troubleshooting: Event threshold values must be monotone
- UNRECOGNIZED_EVENT_CODE
  '*String*' is not a recognized event code
  Troubleshooting: Consult the manual for the list of event codes
- LAST_EVENT_THRESHOLD_CANNOT_BE_DELETED
  Events must have at least one threshold value

Listing Thresholds

Lists event thresholds

```
event_threshold_list [ code=EventCode ] [ internal=<yes|no|all> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
code	Enumeration	Filter by a specific event code.	N	no filter.
internal	Enumeration	Filter XIV internal events.	N	no

Lists event thresholds.

Id	Name	Description	Default Position
code	Code		1
has_thresholds	Has Thresholds?		
not_in_use	Not In Use		
replaced_by	Replaced By		
default_thresholds.0	INFORMATIONAL(def)		7
default_thresholds.1	WARNING(def)		8
default_thresholds.2	MINOR(def)		9
default_thresholds.3	MAJOR(def)		10
default_thresholds.4	CRITICAL(def)		11
thresholds.0	INFORMATIONAL		2
thresholds.1	WARNING		3

Id	Name	Description	Default Position
thresholds.2	MINOR		4
thresholds.3	MAJOR		5
thresholds.4	CRITICAL		6

Example:

```
event_threshold_list
```

Output:

```
Code                                  INFORMATIONAL   WARNING   MINOR
------------------------------------- --------------- --------- -------
STORAGE_POOL_SNAPSHOT_USAGE_INCREASED   none            80        90
STORAGE_POOL_VOLUME_USAGE_INCREASED     none            80        90

MAJOR   CRITICAL   INFORMATIONAL(def)   WARNING(def)   MINOR(def)   MAJOR(def)
------- ---------- -------------------- -------------- ------------ ------------
95      none       none                 80             90           95
95      none       none                 80             90           95

CRITICAL(def)
---------------
none
none
```

Access Control:

User Category	Permission	Condition
Storage administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Application administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Read-only users	Conditionally Allowed	Only the technician can run this command with the internal parameter
Technicians	Allowed	

Generating a Custom Event

Generates a mm event.

```
mm_event description=Description
[ severity=<INFORMATIONAL|WARNING|MINOR|MAJOR|CRITICAL> ] category=Category
mm_data=AdditionalData
```

Parameters:

Name	Type	Description	Mandatory	Default
description	String	Description of the event.	Y	

Name	Type	Description	Mandatory	Default
severity		Severity of the event.	N	Informational
category	String	Category of the event.	Y	
mm_data	String	Additional data for the event.	Y	

This command generates an mm event. This can be used for either generating an event from a user application or host side software, or in order to test the event notifications procedures.

Example:

```
mm_event description="Description" category=Disk mm_data="Additional Data"
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Activating a Rule

Activates an event notification rule.

```
rule_activate rule=RuleName
```

Parameters:

Name	Type	Description	Mandatory	Default
rule	Object name	Name of the rule to be activated.	Y	

This command activates the specified rule. An active rule is matched against events and generates notifications. If the rule is already active, then this command has no effect.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- EVENT_RULE_NAME_DOES_NOT_EXIST
  Event rule name does not exist

Creating Event Notification Rules

Creates an event notification rule.

```
rule_create rule=RuleName
      [ min_severity=<INFORMATIONAL|WARNING|MINOR|MAJOR|CRITICAL|NONE> ]
      [ codes=EventCodes | except_codes=EventCodes ]
      [ escalation_only=<yes|no> ]
  dests=dest1,dest2,...
      [ snooze_time=SnoozeTime ]
      [ escalation_time=EscalationTime escalation_rule=EscalationRule ]
```

Parameters:

Name	Type	Description	Mandatory	Default
rule	Object name	Name of the new rule.	Y	
min_severity	Enumeration	Minimum event severity for rule filtering.	N	All severities.
codes		Filter only events with these codes.	N	All events.
except_codes		Filter only events with other codes.	N	All events.
escalation_only	Boolean	Specifies that this rule can only be used for escalation.	N	no
dests	Object name	Comma separated list of destinations and destination groups for event notification.	Y	
snooze_time	Integer	Snooze time in minutes.	N	No snoozing.
escalation_rule	Object name	Escalation rule.	N	
escalation_time	Integer	Escalation time in minutes. Escalation time should not be defined as shorter than snooze time. Refer to escalation_rule above for more information.	N	No escalation.

This command defines a new event notification rule. An event notification rule is used in order to determine which events should create which notifications. When an event is created, it is checked by all currently defined rules, and based on these rules the notifications are created.

Each rule has filtering and notifications configuration.

The filtering configuration controls which events match this rule. The filtering can be based on the event's code, by specifying a minimum severity. When using this configuration, each event with a severity higher or equal to the rule's `min_severity` parameter match this rule. Alternatively, the rule may match only a specific event code. The two filters can be combined together, when required for events whose severity depends on a run-time parameter.

The second part of the configuration of a rule is a list of destinations and destination groups that receive the notification when an event matches the filtering criteria. If a destination is included both in the rule and in one of the rule's destination groups, it still gets only one notification. The same applies if a destination is included in two destination groups, or if the event matches the filtering criteria of several rules, all using the same destination.

A rule can be defined as *alerting*, which means that notifications are being sent repeatedly until the matching events are cleared using the Clearing Alerting Events command.

Note:

Clearing the event does not mean that the problem has been solved. It only means that it was noticed and there is no need to continue to send notifications.

The repeated sending of notifications can be defined by two ways:

- The `snooze` parameter causes the notifications to be sent again and again to the same destinations. The time in minutes between the repeated transmissions is determined by the `snooze` value.
- The `escalation_time` and `escalation_rule` parameters causes the notifications to be sent to the destination list of the `escalation_rule` if it is not cleared within `escalation_time` minutes.

Rules can escalate only to alerting rules (meaning to rules that have snooze or escalation definitions) in order to prevent a situation where notifications are stopped from being sent.

A rule cannot escalate to itself, and neither can it be defined in a cyclic escalation of rules.

escalation_only defines a rule without filters, which can only be used as an escalation for other rules.

The snooze time cannot be longer than the escalation time.

It is not permitted to define new rules while there are uncleared alerting events.

The following example sends alerts upon critical events to John's cellular number and to the emails of all the IT staff. The alerts will be resent every 20 minutes until the events are cleared.

Example:

```
xcli -u  -c Nextra1 rule_create rule=critical_alerts min_severity=critical
                    destinations=john-cell,itstaff snooze_time=20
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- EVENT_RULE_MAX_REACHED
  Maximum number of event rules already defined
- EVENT_RULE_CANNOT_ESCALATE_TO_NON_ALERTING_RULES
  Event rule cannot escalate to non-alerting rule
  Troubleshooting: Alerting rule can only escalate to another escalating rule
- DEST_APPEARS_TWICE
  Destination or destination group appears twice
- EVENT_RULE_NAME_ALREADY_EXISTS
  Event rule name already exists
- EVENT_RULE_NAME_DOES_NOT_EXIST
  Event rule name does not exist
- NAME_IS_NEITHER_DEST_NOR_GROUP
  Name is neither the name of a destination group nor the name of a destination
- ESCALATION_TIME_MUST_BE_LARGER_THAN_SNOOZE_TIME
  Escalation time must be larger than snooze time
- RULE_MAX_DESTS_REACHED
  Maximum number of destinations and destination groups in a rule already defined
- EVENT_RULE_MUST_HAVE_FILTER
  An alerting event rule must have a filter, either event code or severity
- EVENT_RULE_CANNOT_REFER_TO_INTERNAL_EVENT_CODES
  A user event rule cannot refer to internal event codes
- ESCALATION_EVENT_RULE_CANNOT_HAVE_FILTER
  An escalation-only event rule cannot have code or min_severity specification
- ESCALATION_EVENT_RULE_MUST_BE_ALERTING
  Escalation-only event rules must be alerting rules
- TOO_MANY_EVENT_CODES
  A maximum of *Maximum* event codes can be specified
- EVENT_CODE_APPEARS_TWICE
  Event code '*Code*' appears twice in the list
  Troubleshooting: Each event code must appear at most once.
- UNRECOGNIZED_EVENT_CODE
  '*String*' is not a recognized event code
  Troubleshooting: Consult the manual for the list of event codes
- EVENT_RULE_CANNOT_HAVE_A_CATEGORY
  A user event rule cannot have a category definition

Deactivating a Rule

Deactivates an event notification rule.

```
rule_deactivate rule=RuleName
```

Parameters:

Name	Type	Description	Mandatory	Default
rule	Object name	Name of the rule to be deactivated.	Y	

This command deactivates the specified rule. A deactivated rule is not matched against events and does not generate notifications. If the rule is already inactive, then this command has no effect.

In-active rules can not be used as escalation rules.

escalation_only rules can not be deactivated.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- EVENT_RULE_NAME_DOES_NOT_EXIST
  Event rule name does not exist
- ESCALATION_ONLY_RULES_ARE_ALWAYS_ACTIVE
  Escalation-only event rules cannot be deactivated or activated

Deleting Event Notification Rules

Deletes an event notification rule.

```
rule_delete rule=RuleName
```

Parameters:

Name	Type	Description	Mandatory	Default
rule	Object name	Rule to be deleted.	Y	

This command deletes an event notification rule.

Rules that are defined as the escalation of other rules cannot be deleted.

It is not permitted to delete a rule while there are uncleared alerting events.

Example:

```
rule_delete rule=emergency_alerts
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_RULE
  Are you sure you want to delete Rule *Rule*?

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- EVENT_RULE_NAME_DOES_NOT_EXIST
  Event rule name does not exist
- EVENT_RULE_USED_FOR_ESCALATION_CAN_NOT_BE_DELETED
  Event rule is an escalation rule of another event rule and thus cannot be deleted
  Troubleshooting: Delete all escalation rules that refer to this rule as their escalation rule

Listing Event Notification Rules

Lists event notification rules.

```
rule_list [ rule=RuleName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
rule	Object name	Rule to be listed.	N	All rules.

This command lists all event notification rules or a specific rule and their configuration.

Id	Name	Description	Default Position
name	Name		1
min_severity	Minimum Severity		2
codes	Event Codes		3
except_codes	Except Codes		4
dests	Destinations		5
active	Active		6
escalation_time	Escalation Time		

Id	Name	Description	Default Position
snooze_time	Snooze Time		
escalation_rule	Escalation Rule		
escalation_only	Escalation Only		7
category	Category		
creator	Creator		

Example:

```
rule_list
```

Output:

```
Name             Minimum Severity  Event Code  Destinations
---------------  ----------------  ----------  -----------------
emergency_alerts  critical          all         john-cell,itstaff
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Renaming Event Notification Rules

Renames an event notification rule.

```
rule_rename rule=RuleName new_name=NewRuleName
```

Parameters:

Name	Type	Description	Mandatory	Default
rule	Object name	Rule to be renamed.	Y	
new_name	Object name	New name of the rule.	Y	

This command renames an event notification rule.

Example:

```
rule_rename rule=critical_alerts new_name=emergency_alerts
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- EVENT_RULE_NAME_ALREADY_EXISTS
  Event rule name already exists
- EVENT_RULE_NAME_DOES_NOT_EXIST
  Event rule name does not exist

Updating an Event Notification Rule

Updates an event notification rule.

```
rule_update rule=RuleName
     [ min_severity=<INFORMATIONAL|WARNING|MINOR|MAJOR|CRITICAL|NONE> ]
     [ codes=EventCodes ] [ except_codes=EventCodes ]
     [ escalation_only=<yes|no> ]
   [ dests=dest1,dest2,...
     ] [ snooze_time=SnoozeTime ]
     [ escalation_time=EscalationTime ] [ escalation_rule=EscalationRule ]
```

Parameters:

Name	Type	Description	Mandatory	Default
rule	Object name	Name of the rule.	Y	
min_severity	Enumeration	Minimum event severity for rule filtering.	N	Leave unchanged.
codes		Filter only events with this code.	N	Leave unchanged.
except_codes		Filter only events with other codes.	N	Leave unchanged.
escalation_only	Boolean	Specifies that this rule can only be used for escalation.	N	no
dests	Object name	Comma separated list of destinations and destination groups for event notification.	N	Leave unchanged.
snooze_time	Integer	Snooze time in minutes.	N	Leave unchanged.
escalation_time	Integer	Escalation time in minutes.	N	Leave unchanged.

Name	Type	Description	Mandatory	Default
escalation_rule	Object name	Escalation rule.	N	Leave unchanged.

This command updates the configuration of an event notification rule. All parameters and their descriptions are identical to the Creating Event Notification Rules command.

Parameters which are not specified are not changed.

Example:

```
rule_update rule=critical_alerts min_severity=critical
                    destinations=john-cell,itstaff snooze_time=30
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- EVENT_RULE_NAME_DOES_NOT_EXIST
  Event rule name does not exist
- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- EVENT_RULE_CANNOT_ESCALATE_TO_ITSELF
  An event rule cannot be its own escalation rule
- EVENT_RULE_CANNOT_ESCALATE_TO_NON_ALERTING_RULES
  Event rule cannot escalate to non-alerting rule
  Troubleshooting: Alerting rule can only escalate to another escalating rule
- DEST_APPEARS_TWICE
  Destination or destination group appears twice
- EVENT_RULE_MISSING_ESCALATION_RULE
  An alerting event rule must have an escalation rule
  Troubleshooting: If escalation time is specified, then an escalation rule must be specified also.
- EVENT_RULE_MISSING_ESCALATION_TIME
  An alerting event rule must have escalation time
  Troubleshooting: If an escalation rule is specified, then escalation time must be specified also.
- NAME_IS_NEITHER_DEST_NOR_GROUP
  Name is neither the name of a destination group nor the name of a destination

- ESCALATION_TIME_MUST_BE_LARGER_THAN_SNOOZE_TIME
  Escalation time must be larger than snooze time
- RULE_MAX_DESTS_REACHED
  Maximum number of destinations and destination groups in a rule already defined
- EVENT_RULE_MUST_HAVE_FILTER
  An alerting event rule must have a filter, either event code or severity
- CYCLIC_ESCALATION_RULES_DEFINITION
  Event rule escalation cannot be cyclic
- EVENT_RULE_USED_FOR_ESCALATION_MUST_BE_ALERTING
  Event rule is an escalation rule of another event rule and thus must be an alerting rule
- EVENT_RULE_CANNOT_REFER_TO_INTERNAL_EVENT_CODES
  A user event rule cannot refer to internal event codes
- ESCALATION_EVENT_RULE_CANNOT_HAVE_FILTER
  An escalation-only event rule cannot have code or min_severity specification
- EVENT_RULE_CANNOT_HAVE_A_CATEGORY
  A user event rule cannot have a category definition
- EVENT_RULE_CANNOT_HAVE_BOTH_CODES_AND_EXCEPTION_CODES
  An event rule cannot have both codes and exception codes
- ESCALATION_EVENT_RULE_MUST_BE_ALERTING
  Escalation-only event rules must be alerting rules
- TOO_MANY_EVENT_CODES
  A maximum of *Maximum* event codes can be specified
- EVENT_CODE_APPEARS_TWICE
  Event code '*Code*' appears twice in the list
  Troubleshooting: Each event code must appear at most once.
- UNRECOGNIZED_EVENT_CODE
  '*String*' is not a recognized event code
  Troubleshooting: Consult the manual for the list of event codes

Defining an SMS Gateway

Defines an SMS gateway.

```
smsgw_define smsgw=SMSGatewayName email_address=EmailAddressScheme
           subject_line=SubjectLineScheme email_body=EmailBodyScheme
     [ smtpgw=<SMTPGW1,...|ALL> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
smsgw	Object name	SMS gateway name.	Y	
email_address	Token String	Format for the email address.	Y	
subject_line	Token String	Format for the subject line.	Y	
email_body	Token String	Format for the email body.	Y	

Name	Type	Description	Mandatory	Default
smtpgw	Object name	List of SMTP gateways to be used.	N	The SMTP gateways defined in the smtpgw_prioritize command.

SMS gateways are used to send event notifications via SMS messages. SMS messages are sent via SMS-to-Email servers, and when defining a new SMS gateway, we need to know how to SMS messages are encapsulated in the email message.

When the XIV system sends an SMS message it uses the actual message text that describes the event and the destination number. The destination number is comprised from an area code and the local number, both which are specified when a destination is defined as described in the Defining a New Event Notification Destination command.

The message's text and the destination numbers can be embedded into the email message in either the email destination address, email subject line or the email body. This command defines how email messages are formatted, and how they contain the information of the specific SMS.

When defining the SMS gateway, three fields must be specified in order to define the formatting:

- *email_address*: This is the email address used for sending the SMS via the Email-to-SMS gateway.
- *subject_line*: This is the subject line of the outgoing email that would be converted into an SMS.
- *email_body*: This is the body of the outgoing email that would be converted into an SMS.

When specifying each of these fields, the text can be either fixed, contain the event's text or contain the destination phone number. This is done by embedding the following escape sequences into the text:

- *{areacode}*. This escape sequence is replaced by the destination's cellular number area code.
- *{number}*. This escape sequence is replaced by the destination's cellular local number.
- *{message}*. This escape sequence is replaced by the text to be shown to the user.
- \{, \}, \\. These are replaced by the {, } or \ respectively.

By default, the email to the Email-to-SMS server is sent through the defined SMTP servers, prioritized by the Prioritizing SMTP Gateways command. If needed, the user may specify a specific SMTP gateway or gateways to be used for sending email to this Email-to-SMS gateway.

Several SMS gateways can be defined. The system will try the SMS gateways, in the order specified in Prioritizing SMS Gateways until it successfully connects to one of them. It is possible to define that specific SMS destinations will use specific SMS gateways (see Defining a New Event Notification Destination).

Example:

```
smsgw_define smsgw=SMSGW1
             email_address={areacode}{number}@sms2emailserver.yourcompany.com
    subject_line=SMS email_body={message}
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- GATEWAY_MAX_REACHED
  Maximum number of gateways already defined
- SMSGW_CANNOT_BE_DEFINED_WITHOUT_SMTPGW
  SMS gateways cannot be defined if no SMTP gateways are defined
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist
- GATEWAY_NAME_APPEARS_TWICE
  Gateway name appears twice in the list
- GATEWAY_NAME_ALREADY_EXISTS
  Gateway name already exists

Deleting an SMS Gateway

Deletes an SMS gateway.

```
smsgw_delete smsgw=SMSGatewayName
```

Parameters:

Name	Type	Description	Mandatory	Default
smsgw	Object name	SMS gateway to be deleted.	Y	

This command deletes an SMS gateway. A gateway cannot be deleted if it is part of a notification rule or if it is being used by a destination.

It is impossible to delete an SMS gateway while there are uncleared alerting events.

Example:

```
smsgw_delete smsgw=external-SMSGW
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_SMS_GATEWAY
  Are you sure you want to delete SMS gateway *Gateway*?

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist
- GATEWAY_USED_BY_DESTINATION
  Gateway is used by a destination

Listing SMS Gateways

Lists SMS gateways.

```
smsgw_list [ smsgw=SMSGatewayName ]
```

Parameters:

Name	Type	Description	Mandatory	Default
smsgw	Object name	Name of SMS gateway to list.	N	All gateways.

Lists all SMS gateways or a specific one. For each SMS gateway all its configuration information is listed.

Id	Name	Description	Default Position
name	Name		1
email_address	Email Address		2
gateways	SMTP Gateways		3
subject_line	Subject Line		
email_body	Email Body		
priority	Priority		

Example:

```
smsgw_list
```

Output:

```
Name    Email Address                                      SMTP Gateways
SMSGW1  {areacode}{number}@sms2emailserver.yourcompany.com  all
SMSGW2  {areacode}{number}@sms2emailservice.com             all
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Prioritizing SMS Gateways

Sets the priorities of the SMS gateways for sending SMS messages.

```
smsgw_prioritize order=<gw1[,gw2]...>
```

Parameters:

Name	Type	Description	Mandatory	Default
order	Object name	List of all SMS gateways ordered by priority.	Y	

This command sets the priority in which SMS gateways are used to send SMSs. SMS messages can be sent to cell phones through one of the email-to-SMS gateways in this list. This command determines the order in which XIV attempts to use these SMS gateways.

Only one gateway is used and subsequent gateways are only tried if the preceding ones in this priority list return an error.

Specific SMS destinations may define their own SMS gateways to be used when sending SMS to these destinations, regardless of this list.

Example:

```
smsgw_prioritize order=SMSGW1,SMSGW2
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	

User Category	Permission	Condition
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- GATEWAY_NAME_APPEARS_TWICE
  Gateway name appears twice in the list
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist
- GATEWAY_NAME_MISSING_FROM_LIST
  Gateway name is missing from the list

Renaming an SMS Gateway

Renames an SMS gateway.

```
smsgw_rename smsgw=SMSGatewayName new_name=NewSMSGWName
```

Parameters:

Name	Type	Description	Mandatory	Default
smsgw	Object name	SMS gateway to be renamed.	Y	
new_name	Object name	New name for the SMS gateway.	Y	

This command renames an SMS gateway.

SMS gateways cannot be renamed while there are uncleared alerting events.

Example:

```
smsgw_rename smsgw=SMSGW2 new_name=external-SMSGW
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- GATEWAY_NAME_ALREADY_EXISTS
  Gateway name already exists
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist

Updating an SMS Gateway

Updates an SMS gateway.

```
smsgw_update smsgw=SMSGatewayName [ email_address=EmailAddressScheme ]
     [ subject_line=SubjectLineScheme ] [ email_body=EmailBodyScheme ]
   [ smtpgw=<SMTPGW1[,SMTPGW2]...|ALL> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
smsgw	Object name	SMS gateway name.	Y	
email_address	Token String	Format for email address.	N	Leave unchanged.
subject_line	Token String	Format for subject line.	N	Leave unchanged.
email_body	Token String	Format for the email's body.	N	Leave unchanged.
smtpgw	Object name	List of SMTP gateways to be used.	N	The SMTP gateways defined in the smtpgw_prioritize command.

This command updates the configuration information of an existing SMS gateway. For the exact description and documentation of each parameter, see the documentation of Defining an SMS Gateway.

This command cannot be executed while there are uncleared alerting events.

Parameters which are not specified will not be changed.

Example:

```
smsgw_update smsgw=SMSGW1
email_address={areacode}{number}@sms2emailserver.yourcompany.com
    subject_line=NextraSMS
    email_body={message}
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- GATEWAY_NAME_APPEARS_TWICE
  Gateway name appears twice in the list
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist

Defining a New SMTP Gateway

Defines an SMTP gateway.

```
smtpgw_define smtpgw=SMTPGatewayName address=Address
              [ from_address=<SenderEmailAddress|DEFAULT> ]
              [ reply_to_address=<ReplyToAddress|DEFAULT> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
smtpgw	Object name	SMTP gateway name.	Y	
address		SMTP gateway address (IP or DNS name).	Y	
from_address		Sender's email address used for out-going emails sent through this SMTP server.	N	DEFAULT (system-wide sender's address that applies to all servers).
reply_to_address		The reply to address used for outgoing emails sent through this SMTP server.	N	DEFAULT (system-wide reply-to address that applies to all servers).

This command defines an SMTP gateway.

Several email gateways can be defined to enable notification of events by email or to enable the sending of SMS messages via Email-to-SMS gateways. By default, XIV attempts to send each email notification

through the first gateway according to the order that you specify. Subsequent gateways are only tried if the first in line returns an error. A specific email destination, or a specific SMS gateway may be defined to use only specific SMTP gateways.

The SMTP protocol dictates that every email message must specify the email address of the sender. This sender address must be a valid address for two reasons:

- Many SMTP gateways require a valid sender address, otherwise they will not forward the email, as a security measure in order to prevent unauthorized usage of the SMTP server. Often this sender address must be limited to a specific domain.
- The sender's address is used as the destination for error messages generated by the SMTP gateways, such as: incorrect email address, full email mailbox and so on.

If the sender's address is not specified for a specific SMTP gateway, a global system-wide sender's address specified in Setting Configuration Parameters is used.

The user can also configure a reply-to address which is different from the sender's address, if it is required that the return emails are sent to another destination.

Example:

```
smtpgw_define smtpgw=mailserver1 address=smtp.yourcompany.com
from_address=nextra@yourcompany.com
reply_to_address=nextraerrors@yourcompany.com
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- FROM_ADDRESS_NOT_DEFINED
  Neither the gateway's From Address nor the default From Address is defined
- GATEWAY_MAX_REACHED
  Maximum number of gateways already defined
- GATEWAY_NAME_ALREADY_EXISTS
  Gateway name already exists

Deleting an SMTP Gateway

Deletes a specified SMTP gateway.

```
smtpgw_delete smtpgw=SMTPGatewayName
```

Parameters:

Name	Type	Description	Mandatory	Default
smtpgw	Object name	SMTP gateway to be deleted.	Y	

This command deletes a specified SMTP gateway. A gateway cannot be deleted if it is part of a notification rule, is being used as an SMS gateway or if it belongs to a destination.

An SMTP gateway cannot be deleted while there are uncleared alerting events.

Example:

```
smtpgw_delete smtpgw=mailserverbackup
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_SMTP_GATEWAY
  Are you sure you want to delete SMTP gateway *Gateway*?

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist
- GATEWAY_USED_BY_DESTINATION
  Gateway is used by a destination
- GATEWAY_USED_BY_SMS_GATEWAY
  Gateway is used by an SMS Gateway

Listing SMTP Gateways

Lists SMTP gateways.

```
smtpgw_list [ smtpgw=SMTPGatewayName ]  [ internal=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
smtpgw	Object name	Name of SMTP gateway to list.	N	no.
internal	Enumeration	Filters gateways by their XIV-internal attribute.	N	no

This command lists defined SMTP gateways and their configuration information.

Id	Name	Description	Default Position
name	Name		1
address	Address		2
priority	Priority		3
from_address	From Address		
reply_to_address	Reply-to Address		
failed	Failed		
port	Port		
creator	Creator		

Example:

```
smtpgw_list
```

Output:

```
Name         Email Address         Port  Priority
-----------  --------------------  ----  --------
mailserver1  smtp.yourcompany.com  25    1
mailserver2  smtp.yourcompany.com  25    2
```

Access Control:

User Category	Permission	Condition
Storage administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Application administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Read-only users	Conditionally Allowed	Only the technician can run this command with the internal parameter

User Category	Permission	Condition
Technicians	Allowed	

Prioritizing SMTP Gateways

Sets the priority of which SMTP gateway should be used to send emails.

```
smtpgw_prioritize order=<gw1[,gw2]...>
```

Parameters:

Name	Type	Description	Mandatory	Default
order	Object name	List of all the SMTP gateways in order of their priority.	Y	

This command sets the priority in which SMTP gateway should be used to send emails. Several email gateways can be defined to enable notification of events or the sending of SMS by email. By default, XIV attempts to send each email through the first gateway according to the order that is specified in this command. Only one gateway is used and subsequent gateways are only tried if the preceding ones in this priority list return an error.

These priorities are used only for email destinations and SMS gateways that did not specify their own SMTP gateways.

Example:

```
smtpgw_prioritize order=mailserver2,mailserver1
```

Output:

```
Command completed successfully
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- GATEWAY_NAME_APPEARS_TWICE
  Gateway name appears twice in the list
- GATEWAY_NAME_DOES_NOT_EXIST

Gateway name does not exist
- GATEWAY_NAME_MISSING_FROM_LIST
  Gateway name is missing from the list

Renaming an SMTP Gateway

Renames an SMTP gateway.

```
smtpgw_rename smtpgw=SMTPGatewayName new_name=NewSMTPGWName
```

Parameters:

Name	Type	Description	Mandatory	Default
smtpgw	Object name	SMTP gateway to be renamed.	Y	
new_name	Object name	New name for the SMTP gateway.	Y	

This command renames an SMTP gateway.

Example:

```
smtpgw_rename smtpgw=mailserver2 new_name=mailserverbackup
```

Output:

```
Command completed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- GATEWAY_NAME_ALREADY_EXISTS
  Gateway name already exists
- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist

Updating an SMTP Gateway

Updates the configuration of an SMTP gateway.

```
smtpgw_update smtpgw=SMTPGatewayName [ address=Address ]
              [ from_address=<SenderEmailAddress|DEFAULT> ]
              [ reply_to_address=<ReplyToAddress|DEFAULT> ] [ internal=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
smtpgw	Object name	SMTP gateway name.	Y	
address		SMTP gateway address (IP or DNS name).	N	Leave unchanged.
internal	Boolean	Should be specified as YES for XIV internal gateway.	N	NO
from_address		Sender's Email address used for out-going emails sent through this SMTP server, or DEFAULT for the system-wide default.	N	Leave unchanged.
reply_to_address		The reply-to address used for outgoing emails sent through this SMTP server, or DEFAULT for the system-wide default.	N	Leave unchanged.

This command updates the configuration of an existing SMTP gateway. Fields which are not specified are not changed.

Example:

```
smtpgw_update smtpgw=mailserver1 address=smtp2.yourcompany.com
                          from_address=nextra@yurcompany.com
          reply_to_address=nextraerrors@yourcompany.com
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter
Application administrator	Conditionally Allowed	Only the technician can run this command with the internal parameter

User Category	Permission	Condition
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- GATEWAY_NAME_DOES_NOT_EXIST
  Gateway name does not exist
- CANNOT_CHANGE_EVENT_CONF_WITH_ALERTING_EVENTS
  Cannot change event configuration while there are alerting events
  Troubleshooting: Clear all alerting events before changing event configuration
- FROM_ADDRESS_NOT_DEFINED
  Neither the gateway's From Address nor the default From Address is defined
- ONLY_TECHNICIAN_CAN_REFER_TO_INTERNAL_EVENT_OBJECTS
  Only technician can refer to internal event objects

Chapter 14. IP Configuration

The following sections describe the XIV Command Line Interface (XCLI) for IP configuration.

The sections are listed as follows:

- ipinterface_add_port(Adds an Ethernet port to the link aggregation group of an IP interface.)
- ipinterface_create(Creates a new IP interface for iSCSI.)
- ipinterface_delete(Deletes an IP interface.)
- ipinterface_list(Lists the configuration of a specific IP interface or all IP interfaces.)
- ipinterface_list_ports(Lists all Ethernet ports together with their configuration and status.)
- ipinterface_remove_port(Removes an Ethernet port from the link aggregation group of an IP interface.)
- ipinterface_rename(Renames an IP interface.)
- ipinterface_run_arp(Prints the ARP database of the specified IP interface.)
- ipinterface_run_traceroute(Tests connectivity to a remote IP node using the ICMP trace-route mechanism.)
- ipinterface_update(Updates the configuration of an IP interface.)
- support_center_connect(This command connects to a support center.)
- support_center_define(This command defines a support center.)
- support_center_delete(This command deletes a support center.)
- support_center_disconnect(This command disconnects the IBM XIV Storage System from a support center.)
- support_center_list(This command lists support centers.)
- support_center_status(This command lists information about all defined support centers.)

Adding Ethernet Ports to IP Interfaces

Adds an Ethernet port to the link aggregation group of an IP interface.

```
ipinterface_add_port ipinterface=IPInteraceName port=P
```

Parameters:

Name	Type	Description	Mandatory	Default
ipinterface	Object name	IP interface to which the port is to be added.	Y	
port	Integer	Number of the port to be added to the group.	Y	

This command adds an Ethernet port to the link aggregation group of an IP interface.

The specified port is added to the link aggregation group of the specified IP interface.

Ports defined as a link aggregation group must be connected to the same Ethernet switch, and a parallel link aggregation group must be defined on that Ethernet switch.

The module is not provided, as it must be the module of the other ports of the interface.

This command cannot be applied to Management or VPN interfaces.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist
- ILLEGAL_PORT_NUMBER
  Port number is out of range
- PORT_ALREADY_IN_INTERFACE
  Port is already part of the specified IP Interface
- PORT_IS_USED_IN_ANOTHER_IP_INTERFACE
  One of the physical ports specified is already assigned to an IP Interface
- COMMAND_NOT_ALLOWED_ON_MANAGEMENT_INTERFACE
  Operation is not allowed on Management IP Interface
- IPINTERFACE_NOT_AGGREGATED
  Ports cannot be added to a non-aggregated IP Interface

Creating a New IP Interface

Creates a new IP interface for iSCSI.

```
ipinterface_create ipinterface=IPInterfaceName address=IPaddress netmask=NetworkMask [ gateway=DefaultGateway ] [ mtu=MTU ] modul
```

Parameters:

Name	Type	Description	Mandatory	Default
ipinterface	Object name	Name of the IP interface to be created. Do not use the names `Management` or `VPN`.	Y	
address		IP address of the interface.	Y	
netmask		Network mask of the interface.	Y	
gateway		IP address of the default gateway for this interface. This is optional.	N	None

Name	Type	Description	Mandatory	Default
mtu	Integer	Maximum Transmission Unit: The supported packet size by the connecting Ethernet switch. This is optional when the default equals 1536. MTU of up to 4500 is supported.	N	4500 for iSCSI and 1536 for Management and VPN.
module		Component identifier (rack and module) of the module containing the Ethernet ports.	Y	
ports	Integer	Comma-separated list (one or more) of port numbers.	Y	

This command defines a new IP interface for iSCSI traffic. Gateway, MTU, network mask and IP are the standard IP definitions.

The IP interface is defined on a Port Group, where a Port Group is one or more ports (all on the same module) that is linked together as an 802.3ad link aggregation group.

Each iSCSI Ethernet port can be defined as an IP interface, or groups of Ethernet iSCSI ports on the same module can be defined as a single link aggregation group. Ports defined as a link aggregation must be connected to the same Ethernet switch, and the parallel link aggregation must be defined on that switch.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- IPINTERFACE_EXISTS
  IP Interface name already used
- ILLEGAL_PORT_NUMBER
  Port number is out of range
- PORT_IS_USED_IN_ANOTHER_IP_INTERFACE
  One of the physical ports specified is already assigned to an IP Interface
- PORT_REPEATS_TWICE
  Port list contains the same value more than once
- FORCE_NO_AGGREGATION_ALLOWED_FOR_SINGLE_PORT_ONLY
  More than one port specified for non-aggregated IP Interface
- IP_ADDRESS_ALREADY_USED_IN_ANOTHER_INTERFACE

IP address is already assigned to another interface
- IPADDRESS_AND_GATEWAY_ARE_NOT_ON_SAME_SUBNET
  IP address specified for the default gateway is not in the subnet of the IP Interface
- MTU_TOO_LARGE
  Specified MTU value is too large
- BAD_PORTS_FORMAT
  Port list should be a comma separated list of positive integers
- ILLEGAL_COMPONENT_ID
  Component ID is illegal
- TOO_MANY_PORTS_IN_AGGREGATION_GROUP
  Too many physical ports for one IP interface
- ILLEGAL_IPADDRESS
  Illegal IP address was entered
- ILLEGAL_GATEWAY_IPADDRESS
  Illegal IP address was specified for default gateway

Deleting IP Interfaces

Deletes an IP interface.

```
ipinterface_delete ipinterface=IPInterfaceName
```

Parameters:

Name	Type	Description	Mandatory	Default
ipinterface	Object name	IP interface to be deleted.	Y	

This command deletes the IP interface. Only the interfaces defined for iSCSI traffic can be deleted. Management and VPN interfaces cannot be deleted.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist
- COMMAND_NOT_ALLOWED_ON_MANAGEMENT_INTERFACE
  Operation is not allowed on Management IP Interface
- IPINTERFACE_HAS_CONNECTIVITY
  IP interface has connectivity defined to another machine

Listing IP Interface Configuration

Lists the configuration of a specific IP interface or all IP interfaces.

```
ipinterface_list [ ipinterface=IPInterfaceName | address=IPAddress ]
```

Parameters:

Name	Type	Description	Mandatory	Default
ipinterface	Object name	IP interface to be listed.	N	All interfaces
address		IP address of the interface to be listed.	N	All interfaces

This command lists configuration information for the specified IP interface or for all IP interfaces (including Management). The Management or VPN name can only be used to view the configuration of the management of VPN interfaces.

The following information is listed:

- Name
- Type (iSCSI/management)
- IP address (or comma separated addresses for management and VPN)
- Network mask
- Default gateway
- CIDR address (or comma separated addresses for management and VPN)
- Default IPv6 gateway
- MTU
- Module (for iSCSI only)
- Comma separated list of ports (for iSCSI only)

Id	Name	Description	Default Position
name	Name		1
type	Type		2
address	IP Address		3
netmask	Network Mask		4
gateway	Default Gateway		5
address6	IPv6 Address		6
gateway6	IPv6 Gateway		7
mtu	MTU		8
module	Module		9
ports	Ports		10

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	

User Category	Permission	Condition
Read-only users	Allowed	
Technicians	Allowed	

Showing the Status and Configuration of Ethernet Ports

Lists all Ethernet ports together with their configuration and status.

```
ipinterface_list_ports
```

This command lists all Ethernet ports together with their configuration and status.

All physical Ethernet ports used to connect to the user's network are listed. This list shows the following information:

- Component ID (Module number for iSCSI or switch number for management/field technician port)
- Port number on module/switch
- For management/VPN/field technician: "management"/"VPN"/"field technician"
- IP interface containing the ports (or none, if port is not configured as part of IP interface)
- Status up/down
- Auto-negotiation: Half-full duplex, 1000/100/10

Id	Name	Description	Default Position
index	Index		1
role	Role		2
ip_interface_name	IP Interface		3
connected_component	Connected Component		4
is_link_up	Link Up?		5
negotiated_speed_Mbs	Negotiated Speed (Mb/s)		6
is_full_duplex	Full Duplex?		7
module_id	Module		8
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Removing Ethernet Ports from IP Interfaces

Removes an Ethernet port from the link aggregation group of an IP interface.

```
ipinterface_remove_port ipinterface=IPInteraceName port=P
```

Parameters:

Name	Type	Description	Mandatory	Default
ipinterface	Object name	IP interface from which the port is to be removed.	Y	
port	Integer	Number of the port to be removed from the group.	Y	

This command removes the specified port from the link aggregation group of the specified IP interface. The module does not need to be specified, because it is the same module as the other ports of the IP interface.

The last port of the IP interface cannot be removed.

If the IP interface must be moved to a different module, first delete the interface and then recreate it. This command cannot be applied to Management or VPN interfaces.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist
- ILLEGAL_PORT_NUMBER
  Port number is out of range
- PORT_NOT_IN_INTERFACE
  Port is not part of the specified IP Interface
- COMMAND_NOT_ALLOWED_ON_MANAGEMENT_INTERFACE
  Operation is not allowed on Management IP Interface
- IPINTERFACE_LAST_PORT
  Last port in IP Interface cannot be removed

Renaming an IP Interface

Renames an IP interface.

```
ipinterface_rename ipinterface=IPInterfaceName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
ipinterface	Object name	Original name of the IP interface.	Y	
new_name	Object name	New name of the IP interface.	Y	

This command renames an IP interface. The IP interface must be unique in the system. This command cannot be applied to Management or VPN interfaces.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist
- IPINTERFACE_EXISTS
  IP Interface name already used
- COMMAND_NOT_ALLOWED_ON_MANAGEMENT_INTERFACE
  Operation is not allowed on Management IP Interface

Printing the ARP Database of an IP Interface

Prints the ARP database of the specified IP interface.

```
ipinterface_run_arp localipaddress=IPaddress
```

Parameters:

Name	Type	Description	Mandatory	Default
localipaddress		IP address of the IP interface for which the ARP database should be printed.	Y	

This command prints the ARP database of an IP interface, meaning a list of pairs of IP addresses and their associated Ethernet MAC addresses. The IP address must be one of the IP addresses defined for iSCSI IP interfaces, or the Management or VPN name.

Id	Name	Description	Default Position
arp_output	arp Output		1

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- NO_IP_INTERFACE_MATCHES_CRITERIA
  No IP Interface matches given criteria
- MORE_THAN_ONE_IP_INTERFACE_MATCHES
  More than one IP Interface matches given criteria

Testing the Traceroute to a Remote IP

Tests connectivity to a remote IP node using the ICMP trace-route mechanism.

```
ipinterface_run_traceroute localipaddress=IPaddress remote=remoteHost
```

Parameters:

Name	Type	Description	Mandatory	Default
localipaddress		IP address of the IP interface for which the traceroute command is run.	Y	
remote		IP address or DNS for the traceroute test.	Y	

This command runs a route trace to the specified remote host through the specified IP interface. The IP address must be one of the IP addresses defined for iSCSI IP interfaces or the Management or VPN name.

Id	Name	Description	Default Position
traceroute_output	traceroute Output		1

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	

User Category	Permission	Condition
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- NO_IP_INTERFACE_MATCHES_CRITERIA
  No IP Interface matches given criteria
- MORE_THAN_ONE_IP_INTERFACE_MATCHES
  More than one IP Interface matches given criteria

Updating an IP Interface

Updates the configuration of an IP interface.

```
ipinterface_update ipinterface=IPInterfaceName [ address=<IPaddress,...> ] [ netmask=NetworkMask ] [ gateway=DefaultGateway ] [ m
```

Parameters:

Name	Type	Description	Mandatory	Default
ipinterface	Object name	Name of the IP interface to be updated.	Y	
address		IP address of the interface or a list of addresses for the Management and VPN interfaces.	N	Leaves the address unchanged.
netmask		Network mask of the interface.	N	Leaves the network mask unchanged.
gateway		IP address of the default gateway for this interface.	N	Leaves unchanged.
mtu	Integer	Maximum Transmission Unit: The packet size that is supported by the connecting Ethernet switch.	N	Keep unchanged.

This command updates the configuration of an existing IP interface.

Fields that are not specified do not change their values.

The name of the interface may either be one of the previously defined IP interfaces for iSCSI, or Management for the management IP interface, or VPN for the VPN interface.

Management ports are dedicated for CLI and GUI communications, as well as for outgoing SNMP and SMTP connections. For management interfaces, the user must specify three IP addresses (equal to the number of potential managers, minus the number of management ports).

For VPN interfaces, the user must specify two IP addresses (equal to the number of VPN ports). All VPN addresses must reside on the same subnet.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist
- IP_ADDRESS_ALREADY_USED_IN_ANOTHER_INTERFACE
  IP address is already assigned to another interface
- IPADDRESS_AND_GATEWAY_ARE_NOT_ON_SAME_SUBNET
  IP address specified for the default gateway is not in the subnet of the IP Interface
- IPINTERFACE_MANAGEMENT_DIFFERENT_SUBNET
  IP addresses management modules must all be in the same subnet
- IPINTERFACE_MANAGEMENT_MISSING_IPS
  Number of IP addresses specified is less than the number of management modules
- IPINTERFACE_MANAGEMENT_TOO_MANY_IPS
  Number of IP addresses specified is larger than the number of management modules
- MTU_TOO_LARGE
  Specified MTU value is too large
- ILLEGAL_IPADDRESS
  Illegal IP address was entered
- ILLEGAL_GATEWAY_IPADDRESS
  Illegal IP address was specified for default gateway

Connecting to a Support Center

This command connects to a support center.

```
support_center_connect [ < timeout=Timeout [ idle_timeout=IdleTimeout ] > | always_on=<yes|no> ] [ module=ComponentId ] [ password=Pas
```

Parameters:

Name	Type	Description	Mandatory	Default
timeout		Specified duration of the session. After the duration elapses, the session will be disconnected. Time is specified in hh:mm format.	N	none

Name	Type	Description	Mandatory	Default
idle_timeout		Specified idle time for the session after which it will be disconnected. Time is specified in hh:mm format.	N	[timeout]
module		The module from which the connection to the support center should be initiated	N	[the module that handled the CLI request]
password	String	A password set by the customer, that needs to be submitted by support services, in order to start a remote support session Format: string, must be 6-12 alpha-numeric characters, and is case-insensitive.	N	none
always_on	Boolean	Enables a constant connection to the support center (rather than an on-demand connection).	N	none

This command connects to a defined support center.

If the support center is not defined, the command will fail.

Two parameters enable to control the duration of the session: timeout and idle_disconnect.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- NO_SUPPORT_CENTERS_ARE_DEFINED
  No support centers are defined.
- REMOTE_SUPPORT_CONTROL_FAILURE
  Remote support control failure: *Error Message*.
- IDLE_TIMEOUT_MUST_BE_LOWER_THAN_TIMEOUT
  The idle timeout of the connection must be lower than its timeout.
- REMOTE_SUPPORT_CONTROL_ABNORMAL_FAILURE
  Unable to perform remote support function.

- MODULE_HAS_NO_VALID_PORT
  Module has no valid port for support center connection.

Defining a Support Center

This command defines a support center.

```
support_center_define support_center=SupportCenterName address=SupportCenterIPAddress
[ port=port ] [ priority=priority ]
```

Parameters:

Name	Type	Description	Mandatory	Default
support_center	Object name	The name of the support center server	Y	
address		The IP address of the support center server	Y	
port	Positive integer	The TCP port to connect to on the support center	N	22
priority		The priority of the support center (support centers with a higher priority will be connected first)	N	0

This command defines a support center.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- MAX_SUPPORT_CENTERS_DEFINED
  Maximum number of support centers is already defined.

Deleting a Support Center

This command deletes a support center.

```
support_center_delete support_center=SupportCenterName
```

Parameters:

Name	Type	Description	Mandatory	Default
support_center	Object name	The name of the support center to delete.	Y	

This command deletes a support center. Sessions that belong to this support center are disconnected, even if they are open at the time of deletion.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Warnings:

- ARE_YOU_SURE_TO_DELETE_THE_SUPPORT_CENTER
  Are you sure you want to delete Support Center?.

Completion Codes:

- SUPPORT_CENTER_NOT_DEFINED
  Support Center is not defined.

Disconnecting from a Support Center

This command disconnects the IBM XIV Storage System from a support center.

```
support_center_disconnect
```

This command disconnects the IBM XIV Storage System from a support center.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- REMOTE_SUPPORT_CONTROL_FAILURE
  Remote support control failure: *Error Message*.
- REMOTE_SUPPORT_CONTROL_ABNORMAL_FAILURE
  Unable to perform remote support function.

Listing Support Centers

This command lists support centers.

```
support_center_list
```

This command displays the following information about all defined support centers:

- Name
- IP Address
- Port
- Priority

Id	Name	Description	Default Position
name	Name		1
address	Address		2
port	Port		3
priority	Priority		4

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Presenting Status of a Support Center

This command lists information about all defined support centers.

```
support_center_status
```

This command lists information about all defined support centers.

Id	Name	Description	Default Position
state	State		1
connected_support_sessions	Connected sessions		2
minutes_to_timeout	Timeout (min)		3
running_from_module	Module		4
start_time	Connected since		5
destination	Destination		6

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	

User Category	Permission	Condition
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- REMOTE_SUPPORT_CONTROL_FAILURE
  Remote support control failure: *Error Message*.
- REMOTE_SUPPORT_CONTROL_ABNORMAL_FAILURE
  Unable to perform remote support function.

Chapter 15. Infiniband

The following sections describe the XIV Command Line Interface (XCLI) for Infiniband Fabric management.

The sections are listed as follows:

- ib_port_move(Moves existing infiniband port defintion to a different port number on the same switch.)
- ib_port_list(Lists configured IB ports.)
- ib_port_perf_resume(Resume a port that was shutdown due to performance problems.)
- ib_get_switch_logs(Collect IB switch logs.)
- switch_list(Lists configured IB switches.)
- sm_service_list(Lists status of sm_port services for each module.)

Moves Existing Infiniband Port

Moves existing infiniband port defintion to a different port number on the same switch.

```
ib_port_move ib_port=ComponentId new_port=Number
```

Parameters:

Name	Type	Description	Mandatory	Default
ib_port		Component specification of infiniband port.	Y	
new_port		New port number.	Y	

Moves existing infiniband port to a different port number on the same switch. The new port number must not be defined, and the old port must be defined.

Example:

```
xcli -u -c XIV1 ib_port_move 1:IB_Switch:1:15 36
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- IB_PORT_NOT_PRESENT

  Specified port is not defined in the system.

- IB_PORT_EXISTS
  Specified IB port is already defined in the system.
- IB_PORT_NOT_VALID
  Illegal number for IB port was given.
- IB_PORT_NOT_LICENSED
  Specified IB port is not licensed in this switch.
- IB_PORT_MOVE_ONLY_IN_SWITCHT
  IB port should move only in the same switch it is connected to.
- OPERATION_NOT_ALLOWED_ON_NON_REDUNDANT_SYSTEM
  Service cannot be restarted while system is not redundant
  Troubleshooting: Please wait until rebuild process is over

Lists Configured IB Ports

Lists configured IB ports.

```
ib_port_list [ ib_port=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
ib_port		IB port to list.	N	All IB ports

Lists a table of configured IB ports.

Example:

```
xcli -u -c XIV1 ib_port_list
```

- Port
- Connected Component
- Status
- Allow Any GUID
- GUID
- State
- Currently Functioning
- Requires Service
- Service Reason
- SM Port in Test
- SM Port is Master
- SM Port Target State
- SM Port Status

Id	Name	Description	Default Position
port	Port		1
component_id	Connected Component		2
status	Status		3

Id	Name	Description	Default Position
skip_miswire	Allow Any GUID		4
saved_info.peer_guid	GUID		5
saved_info.last_state	State		6
currently_functioning	Currently Functioning		
requires_service	Requires Service		
service_reason	Service Reason		
sm_port_in_test	SM Port in Test		
sm_port_is_master	SM Port is Master		
sm_port_should_have_state	SM Port Target State		
sm_port_status	SM Port Status		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Resumes a Port That Was Shutdown Due to Performance Problems

Resume a port that was shutdown due to performance problems.

```
ib_port_perf_resume ib_port=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
ib_port		Component specification of infiniband port.	Y	

Resume a port that was shutdown due to performance problems. Port must be defined in the configuration.

Example:

```
xcli -u -c XIV1 ib_port_perf_resume ib_port=1:IB_Switch_Port:1:15
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Allowed	

Completion Codes:

- IB_SWITCH_NOT_PRESENT
  Specified switch is not defined in the system or the switch value is not valid.
- IB_PORT_NOT_PRESENT
  Specified port is not defined in the system.

Collecting IB Switch Logs

Collect IB switch logs.

```
ib_get_switch_logs ib_switch=ComponentId target_module=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
ib_switch		Component specification of infiniband switch.	Y	
target_module		The target module to put the log in.	Y	

Removes existing infiniband port from configuration. Port must be defined in the configuration.

Example:

```
xcli -u -c XIV1 ib_get_switch_logs ib_switch=1:IB_Switch:1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- IB_SWITCH_NOT_PRESENT
  Specified switch is not defined in the system or the switch value is not valid.

List Configured IB Switches.

Lists configured IB switches.

```
switch_list [ switch=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
switch		IB switch to list.	N	All IB switchs

Lists a table of configured IB switches.

Example:

```
xcli -u -c XIV1 switch_list
```

Id	Name	Description	Default Position
component_id	Switch		1
status	Status		2
currently_functioning	Currently Functioning		3
ps1	Power Supply #1		4
ps2	Power Supply #2		5
prob_fans_num	Problematic Fans		6
prob_temp_num	Problematic Temperatures		7
prob_volt_num	Problematic Voltages		8
temp_is4	IS4 Temperature		
temp_ps_ambient	PS Ambient Temperature		
temp_is4_ambient	IS4 Ambient Temperature		
temp_board	Board Temperature		
fans_rpm.0	Fan #1 RPM		
fans_rpm.1	Fan #2 RPM		
fans_rpm.2	Fan #3 RPM		
fans_rpm.3	Fan #4 RPM		
voltage.0	Expected Voltage #1		
expected_voltage.0	Expected Voltage #1		
voltage.1	Expected Voltage #2		
expected_voltage.1	Expected Voltage #2		
voltage.2	Expected Voltage #3		
expected_voltage.2	Expected Voltage #3		
voltage.3	Expected Voltage #4		
expected_voltage.3	Expected Voltage #4		
voltage.4	Expected Voltage #5		
expected_voltage.4	Expected Voltage #5		
voltage.5	Expected Voltage #6		
expected_voltage.5	Expected Voltage #6		
voltage.6	Expected Voltage #7		
expected_voltage.6	Expected Voltage #7		
voltage.7	Expected Voltage #8		
expected_voltage.7	Expected Voltage #8		

Id	Name	Description	Default Position
mgmt_guid	Managememt GUID		
fabric_guid	Fabric GUID		
curr_vpd.chassis_type	Current VPD - Chassis type		
curr_vpd.mgmt_type	Current VPD - Managemet type		
curr_vpd.cpu_type	Current VPD - CPU type		
curr_vpd.chassis_pn	Current VPD - Chassis P/N		
curr_vpd.mgmt_pn	Current VPD - Management P/N		
curr_vpd.cpu_pn	Current VPD - CPU P/N		
curr_vpd.chassis_sn	Current VPD - Chassis S/N		
curr_vpd.mgmt_sn	Current VPD - Management S/N		
curr_vpd.cpu_sn	Current VPD - CPU S/N		
curr_vpd.asic_fw_version	Current ASIC firmware version		
curr_vpd.mgmt_fw_version	Current Management firmware version		
prev_vpd.chassis_type	Previous VPD - Chassis type		
prev_vpd.mgmt_type	Previous VPD - Managemet type		
prev_vpd.cpu_type	Previous VPD - CPU type		
prev_vpd.chassis_pn	Previous VPD - Chassis P/N		
prev_vpd.mgmt_pn	Previous VPD - Management P/N		
prev_vpd.cpu_pn	Previous VPD - CPU P/N		
prev_vpd.chassis_sn	Previous VPD - Chassis S/N		
prev_vpd.mgmt_sn	Previous VPD - Management S/N		
prev_vpd.cpu_sn	Previous VPD - CPU S/N		
prev_vpd.asic_fw_version	Previous ASIC firmware version		
prev_vpd.mgmt_fw_version	Previous Management firmware version		
initial_vpd.chassis_type	Initial VPD - Chassis type		
initial_vpd.mgmt_type	Initial VPD - Managemet type		
initial_vpd.cpu_type	Initial VPD - CPU type		
initial_vpd.chassis_pn	Initial VPD - Chassis P/N		
initial_vpd.mgmt_pn	Initial VPD - Management P/N		
initial_vpd.cpu_pn	Initial VPD - CPU P/N		

Id	Name	Description	Default Position
initial_vpd.chassis_sn	Initial VPD - Chassis S/N		
initial_vpd.mgmt_sn	Initial VPD - Management S/N		
initial_vpd.cpu_sn	Initial VPD - CPU S/N		
initial_vpd.asic_fw_version	Initial ASIC firmware version		
initial_vpd.mgmt_fw_version	Initial Management firmware version		
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing sm_port Services Statuses

Lists status of sm_port services for each module.

```
sm_service_list
```

Lists status of sm_port services for each module.

Example:

```
xcli -u -c XIV1 sm_service_list
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Chapter 16. Access Control

The following sections describe the XIV Command Line Interface (XCLI) for user access control.

The sections are listed as follows:

- access_define(Defines an association between a user group and a host.)
- access_delete(Deletes an access control definition.)
- access_list(Lists access control definitions.)
- ldap_add_server(Adds an LDAP server definition.)
- ldap_test(Tries to authenticate a specified user against an LDAP server, based on existing configuration)
- ldap_config_get(Displays system parameters governing user authentication against a specified LDAP server.)
- ldap_config_set(Configures general system parameters governing user authentication against LDAP servers)
- ldap_list_servers(Lists LDAP servers defined in the system.)
- ldap_mode_get(Lists LDAP-based authentication mode.)
- ldap_mode_set(Enables/disables LDAP-based authentication mode.)
- ldap_update_server(Update an existing server configuration)
- ldap_remove_server(Removes an LDAP server definition.)
- ldap_user_test(Tests user credentials in LDAP authentication.)
- user_define(Defines a new user.)
- user_delete(Deletes a user.)
- user_group_add_user(Adds a user to a user group.)
- user_group_create(Creates a user group.)
- user_group_delete(Deletes a user group.)
- user_group_list(Lists all user groups or a specific one.)
- user_group_remove_user(Removes a user from a user group.)
- user_group_rename(Renames a user group.)
- user_group_update(Updates a user group.)
- user_list(Lists all users or a specific user.)
- user_rename(Renames a user.)
- user_update(Updates a user.)

Adding an Access Control Definition

Defines an association between a user group and a host.

```
access_define user_group=UserGroup < host=Host | cluster=Cluster >
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	User group to be associated with the host or cluster.	Y	

Name	Type	Description	Mandatory	Default
host	Object name	Host to be associated with the user group.	N	
cluster	Object name	Cluster to be associated with the user group.	N	

This command associates a user group with a host or a cluster. Hosts and clusters can be associated with only a single user group.

Example:

```
access_define host=host1 user_group=usergroup1
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- USER_GROUP_NAME_DOES_NOT_EXIST
  User group name does not exist
- CLUSTER_BAD_NAME
  Cluster name does not exist
- HOST_BAD_NAME
  Host name does not exist
- HOST_BELONGS_TO_CLUSTER
  Host is part of a cluster

Deleting an Access Control Definition

Deletes an access control definition.

```
access_delete user_group=UserGroup < host=Host | cluster=Cluster >
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	User group of the access control definition to be deleted.	Y	
host	Object name	Host of the access control definition to be deleted.	N	
cluster	Object name	Cluster of the access control definition to be deleted.	N	

This command deletes the association between the user group and host or cluster. The operation fails if no such access definition exists. When a host is removed from a cluster, the host's associations become the cluster's associations, thereby allowing continued mapping of operations so that all scripts continue to work.

Example:

```
access_delete user_group=usergroup1
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- USER_GROUP_NAME_DOES_NOT_EXIST
  User group name does not exist
- USER_GROUP_DOES_NOT_HAVE_ACCESS_TO_CLUSTER
  User Group does not have access to cluster
- CLUSTER_BAD_NAME
  Cluster name does not exist
- HOST_BAD_NAME
  Host name does not exist
- HOST_BELONGS_TO_CLUSTER
  Host is part of a cluster
- USER_GROUP_DOES_NOT_HAVE_ACCESS_TO_HOST
  User Group does not have access to host

Listing Access Control Definitions

Lists access control definitions.

```
access_list [ user_group=UserGroup ] [ host=Host | cluster=Cluster ]
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	Filters the access control listing so that it only shows this user group.	N	All user groups.
host	Object name	Filters the access control listing so that it only shows this host.	N	All hosts.
cluster	Object name	Filters the access control listing so that it only shows this cluster.	N	All clusters.

This command lists access control definitions. The list can be displayed for all access control definitions or it can be filtered for a specific user group, host/cluster or both.

Id	Name	Description	Default Position
type	Type		1
name	Name		2
user_group	User Group		3

Example:

```
access_list host=buffyvam
```

Output:

```
Type   Name       User Group
host   buffyvam   testing
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- HOST_BAD_NAME
  Host name does not exist
- CLUSTER_BAD_NAME
  Cluster name does not exist
- USER_GROUP_NAME_DOES_NOT_EXIST
  User group name does not exist

Adding an LDAP Server Definition

Adds an LDAP server definition.

```
ldap_add_server  fqdn=Fqdn address=IPaddress
  base_dn=LdapDn [ certificate=PemCertificate ] [ port=PortNum ] [ secure_port=PortNum ]
```

Parameters:

Name	Type	Description	Mandatory	Default
fqdn		FQDN of the LDAP server.	Y	
address		IP address of the LDAP server.	Y	
base_dn		Base_DN of the LDAP server. Serves as the starting reference point for searches	Y	
certificate		The content of a `.pem` file, with asterisks (`*`) instead of newlines.	N	no certificate
port	Integer	Port number	N	389
secure_port	Integer	Secure port number	N	636

This command adds an LDAP server to the system.

Example:

```
ldap_add_server fqdn=ldap.example.com address=1.2.3.4
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Disallowed	

Completion Codes:

- BAD_SSL_CERTIFICATE
  Cannot decipher SSL certificate
- MAX_LDAP_SERVERS_REACHED
  Maximum number of LDAP servers already defined
- SSL_CERTIFICATE_HAS_EXPIRED
  SSL certificate has expired on *Expiration Date*.
- ADDRESS_CURRENTLY_ASSOCIATED_WITH_ANOTHER_LDAP_SERVER
  The specified IP address is currently associated with another LDAP server
- LDAP_SERVER_EXISTS
  LDAP server with specified FQDN already exists

Testing an LDAP Configuration

Tries to authenticate a specified user against an LDAP server, based on existing configuration

```
ldap_test [ fqdn=fqdn ] user=userName password=Password
```

Parameters:

Name	Type	Description	Mandatory	Default
fqdn		FQDN of an LDAP server	N	All servers
user	String	The username of the tested user	Y	
password	String	The password of the tested user	Y	

This command tries to authenticate a specified user against an LDAP server, based on existing configuration

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- NO_LDAP_SERVERS_ARE_DEFINED
  No LDAP servers are defined in the system
- LDAP_SERVER_NOT_DEFINED
  LDAP server *FQDN* is not defined in the system.

- LDAP_IS_NOT_FULLY_CONFIGURED
  LDAP is not fully configured
  Troubleshooting: Check your settings.
- NO_LDAP_SERVERS_WITH_CERTIFICATE_ARE_DEFINED
  No LDAP servers with an LDAP certificate are defined in the system
- SSL_CERTIFICATE_HAS_EXPIRED_FOR_SERVER
  SSL certificate of ldap server '*Server FQDN*' has expired on *Expiration Date*.
- USER_IS_PREDEFINED_IN_THE_SYSTEM
  User is predefined in the system
- LOGIN_FAILURE_USER_CANNOT_BE_UNIQUELY_AUTHENTICATED_BY_LDAP_SERVER
  User *User Name* was not uniquely authenticated by LDAP server '*Server FQDN*'.
- LOGIN_FAILURE_LDAP_SERVER_UNREACHABLE
  No LDAP server can be reached.
- LOGIN_FAILURE_XIV_USER_NOT_AUTHENTICATED_BY_LDAP_SERVER
  XIV User '*XIV User*' was not authenticated by LDAP server '*Server FQDN*'.
- LOGIN_FAILURE_LDAP_SERVER_UNREACHABLE_OR_USER_NOT_FOUND
  User *User Name* was not found in LDAP servers '*Servers FQDN*'.
- LOGIN_FAILURE_INVALID_BASE_DN
  The base dn of server '*Server FQDN*' is invalid.
- LOGIN_FAILURE_USER_NOT_AUTHENTICATED_BY_LDAP_SERVER
  User *User Name* was not authenticated by LDAP server '*Server FQDN*'.
- LOGIN_FAILURE_USER_HAS_NO_RECOGNIZED_ROLE
  User *User Name* has no recognized LDAP role.
- LOGIN_FAILURE_USER_HAS_MORE_THAN_ONE_RECOGNIZED_ROLE
  User *User Name* has more than one recognized LDAP role.
- LOGIN_FAILURE_USER_MISSING_ID_ATTRIBUTE
  User *User Name* is missing the LDAP ID attribute '*Attribute*'.
- LOGIN_FAILURE_USER_MISSING_GROUP_ATTRIBUTE
  User *User Name* is missing the group attribute '*Attribute*'.
- LOGIN_FAILURE_USER_NOT_FOUND_IN_LDAP_SERVERS
  User *User Name* was not found in LDAP servers.

Listing LDAP Configuration Parameters

Displays system parameters governing user authentication against a specified LDAP server.

```
ldap_config_get
```

This command displays system parameters governing user authentication against a specified LDAP server. A successful execution of this command depends on corresponding to a valid LDAP server.

The output of the command does not list LDAP servers. Such data can be found by using the ldap_list_servers command.

The xiv_password parameter is not listed.

Example:

```
ldap_config_get
```

Output:

```
Name                    Value
current_server
base_dn
version                 3
xiv_group_attrib
storage_admin_role
read_only_role
session_cache_period    20
bind_time_limit         20
user_id_attrib          objectSiD
first_expiration_event  30
second_expiration_event 14
third_expiration_event  7
use_ssl                 no
xiv_user
```

Id	Name	Description	Default Position
name	Name		1
value	Value		2

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Configuring LDAP in the System

Configures general system parameters governing user authentication against LDAP servers

```
ldap_config_set
    [ user_name_attrib=LdapAttrib ]
    [ xiv_group_attrib=LdapAttrib ]
    [ storage_admin_role=LdapAttribute ]
    [ read_only_role=LdapRole ]
    [ use_ssl=<yes|no> ]
    [ user_id_attrib=LdapAttrib ]
    [ session_cache_period=Minutes ]
    [ bind_time_limit=Seconds ]
    [ first_expiration_event=Days ]
    [ second_expiration_event=Days ]
    [ third_expiration_event=Days ]
    [ version=LdapVersion ]
    [ xiv_user=LdapAttrib ]
    [ xiv_password=LdapAttrib ]
    [ server_type=<SUN DIRECTORY|MICROSOFT ACTIVE DIRECTORY|OPEN LDAP> ]
    [ group_search_depth=Depth ]
    [ group_search_max_queries=Number ]
    [ group_search_stop_when_found=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
user_name_attrib	String	User name attribute for queries. If not specified, it is set to `uid` for Sun Directory servers and `userPrincipalName` for Microsoft Active Directory servers.	N	according to server type
xiv_group_attrib	String	LDAP attribute designated to hold XIV-mapped roles	N	none
storage_admin_role	String	LDAP value mapped to the XIV storage administrator role. Multiple (up to 8) values are supported and must be separated using a comma (,). Multiple roles are not available for Sun Directory LDAP Servers.	N	none
read_only_role	String	LDAP value mapped to the XIV read only role. Multiple (up to 8) values are supported and must be separated using a comma (,)	N	none
use_ssl	Boolean	Indicates if secure LDAP is mandated	N	no
user_id_attrib	String	LDAP attribute set to identify the user (in addition to user DN) when recording user operations in the XIV event log	N	objectSiD
session_cache_period	Positive integer	Duration user credentials are kept before attempt to re-login the user	N	20
bind_time_limit	Positive integer	Duration after which the next LDAP server on the ldap server list will be called	N	0 (with bind_time_limit=0 we approach the LDAP server for every command. the performance issues depend on its availability.)
first_expiration_event	Positive integer	Number of days before expiration of certificate to set first alert (severity: warning)	N	30/14/7 (third is smallest)

Name	Type	Description	Mandatory	Default
second_expiration_event	Positive integer	Number of days before expiration of certificate to set second alert (severity: warning)	N	30/14/7 (third is smallest)
third_expiration_event	Positive integer	Number of days before expiration of certificate to set third alert (severity: warning)	N	30/14/7 (third is smallest)
version	Positive integer	Version of LDAP used (only version 3 is supported).	N	3
xiv_user	String	XIV user to be used for query the LDAP	N	none
xiv_password	String	XIV password to be used for query the LDAP	N	none
server_type	Enumeration	Type of the LDAP server.	N	none
group_search_depth	Positive integer	Depth of group hirarchy to search in.	N	0
group_search_max_queries	Positive integer	Maximum number of group queries to perform per server.	N	39
group_search_stop_when_found	Boolean	Stop the group search when a group match is found.	N	yes

This command configures general system parameters governing user authentication against LDAP servers.

LDAP access permissions which are not enforced for XIV predefined users. These XIV predefined users are authenticated by the IBM XIV Storage System and not by LDAP even if LDAP authentication is enabled.

Predefined user names include the following:

- admin
- technician
- xiv_development
- xiv_maintenance

Whenever an LDAP user - with a user name identical to any of the predefined names - tries to log into XIV (when LDAP authentication is enabled), that user will normally be denied access, since it is not authenticated against LDAP (but rather against XIV), and the user's (LDAP) password will likely not match the XIV password. However, logging into XIV using the password of the corresponding predefined user, the user will be granted the rights of the corresponding predefined user, regardless of its LDAP settings (e.g., association with an XIV application admin role), as LDAP is not consulted for predefined users.

Example:

```
ldap_config_set
base_dn version xiv_group_attrib
storage_admin_role read_only_role
session_cache_period bind_time_limit
use_ssl user_id_attrib first_expiration_event
second_expiration_event
third_expiration_event
xiv_user
xiv_password
server_type="SUN DIRECTORY"
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- LDAP_IS_NOT_FULLY_CONFIGURED
  LDAP is not fully configured
  Troubleshooting: Check your settings.
- LDAP_CONFIG_CHANGE_IS_ILLEGAL_WHEN_AUTHENTICATION_IS_ACTIVE
  This LDAP configuration change is invalid when LDAP configuration is active
  Troubleshooting: Disable LDAP-based authentication and then change LDAP configuration.
- LDAP_ROLE_ALREADY_USED
  LDAP role is already in use in LDAP configuration or in a user group
- NO_LDAP_SERVERS_WITH_CERTIFICATE_ARE_DEFINED
  No LDAP servers with an LDAP certificate are defined in the system
- INVALID_EXPIRATION_EVENT_DATES
  Dates for expiration events must be in ascending order
- LDAP_READ_ONLY_ROLE_HAS_WRONG_NUMBER_OF_PARTS
  LDAP read only role contains too many parts
  Troubleshooting: the role is divided to parts by ';' the number of parts shold be between 0 and 8
- LDAP_ROLE_HAS_DUPLICATED_PARTS
  LDAP role contains duplicated parts
- LDAP_STORAGE_ADMIN_ROLE_HAS_WRONG_NUMBER_OF_PARTS
  LDAP storage admin role contains too many parts
  Troubleshooting: the role is divided to parts by ';' the number of parts shold be between 0 and 8

Listing LDAP Servers Defined in the System

Lists LDAP servers defined in the system.

```
ldap_list_servers  [ fqdn=Fqdn ]
```

Parameters:

Name	Type	Description	Mandatory	Default
fqdn		FQDN of a specific server to list.	N	All servers.

This command lists the LDAP servers defined in the system, along with their type description and whether they are mandatory.

Example:

```
ldap_list_servers fqdn
```

Output:

```
<code value="SUCCESS"/>
        <empty_table_message value="No LDAP servers are defined in the system"/>
        <last_change_index value="367896"/>
        <status value="0"/>
        <status_str value="Command completed successfully"/>
```

Id	Name	Description	Default Position
fqdn	FQDN		1
address	Address		2
base_dn	Base DN		3
has_certificate	Has Certificate		4
expiration_date	Expiration Date		5
valid_certificate	Valid Certificate		
accessible	Accessible		
port	Port		6
secure_port	Secure Port		7

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Listing LDAP-Based Authentication Mode

Lists LDAP-based authentication mode.

```
ldap_mode_get
```

This command returns the authentication mode.

The command succeeds regardless of whether the LDAP server is inaccessible.

Example:

```
ldap_mode_get
```

Output:

```
Mode
Inactive
```

Id	Name	Description	Default Position
mode	Mode		1

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Enabling or Disabling LDAP-Based Authentication Mode

Enables/disables LDAP-based authentication mode.

```
ldap_mode_set  mode=<active|inactive>
```

Parameters:

Name	Type	Description	Mandatory	Default
mode	Boolean	Required state of LDAP authentication.	Y	

This command enables, or disables, LDAP-based authentication.

Example:

```
ldap_mode_set mode=active
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_ENABLE_LDAP_AUTHENTICATION
  Are you sure you want to enable LDAP authentication?
- ARE_YOU_SURE_YOU_WANT_TO_DISABLE_LDAP_AUTHENTICATION
  Are you sure you want to disable LDAP authentication?

Completion Codes:

- LDAP_IS_NOT_FULLY_CONFIGURED
  LDAP is not fully configured
  Troubleshooting: Check your settings.
- NO_LDAP_SERVERS_WITH_CERTIFICATE_ARE_DEFINED
  No LDAP servers with an LDAP certificate are defined in the system
- NO_LDAP_SERVERS_ARE_DEFINED
  No LDAP servers are defined in the system

Updating an LDAP Server Definition

Update an existing server configuration

```
ldap_update_server  fqdn=Fqdn [ address=IPaddress ] [ base_dn=LdapDn ]  [ port=PortNum ] [ secure_port=PortNum ]   [ certificate=PemCerti
```

Parameters:

Name	Type	Description	Mandatory	Default
fqdn		FQDN of the LDAP server.	Y	
address		IP address of the LDAP server.	N	none
certificate		The content of a `.pem` file, with asterisks (*) instead of newlines.	N	no certificate
remove_certificate	Boolean	To remove certificate set it to yes	N	no
base_dn		Base_DN of the LDAP directory	N	none
port	Integer	Port number	N	none
secure_port	Integer	Secure port number	N	none

This command Updates an existing LDAP server in configuration.

Example:

```
xcli  -u -c XIV1 ldap_update_server fqdn=ldap.example.com address=1.2.3.4 remove_certificate=yes
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_UPDATE_LDAP_SERVER
  Are you sure you want to update the LDAP server configuration?

Completion Codes:

- LDAP_SERVER_NOT_FOUND
  LDAP server with specified FQDN is not defined in the system
- SSL_CERTIFICATE_HAS_EXPIRED
  SSL certificate has expired on *Expiration Date*.
- ADDRESS_CURRENTLY_ASSOCIATED_WITH_ANOTHER_LDAP_SERVER
  The specified IP address is currently associated with another LDAP server
- BAD_SSL_CERTIFICATE
  Cannot decipher SSL certificate
- NO_UPDATE_PARAMETERS_SPECIFIED
  No LDAP server parameters were specified for update

Removing an LDAP Server Definition

Removes an LDAP server definition.

```
ldap_remove_server  fqdn=Fqdn
```

Parameters:

Name	Type	Description	Mandatory	Default
fqdn		FQDN of the server to remove.	Y	

This command removes an LDAP server to the system.

Example:

```
ldap_remove_server fqdn=cloud.xivldap2.com
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_REMOVE_LDAP_SERVER
  Are you sure you want to remove LDAP server?

Completion Codes:

- LDAP_SERVER_NOT_FOUND
  LDAP server with specified FQDN is not defined in the system
- LDAP_IS_ACTIVE_BUT_THIS_IS_THE_LAST_SERVER
  Deleting the last LDAP server is illegal when LDAP authentication is active
- LDAP_USES_SSL_BUT_THIS_IS_THE_LAST_SERVER_WITH_CERTIFICATE
  Deleting the last LDAP server which has a valid SSL certificate is illegal when LDAP authentication is active and uses SSL

Testing User Credentials in LDAP Authentication

Tests user credentials in LDAP authentication.

```
ldap_user_test  [ fqdn=Fqdn ]
```

Parameters:

Name	Type	Description	Mandatory	Default
fqdn		FQDN of a specific LDAP server.	N	Current active LDAP server

This command authenticates the system's user's via LDAP.

The system returns an indication for the user's credentials through displaying the test result:

- Login OK
- Login Failed - the user is unrecognized

- Login Failed - non-XIV user
- Login Failed - LDAP is inactive
- Login Failed - link error
- Predefined user

Example:

```
ldap_user_test
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- LDAP_AUTHENTICATION_IS_NOT_ACTIVE
  LDAP authentication is not active
- LDAP_SERVER_NOT_DEFINED
  LDAP server *FQDN* is not defined in the system.
- USER_IS_PREDEFINED_IN_THE_SYSTEM
  User is predefined in the system

Defining a New User

Defines a new user.

```
user_define user=UserName password=Password password_verify=Password
 category=<storageadmin|applicationadmin|readonly>
[ email_address=EmailAddress ]
[ area_code=AreaCode number=PhoneNumber ]
```

Parameters:

Name	Type	Description	Mandatory	Default
user	Object name	User name. User names are lower case.	Y	

Name	Type	Description	Mandatory	Default
password		Password of the user to be created. The password must have between 6 and 12 characters consisting of: a-z. A-Z or 0-9. Password is case sensitive.	Y	
password_verify		Password verification, which must be equal to the value of `password`.	Y	
category	Enumeration	The role of the user to be created.	Y	
email_address		Email address of this user. The email address specified here can be used for event notification. Entering this address is optional. The email address format is any legal email address.	N	
number		Cellular phone number of the user for event notification via SMS, excluding the area code. Phone numbers and area codes can be a maximum of 63 digits, dashes (-) and periods (.)	N	
area_code		Area code of the cellular phone number of the user. Phone numbers and area codes can be a maximum of 63 digits, dashes (-) and periods (.)	N	

This command adds a new user. Email address and phone number are optional and can be used for event notification. The category (user role) may be only one of those specified above (other categories contain only a single predefined user).

Access_all can be specified for application administrators only. When it is specified, it means that the user has a application administrator access level for all volumes, and can perform operations on all volumes and not just a subset of the specific volume.

The maximum number of users is 32.

Two predefined users are set system-wide: Admin and Technician.

Example:

```
user_define user=xiv_user1 password=s0mePassw0rd password_verify=s0mePassw0rd
category=applicationadmin
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- USER_NAME_ALREADY_EXISTS
  User name already exists
- MAX_USERS_REACHED
  Maximum number of users already defined
- PASSWORDS_DO_NOT_MATCH
  Passwords must be identical
- USER_PHONE_NUMBER_MUST_ACCOMPANY_AREA_CODE
  Phone numbers and area code must be defined together
- LDAP_AUTHENTICATION_IS_ACTIVE
  Command is not available while LDAP authentication is active

Deleting a User

Deletes a user.

```
user_delete user=UserName
```

Parameters:

Name	Type	Description	Mandatory	Default
user	Object name	User to be deleted.	Y	

This command deletes a user.

Existing objects created by this user contain an empty reference to the creating user after it has been deleted.

Two predefined users are set system-wide: Admin and Technician. Predefined users cannot be deleted or renamed.

Example:

```
user_delete user=user1
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- LDAP_AUTHENTICATION_IS_ACTIVE
  Command is not available while LDAP authentication is active
- USER_NAME_DOES_NOT_EXIST
  User name does not exist
- USER_CANNOT_BE_DELETED
  User cannot be deleted
- USER_IS_REFERRED_TO_BY_DEST
  User is referred to by an event destination and therefore cannot be deleted

Adding Users to a User Groups

Adds a user to a user group.

```
user_group_add_user user_group=UserGroup user=UserName
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	User group into which the user is to be added.	Y	
user	Object name	User to be added to the user group.	Y	

This command adds a user to a user group.

A user group can contain up to eight users.

A user may belong to only one user group.

Only users defined as Application Administrators can be assigned to a group.

This command fails when the user already belongs to the user group.

Example:

```
user_group_add_user user_group=ug1 user=user1
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- USER_GROUP_NAME_DOES_NOT_EXIST
  User group name does not exist
- USER_NAME_DOES_NOT_EXIST
  User name does not exist
- USER_ALREADY_INCLUDED_IN_ANOTHER_GROUP
  User is included in another user group
- USER_GROUP_ALREADY_INCLUDES_USER
  User group already includes user
- ONLY_APPLICATION_ADMIN_USERS_CAN_BE_GROUPED
  User groups can only contain application administrators
- USER_GROUP_HAS_MAXIMUM_NUMBER_OF_USERS
  User group already has the maximum number of users
- LDAP_AUTHENTICATION_IS_ACTIVE
  Command is not available while LDAP authentication is active

Creating User Groups

Creates a user group.

```
user_group_create user_group=UserGroup
[ access_all=<yes|no> ]   [ ldap_role=LdapRole ]
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	Name of the user group to be created.	Y	

Name	Type	Description	Mandatory	Default
access_all	Boolean	Allows application administrators the ability to perform their specified operations on all volumes and not just a subset of the specific volumes	N	no
ldap_role	String	The value representing the user group in LDAP.	N	[none]

This command creates a new user group.

A user group is a group of application administrators who share the same set of snapshot creation limitations. After user groups are created, the limitations of all the users in a user group can be updated using a single command. These limitations are enforced by associating the user groups with hosts or clusters.

Storage administrators create user groups and control the various application administrator's permissions. Hosts and clusters can be associated with only a single user group. When a user belongs to a user group that is associated with a host, it is possible to manage snapshots of the volumes mapped to that host.

User groups have the following limitations:

- Only users who are defined as application administrators can be assigned to a group.
- A user can belong to only a single user group.
- A user group can contain up to eight users.

User and host associations have the following properties:

- User groups can be associated with both hosts and clusters. This allows limiting application administrator access to specific volumes.
- A host that is part of a cluster cannot also be associated with a user group.
- When a host is added to a cluster the host's associations are broken. Limitations on the management of volumes mapped to the host is controlled by the cluster's association.
- When a host is removed from a cluster, the host's associations become the cluster 's associations, this allows continued mapping of operations so that all scripts continue to work.

Example:

```
user_group_create user_group=ug1 ldap_role="App Admin 1" access_all=yes
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	

User Category	Permission	Condition
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- USER_GROUP_NAME_ALREADY_EXISTS
  User group name already exists
- MAX_USER_GROUPS_REACHED
  Maximum number of user groups already defined
- LDAP_ROLE_ALREADY_USED
  LDAP role is already in use in LDAP configuration or in a user group

Deleting a User Group

Deletes a user group.

```
user_group_delete user_group=UserGroup
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	User group to be deleted.	Y	

This command deletes a user group.

A user group can be deleted, even when it is associated with hosts or clusters. It can be deleted while in LDAP Authentication mode.

A user group can be deleted, even when it contains users. Deleting the user group does not delete the users contained in this group.

Example:

```
user_group_delete user_group=ug1
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_DELETE_LDAP_USER_GROUP

  One or more LDAP users might be associated to user group. Are you sure you want to delete this user group?
- ARE_YOU_SURE_YOU_WANT_TO_DELETE_USER_GROUP

  Are you sure you want to delete user group?
- ARE_YOU_SURE_YOU_WANT_TO_DELETE_POPULATED_USER_GROUP

  One or more internal users are associated to user group. Are you sure you want to delete this user group?

Completion Codes:

- USER_GROUP_NAME_DOES_NOT_EXIST

  User group name does not exist

Listing User Groups

Lists all user groups or a specific one.

```
user_group_list [ user_group=UserGroup ]
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	The user group to be listed.	N	All user groups.

This command lists all user groups or a specific one. All the users included in the user group are listed.

Id	Name	Description	Default Position
name	Name		1
access_all	Access All		2
ldap_role	LDAP Role		3
users	Users		4
creator	Creator		

Example:

```
user_group_list
```

Output:

```
Name        Access All   LDAP Role   Users
myug1       yes          Group1
myOtherUG   yes          OtherGroup
ug1         yes          App Admin 1
ug2         yes          App Admin 2
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Removing a User from a User Group

Removes a user from a user group.

```
user_group_remove_user user_group=UserGroup user=UserName
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	User group.	Y	
user	Object name	User to be removed.	Y	

This command removes a user from a user group.

This command fails when the user does not belong to the user group.

Deleting the user group's mapping is done by removing the role association. The user group itself is not deleted.

Example:

```
user_group_remove_user user_group=ug1 user=user1
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_REMOVE_USER
  Are you sure you want to remove user from user group?

Completion Codes:

- USER_GROUP_NAME_DOES_NOT_EXIST
  User group name does not exist
- USER_NAME_DOES_NOT_EXIST
  User name does not exist
- USER_GROUP_DOES_NOT_INCLUDE_USER
  User group does not include user
- LDAP_AUTHENTICATION_IS_ACTIVE
  Command is not available while LDAP authentication is active

Renaming User Groups

Renames a user group.

```
user_group_rename user_group=UserGroup new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	User group to be renamed.	Y	
new_name	Object name	New name of the user group.	Y	

This command renames a user group.

Example:

```
user_group_rename user_group=ug1 new_name=ug2
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- USER_GROUP_NAME_DOES_NOT_EXIST
  User group name does not exist
- USER_GROUP_NAME_ALREADY_EXISTS
  User group name already exists

Updating a User Group

Updates a user group.

```
user_group_update  user_group=UserGroup [ ldap_role=LdapRole ]
  [ access_all=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
user_group	Object name	The name of the user group to be updated.	Y	
ldap_role	String	The value representing the user group in LDAP.	N	Keep current LDAP role.
access_all	Boolean	Assigns application administration access level for all volumes.	N	no

Updates a user group.

Example:

```
user_group_update user_group=ug1 ldap_role="App Admin 1" access_all=yes
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- USER_GROUP_NAME_DOES_NOT_EXIST
  User group name does not exist
- LDAP_ROLE_ALREADY_USED
  LDAP role is already in use in LDAP configuration or in a user group

Listing Users

Lists all users or a specific user.

```
user_list [ user=UserName | show_users=<all|active> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
user	Object name	The user to be listed.	N	All users.
show_users	Enumeration	Indicates whether all internal users will be listed, or only internal users that are active.	N	active

This command lists all users or a specific user. The following information is listed:

- User name: Lower case
- Category
- Email address
- Phone number
- Phone area code
- Containing user group

Passwords are not shown in the list.

Id	Name	Description	Default Position
name	Name		1
category	Category		2
group	Group		3
active	Active		4
email_address	Email Address		5
area_code	Area Code		6
number	Phone Number		7
access_all	Access All		8
creator	Creator		

Example:

```
user_list
```

Output:

```
Name             Category         Group
xiv_development  xiv_development          yes
xiv_maintenance  xiv_maintenance          yes
admin            storageadmin             yes
technician       technician               yes
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	

User Category	Permission	Condition
Read-only users	Allowed	
Technicians	Disallowed	

Renaming Users

Renames a user.

```
user_rename user=UserName new_name=NewName
```

Parameters:

Name	Type	Description	Mandatory	Default
user	Object name	User to be renamed. User names are lower case.	Y	
new_name	Object name	New name of the user.	Y	

This command renames a user.

Example:

```
user_rename user=admin new_name=storage_admin
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- USER_NAME_DOES_NOT_EXIST
  User name does not exist
- USER_NAME_ALREADY_EXISTS
  User name already exists
- USER_CANNOT_BE_RENAMED
  User cannot be renamed
- LDAP_AUTHENTICATION_IS_ACTIVE
  Command is not available while LDAP authentication is active

Updating a User Definition

Updates a user.

```
user_update user=UserName [ password=Password password_verify=Password ]
 [ email_address=EmailAddress ] [ area_code=AreaCode ]
 [ number=PhoneNumber ]
```

Parameters:

Name	Type	Description	Mandatory	Default
user	Object name	The name of the user to be updated. User names are lower case.	Y	
password		New password. Users can only change their own passwords. The password consists of 6-12 characters, comprised of a-z, A-Z and 0-9, and is case sensitive.	N	Retains the current password.
password_verify		Verification of the password: Must be equal to `the password`.	N	Retains the current password.
email_address		Email address of this user (for event notification).	N	Leaves the current email address.
number		Cellular phone number of the user (for event notification via SMS) excluding the area code.	N	Leaves the current number.
area_code		Area code of the cellular phone number of the user.	N	Leaves the current area code.

This command updates the configuration of a user.

A user with the predefined password admin can change the passwords of other users. The Category (Role) of a user cannot be changed. The user Technician does not require a phone number and an email address. Limitations on password changes are as follows:

- Any user can change his/her own password (excluding read-only users).
- The predefined admin user can change all passwords, excluding the user Technician.
- Passwords are case sensitive.

Example:

```
user_update user=admin password=Passw0rd password_verify=Passw0rd
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Conditionally Allowed	A user other than admin may only change its won configuration.
Application administrator	Conditionally Allowed	A user of this category may only change its own configuration.
Read-only users	Conditionally Allowed	A user other than admin may only change its won configuration.
Technicians	Disallowed	

Completion Codes:

- USER_NAME_DOES_NOT_EXIST
  User name does not exist
- PASSWORDS_DO_NOT_MATCH
  Passwords must be identical
- USER_PHONE_NUMBER_MUST_ACCOMPANY_AREA_CODE
  Phone numbers and area code must be defined together
- ADMIN_CAN_NOT_CHANGE_TECHNICIAN_USER
  Administrators cannot change the details of the technician user
- SMS_DESTINATION_REFERS_TO_USER
  An SMS destination refers to the user and therefore it must have a phone number and an area code
- EMAIL_DESTINATION_REFERS_TO_USER
  An email destination refers to the user and therefore it must have an email address
- USER_NOT_ALLOWED_TO_CHANGE_OTHER_USERS
  This user is not allowed to change the details of other users
- USER_NOT_ALLOWED_TO_HAVE_PHONE_NUMBER
  User not allowed to have phone number
- USER_NOT_ALLOWED_TO_HAVE_EMAIL_ADDRESS
  User not allowed to have email address
- USER_NOT_ALLOWED_TO_CHANGE_PASSWORDS
  This user cannot change passwords of other users
- USER_CANNOT_BE_UPDATED_WHILE_LDAP_AUTHENTICATION_IS_ACTIVE
  User cannot be updated while LDAP authentication is active

Chapter 17. Fibre Channel and iSCSI Configuration and Status

The following sections describe the XIV Command Line Interface (XCLI) for fibre channel port configuration.

The sections are listed as follows:

- fc_connectivity_list(Discovers FC hosts and targets on the FC network.)
- fc_port_config(Configures FC ports.)
- fc_port_list(Lists the status and configuration of the system's FC ports.)
- fc_port_reset(Resets an FC port.)
- host_connectivity_list(Lists FC and iSCSI-level connectivity to a pre-defined host.)

Discovering FC Hosts

Discovers FC hosts and targets on the FC network.

```
fc_connectivity_list  [ role=<dual|initiator|target> ] [ wwpn=WWPN ]
                        [ module=ComponentId | fc_port=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
role	Enumeration	Specifies whether the discovery is for initiators or targets.	N	list all - targets and/or initiators.
wwpn		Limits the output only to this specific address.	N	All addresses
module		Limits the output to only enable connectivity to this module.	N	All modules
fc_port		Limits the output to this specific XIV port.	N	All ports

This command lists FC hosts on the network.

type=initiator detects initiators on the network. When type=initiator, the non-logged-in option can only be used to debug hosts that are on the network, but that did not log in.

type=target detects targets. When type=target, the non-logged-in option can only be used to debug targets that rejected the XIV login. This command creates an error for a target-only port to list targets, or for an initiator-only port to list initiators. Each output line contains the following information:

- Component ID (of the module)
- XIV port number (within the module)
- WWPN
- Port ID (can be correlated with the switch database)
- Role: Initiator, Target, Dual

- Initiator/target (is the same for all lines of the same command)
- Login status (Yes/No)

Id	Name	Description	Default Position
component_id	Component ID		1
wwpn	WWPN		2
port_id	Port ID		3
role	Role		4

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Changing FC Port Configuration

Configures FC ports.

```
fc_port_config  fc_port=ComponentId  [ enabled=<yes|no> ]
                        [ role=<target|initiator> ]
                        [ rate=<2|4|8|auto> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
fc_port		Port identifier.	Y	
enabled	Boolean	User enabling/disabling of the port.	N	yes
role	Enumeration	Port role: target, initiator or both.	N	Leaves the role unchanged.
rate	Enumeration	Line rate or auto for auto-negotiated rate.	N	Leaves the rate unchanged.

This command changes the configuration of a port.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- COMPONENT_IS_NOT_AN_FC_PORT
  Component must specify an FC port
- FC_PORT_DOES_NOT_EXIST
  Specified FC port does not exist

Listing FC Ports

Lists the status and configuration of the system's FC ports.

```
fc_port_list [ module=ComponentId  | fcport=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All ports in all modules.
fcport		Lists only a specific port.	N	All ports in all modules.

This command lists all or some FC ports on the system. When no parameters are specified, all ports are listed. If a module is specified without a port, all ports on that module are listed. If a port is specified, a single port is listed.

The following information is provided for each port:

- Component ID of the module Port number (internal to module) 1-N
- WWPN
- Port ID
- Role (Initiator, Target, Dual)
- User-enabled (Yes/No)
- Maximum support rate: 1 GB, 2 GB, 4 GB, 10 GB; constant - function of the HBA's capability
- Configured rate: 1 GB, 2 GB, 4 GB, 10 GB, auto-negotiation; cannot be greater than the maximum supported rate
- Current active rate: 1 GB, 2 GB, 4 GB, 10 GB; equal to the configured rate, unless the configured rate is auto-negotiation
- Port state: Online, Offline, Loopback, Link Down (physical connection is on, but no logical connection)
- Error counts
- Link type: Fabric Direct Attach, Private Loop, Point-to-Point, Public Loop, Unknown

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
port_num	Port Number		
wwpn	WWPN		4
port_id	Port ID		5
role	Role		6
user_enabled	User Enabled		7

Id	Name	Description	Default Position
max_supported_rate	Maximum Supported Rate (GBaud)		
configured_rate	Configured Rate (GBaud)		
current_rate	Current Rate (GBaud)		8
port_state	Port State		9
link_type	Link Type		10
error_count	Error Count		11
active_firmware	Active Firmware		12
credit	Credit		
hba_vendor	HBA Vendor		
is_enabled	Enabled		
module	Module		
serial	Serial		
original_serial	Original Serial		
model	Model		
original_model	Original Model		
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Resetting FC Ports

Resets an FC port.

```
fc_port_reset  fc_port=ComponentId
```

```
fc_port_reset  fc_port=ComponentId  [ firmware_reset=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
fc_port		FC port identifier.	Y	
firmware_reset	Boolean	Performs a firmware reset (resets all ports on the HBA).	N	no

This command resets an FC port.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- COMPONENT_IS_NOT_AN_FC_PORT
  Component must specify an FC port
- FC_PORT_DOES_NOT_EXIST
  Specified FC port does not exist

Listing Connectivity to Hosts

Lists FC and iSCSI-level connectivity to a pre-defined host.

```
host_connectivity_list [ host=HostName | fc_host_port=WWPN ]
[ module=ComponentId | fcport=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Limits viewing to the ports of a specific host.	N	All hosts.
fc_host_port		Limits viewing to this specific port.	N	All ports
module		Limits output to only enable connectivity to this module.	N	All modules
fcport		Limits output to this specific XIV port.	N	All ports

This command shows the connectivity status between a XIV port and a defined host. The output can be limited to a specific port, module or XIV port. Hosts can attach to the FC and iSCSI either directly (point-to-point), via an FC fabric or via a Gigabit Ethernet switch. Connectivity refers to both physical connectivity and SCSI log in. Each output line contains the following information:

- Host (name)
- Host port (WWPN)
- XIV module (rack_id:module_id)
- XIV port number (within the module)
- Boolean-connected Y/N (login)

Output:

```
Host                    Host Port          Module       Local FC port   Local iSCSI port   Type
----------------------- ------------------ ------------ --------------- ------------------ ------
tlib_host_host076_fc0   100000062B151A98   1:Module:5   1:FC_Port:5:1                      FC
```

Id	Name	Description	Default Position
host	Host		1
host_port	Host Port		2
module	Module		3
local_fc_port	Local FC port		4
local_iscsi_port	Local iSCSI port		5
type	Type		6

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Chapter 18. Hardware Maintenance

The following sections describe the XIV Command Line Interface (XCLI) for maintaining hardware components.

The sections are listed as follows:

- ats_list(List information about ATS components)
- cf_list(Lists the CFs in the XIV system.)
- component_list(Lists system components and their status.)
- component_phaseout(Phases out a component.)
- component_phasein(Phases in a hardware component.)
- component_test(Tests a hardware component.)
- component_equip(Marks a hardware component as one that was installed.)
- component_service_required_list(Lists system components and their status.)
- component_service_force_ok(Forces the service required of a component to be OK.)
- component_service_force(Forces the component to be marked as having a certain failure.)
- dimm_list(Lists the DIMMs in the XIV system.)
- cpu_list(Lists the CPUs in the XIV system.)
- pci_adapter_list(Lists the PCI adapters in the XIV system.)
- mm_list(Lists the MaintenanceModules in the XIV system.)
- nic_list(Lists the NICs in the XIV system.)
- module_temperature_list(Lists the modules' internal temperatures in the XIV system.)
- monitor_redist(Monitors the status of a rebuild or redistribute process.)
- disk_list(Lists special disk statuses.)
- module_list(Lists the configuration of all or of the specified modules.)
- ethernet_interface_reset(Reset ethernet interface)
- serial_console_check(Check serial connections between modules.)
- serial_consoles_list(List serial consoles)
- fs_check(Check file systems health state across modules)
- fs_list(List file systems)
- visdor_list(List visdors)
- ups_list(Lists the status of UPS components.)
- service_list(Lists all the service specific statuses.)
- psu_list(Lists the PSUs in the XIV system.)
- traces_stop(Stops system traces.)
- traces_resume(Resumes system traces.)
- traces_status_list(Lists status of system traces.)
- technician_work_in_progress(Notifies the system of a technician at work.)
- ups_cancel_calibration(Cancel UPS calibration)
- ups_check_monitor_cables(Check UPS monitor cables)
- ups_set_battery_date(Set the UPS battery date)
- ups_start_calibration(Start UPS calibration)
- ups_start_self_test(Start UPS self test)

- ups_turn_off(Turn UPS off)
- fan_list(Lists fans in the system.)
- ssd_list(Lists SSDs used as flash cache in the system.)

Listing ATS Configuration

List information about ATS components

```
ats_list  [ ats=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
ats		Lists the configuration of the specified ATS	N	All ATSs

List information about ATS components.

Example:

```
ats_list ats
```

Output:

```
Component ID   Status   Currently Functioning   Model     L1 Input OK   L2 Input OK
-------------- -------- ----------------------- --------- ------------- -------------
1:ATS:1        OK       yes                     ATS-60A   no            yes


Cont.:


Outlet 1 State   Outlet 2 State   Outlet 3 State   Firmware Version
---------------- ---------------- ---------------- ------------------
J2               J2               J2               4


Cont.:

3-Phase   Dual Active
--------- -------------
no        no
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
model	Model		4
input_l1	L1 Input OK		5
input_l2	L2 Input OK		6
out1_state	Outlet 1 State		7
out2_state	Outlet 2 State		8
out3_state	Outlet 3 State		9

Id	Name	Description	Default Position
firmware_version	Firmware Version		10
three_phase_type	3-Phase		11
dual_active_type	Dual Active		12
coil_l1	Coil A On		
coil_l2	Coil B On		
pickup_l1	A Pick-Up		
pickup_l2	B Pick-Up		
default_cal	Default Calibration		
serial_control	Serial Control		
logic_power	Logic Power		
output_30A_1	Output 30A #1		
output_30A_2	Output 30A #2		
output_30A_3	Output 30A #3		
output_10A	Output 10A		
ats_reply_errors	ATS Reply Errors		
ats_connect_errors	ATS Connect Errors		
requires_service	Requires Service		
service_reason	Service Reason		
us_type	US Type		
l1_source	J1 Source		
l2_source	J2 Source		
interlock_failed	Interlock Failed		
p1_current_fault	P1 Current Fault		
p2_current_fault	P2 Current Fault		
p3_current_fault	P3 Current Fault		
coil_c	Coil C On		
coil_d	Coil D On		
pickup_c	C Pick-Up		
pickup_d	D Pick-Up		
oc_j1_a	Over-Current J1 Phase A		
oc_j1_b	Over-Current J1 Phase B		
oc_j1_c	Over-Current J1 Phase C		
oc_j2_a	Over-Current J2 Phase A		
oc_j2_b	Over-Current J2 Phase B		
oc_j2_c	Over-Current J2 Phase C		
no_oc_switching	No OC Switching		
rms_current_p1	RMS Current Outlet P1		
rms_current_p2	RMS Current Outlet P2		
rms_current_p3	RMS Current Outlet P3		
firmware_l1_version	Firmware J1 Version		
firmware_l2_version	Firmware J2 Version		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing CFs in the System

Lists the CFs in the XIV system.

```
cf_list [ module=ComponentId  | cf=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All CFs in all modules.
cf		Lists only a specific cf.	N	A specific CF.

This command lists the CFs in the XIV system.

Example:

```
cf_list -f all
```

Output:

```
Component ID   Status   Currently Functioning   Hardware Status   Serial              Part #
-------------- -------- ----------------------- ----------------- ------------------- --------------------
1:CF:10:1      OK       yes                     OK                0_521134A5          TRANSCEND_20070418
1:CF:11:1      OK       yes                     OK                0_5211349C          TRANSCEND_20070418
1:CF:12:1      OK       yes                     OK                0_521133F1          TRANSCEND_20070418
1:CF:13:1      OK       yes                     OK                20080604_00003C44   TRANSCEND_20070418
1:CF:14:1      OK       yes                     OK                0_52113389          TRANSCEND_20070418
1:CF:15:1      OK       yes                     OK                0_521134AE          TRANSCEND_20070418
1:CF:1:1       OK       yes                     OK                0_5211347A          TRANSCEND_20070418
1:CF:2:1       OK       yes                     OK                0_521133C0          TRANSCEND_20070418
1:CF:3:1       OK       yes                     OK                0_521133B0          TRANSCEND_20070418
1:CF:4:1       OK       yes                     OK                0_52113568          TRANSCEND_20070418
1:CF:5:1       OK       yes                     OK                0_5211357D          TRANSCEND_20070418
1:CF:6:1       OK       yes                     OK                0_5211330F          TRANSCEND_20070418
1:CF:7:1       OK       yes                     OK                0_521133D6          TRANSCEND_20070418
1:CF:8:1       OK       yes                     OK                0_52113C99          TRANSCEND_20070418
1:CF:9:1       OK       yes                     OK                0_5211344C          TRANSCEND_20070418
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3

Id	Name	Description	Default Position
hardware_status	Hardware Status		4
device_name	Device Name		5
serial	Serial		
original_serial	Original Serial		
part_number	Part #		
original_part_number	Original Part Number		
size	Size		
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing System Components

Lists system components and their status.

```
component_list [ component=ComponentId ] [ filter=<ALL|FAILED|NOTOK> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
component		Lists only this component.	N	All components.
filter	Enumeration	Filters the list to show only failed or only non-OK components.	N	ALL

Lists system components. The list can be filtered to show only a specific component, all failed components or all components in a non-OK state.

For status and configuration of specific component types, refer to the List commands for specific components, such as: module_list, disk_list, ups_list, switch_list. The output is a list of components, with the following information for each component:

- Component identification
- Component general status
- Indication about whether the component is currently functioning

Id	Name	Description	Default Position
component_id	Component ID		1

Id	Name	Description	Default Position
status	Status		2
currently_functioning	Currently Functioning		3
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Phasing Out a Component

Phases out a component.

```
component_phaseout component=ComponentId [ markasfailed=<yes|no> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
component		Component identification.	Y	
markasfailed	Boolean	Marks the component as failed after phase-out.	N	yes

This command instructs the system to stop using the component, where the component can be either a disk, module, switch or UPS.

For disks, the system starts a process for copying the disk's data, so that even without this disk, the system is redundant. The state of the disk after the command is *Phasing-out*.

The same process applies for data modules. The system starts a process for copying all the data in the module, so that the system is redundant even without this module. A data module phase-out causes a phase-out for all the disks in that module.

For UPSs and switches, the system configures itself to work without the component. There is no phase-out for power supplies, SFPs or batteries.

Phasing out a module or a disk, if it results in the system becoming non-redundant, is not permitted. Components must be in either OK or a Phase In status.

Once the phase-out process is completed, the component's state is either Fail or Ready, depending on the argument *markasfailed*. If true, the phased-out component is marked as a failed component (in order to replace the component). If false, the phased-out component is in the Ready state.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- PHASEOUT_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE
  This component type cannot be phased-out
- PHASEOUT_WILL_MAKE_SYSTEM_NON_REDUNDANT
  Cannot phase out the component because it will cause data to be unprotected
- PHASEOUT_NOT_ALLOWED_IN_CURRENT_STATUS
  Component cannot be phased-out in its current status
- COMPONENT_DOES_NOT_EXIST
  Component does not exist
- COMPONENT_TYPE_CANNOT_BE_PHASED_OUT_AS_FAILED
  Components of this type cannot be phased-out and marked as failed
- MODULE_CANNOT_BE_PHASED_OUT_DUE_TO_MANAGEMENT_REQUIREMENT
  Module cannot be phased out due to management requirement
  Troubleshooting: Contact support
- CAN_NOT_PHASE_OUT_DISK_WITH_MARKASFAILED_NO
  Disks cannot be phased-out with markasfailed=no
- COMPONENT_TYPE_MUST_BE_PHASED_OUT_AS_FAILED
  Components of this type must be phased-out as failed
- USE_SERVICE_PHASEOUT_COMMAND
  Command component_phaseout does not support services. Please use service_phaseout.
- CONTAINING_COMPONENT_IN_WRONG_STATUS
  Operation not allowed in current status of containing component.
- SUBCOMPONENT_IN_WRONG_STATUS
  Operation not allowed in current status of a subcomponent.
- CONTROLLING_SERVICES_NOT_ALLOWED_FOR_USER_CATEGORY
  Controlling services not allowed for user category
- NOT_ALL_PSUS_OK
  There is one or more PSUs disconnected or failed, this may cause the requested action to cause module failures
  Troubleshooting: Check that all PSUs are properly wired, and ensure that none is failed
- SYSTEM_UPGRADE_CANCELED_BECAUSE_OF_NODE_FAILURE_DURING_UPGRADE
  Last upgrade was canceled because a node failed while the upgrade process was running
- FAILED_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE
  This component type cannot be failed
- HOT_UPGRADE_IS_NOT_ONGOING
  Hot upgrade is not currently ongoing
- OPERATION_NOT_ALLOWED_ON_NON_REDUNDANT_SYSTEM

Service cannot be restarted while system is not redundant

Troubleshooting: Please wait until rebuild process is over

- SYSTEM_IS_REDISTRIBUTING

  Operation is not allowed during rebuild or phase-in
- OPERATION_IS_NOT_ALLOWED_IN_CURRENT_SYSTEM_STATE

  The specified operation is not allowed in the current system state

Phasing In a Component

Phases in a hardware component.

```
component_phasein component=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
component		Component to be phased in.	Y	

This command instructs the system to phase in a component. Components are used by the system immediately. For disk and data modules, a process for copying data to the components (redistribution) begins. Components must be in Ready or Phasing Out states. There is no phase-in for power supplies, SFPs or batteries.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Warnings:

- WARNING_COMPONENT_IS_PHASING_OUT

  Component is being phased out. Are you sure you want to phase it in?

Completion Codes:

- PHASEIN_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE

  This component type cannot be phased-in
- PHASEIN_NOT_ALLOWED_IN_CURRENT_STATUS

  Component cannot be phased-in in its current status
- COMPONENT_DOES_NOT_EXIST

  Component does not exist
- USE_SERVICE_PHASEIN_COMMAND

  Command component_phasein does not support services. Please use service_phasein.
- CONTAINING_COMPONENT_IN_WRONG_STATUS

  Operation not allowed in current status of containing component.
- SUBCOMPONENT_IN_WRONG_STATUS

Operation not allowed in current status of a subcomponent.
- CONTROLLING_SERVICES_NOT_ALLOWED_FOR_USER_CATEGORY
  Controlling services not allowed for user category
- SERVICE_CANNOT_BE_PHASED_IN
  Service cannot be phased in because its interface services cannot be activated.
  Troubleshooting: Check system requirements for activating interface services.
- SYSTEM_UPGRADE_CANCELED_BECAUSE_OF_NODE_FAILURE_DURING_UPGRADE
  Last upgrade was canceled because a node failed while the upgrade process was running
- FAILED_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE
  This component type cannot be failed
- HOT_UPGRADE_IS_NOT_ONGOING
  Hot upgrade is not currently ongoing

Testing a Component

Tests a hardware component.

```
component_test component=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
component		Component ID.	Y	

This command instructs the XIV system to test the component. The command is used after a failed component is replaced. Components must be in a Failed status. Upon a successful test, the component changes to Ready status. Upon a failed test, the component remains in a Failed state.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_HARD_RESET_MODULE
  Are you sure you want to hard reset the module?

Completion Codes:

- COMPONENT_DOES_NOT_EXIST
  Component does not exist
- TEST_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE
  This component type cannot be tested
- DISK_IS_TOO_SMALL
  Disk capacity is smaller than the current system minimum.

Troubleshooting: Replace disk

- DISK_IS_TOO_BIG
  Disk capacity is bigger than the current system disk size. cannot be used.
  Troubleshooting: Replace disk
- DISK_IS_NOT_FUNCTIONING
  Disk is not functioning.
  Troubleshooting: Replace disk
- TEST_NOT_ALLOWED_IN_CURRENT_STATUS
  Component cannot be tested in its current status
- CONTAINING_COMPONENT_IN_WRONG_STATUS
  Operation not allowed in current status of containing component.
- UPS_NOT_ENOUGH_SPARES
  There are not enough spare UPS's in the rack to safely complete the command
  Troubleshooting: Contact support
- HARD_RESET_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE
  Hard reset is not supported for this component type
- TEST_NOT_ALLOWED_AFTER_UPGRADE_DOWNLOAD
  Component cannot be tested after the new software version has already been downloaded
- DISK_MODEL_INTERMIX_NOT_ALLOWED
  Disk model is different than the current system disk model. It cannot be used.
  Troubleshooting: Replace disk

Setting a Component as Equipped

Marks a hardware component as one that was installed.

```
component_equip component=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
component		Component to be equipped.	Y	

This command configures the system to start using the component, assuming that it was assembled. The component is tested by the system. After completing the test, the component is marked as either Ready or Failed.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_HARD_RESET_MODULE
  Are you sure you want to hard reset the module?

Completion Codes:

- EQUIP_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE
  This component type cannot be equipped
- EQUIP_NOT_ALLOWED_IN_CURRENT_STATUS
  Component already equipped
- COMPONENT_DOES_NOT_EXIST
  Component does not exist
- DISK_IS_NOT_FUNCTIONING
  Disk is not functioning.
  Troubleshooting: Replace disk
- TEST_NOT_ALLOWED_AFTER_UPGRADE_DOWNLOAD
  Component cannot be tested after the new software version has already been downloaded
- FAILED_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE
  This component type cannot be failed
- DISK_IS_TOO_BIG
  Disk capacity is bigger than the current system disk size. cannot be used.
  Troubleshooting: Replace disk
- HARD_RESET_NOT_SUPPORTED_FOR_THIS_COMPONENT_TYPE
  Hard reset is not supported for this component type
- DISK_MODEL_INTERMIX_NOT_ALLOWED
  Disk model is different than the current system disk model. It cannot be used.
  Troubleshooting: Replace disk
- **Target event not found. href = ILLEGAL_IB_PORT**
- IB_PORT_NOT_PRESENT
  Specified port is not defined in the system.
- IB_HCA_PORT_ALREADY_CONNECTED
  Specified IB HCA port is already defined in the system.
- SYSTEM_DOES_NOT_HAVE_FREE_MEM
  The system does not have enough free memory to execute the command.
- IB_PORT_EXISTS
  Specified IB port is already defined in the system.
- IB_SWITCH_NOT_PRESENT
  Specified switch is not defined in the system or the switch value is not valid.

Listing System Components Requiring Service

Lists system components and their status.

```
component_service_required_list [ component=ComponentId ] [ filter=<ALL|FAILED|NOTOK> ]
```

Parameters:

Name	Type	Description	Mandatory	Default
component		Lists only this component.	N	All components.
filter	Enumeration	Filters the list to show only failed or only non-OK components.	N	ALL

Lists system components. The list can be filtered to show only a specific component, all failed components or all components in a non-OK state.

For status and configuration of specific component types, refer to the List commands for specific components, such as: module_list, disk_list, ups_list, switch_list. The output is a list of components, with the following information for each component:

- Component identification
- Component general status
- Indication about whether the component is currently functioning

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
requires_service	Requires Service		4
service_reason	Service Reason		5

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Forces the Service Required of a Component to OK

Forces the service required of a component to be OK.

```
component_service_force_ok component=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
component		Component to be have it's service required field cleared.	Y	

Instructs the system to mark the service required field of a component to be OK - no service required.

Currently this makes sense only for modules and disks.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- COMPONENT_DOES_NOT_EXIST
  Component does not exist

Mark Component as Failed

Forces the component to be marked as having a certain failure.

```
component_service_force component=ComponentId category=CategoryMnemonic
```

Parameters:

Name	Type	Description	Mandatory	Default
component		Component to be marked as having a certain type of failure	Y	
category	Enumeration	Failure to mark component with	Y	

Instructs the system to mark the component as having a certain failure. As a result also the required service field will be modified.

Currently this makes sense only for modules and disks.

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- COMPONENT_DOES_NOT_EXIST
  Component does not exist

Listing DIMMs in the System

Lists the DIMMs in the XIV system.

```
dimm_list [ module=ComponentId  | dimm=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All DIMMs in all modules.
dimm		Lists only a specific DIMM.	N	A specific DIMM.

This command lists the DIMMs in the XIV system.

Example:

```
dimm_list -f all
```

Output:

```
Component ID   Status   Currently Functioning   Hardware Status   DIMM Id   CPU
-------------- -------- ----------------------- ----------------- --------- -----
1:DIMM:10:1    OK       yes                     OK                2         0
1:DIMM:10:2    OK       yes                     OK                4         0
1:DIMM:10:3    OK       yes                     OK                6         0
1:DIMM:11:1    OK       yes                     OK                2         0
1:DIMM:11:2    OK       yes                     OK                4         0
1:DIMM:11:3    OK       yes                     OK                6         0


Cont.:


Channel   Slot   Size(Mb)   Speed(MHz)   Manufacturer   Serial     Original Serial
--------- ------ ---------- ------------ -------------- ---------- -----------------
0         0      8192       1333         Samsung        50F84144   50F84144
1         0      8192       1333         Samsung        59F84144   59F84144
2         0      8192       1333         Samsung        FAF74144   FAF74144
0         0      8192       1333         Samsung        4AF84144   4AF84144
1         0      8192       1333         Samsung        A1F74144   A1F74144
2         0      8192       1333         Samsung        90F74144   90F74144

Cont.:

Part #             Original Part Number   Requires Service
------------------ ---------------------- ------------------
M393B1K70CH0-YH9   M393B1K70CH0-YH9
M393B1K70CH0-YH9   M393B1K70CH0-YH9
M393B1K70CH0-YH9   M393B1K70CH0-YH9
M393B1K70CH0-YH9   M393B1K70CH0-YH9
M393B1K70CH0-YH9   M393B1K70CH0-YH9
M393B1K70CH0-YH9   M393B1K70CH0-YH9
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3

Id	Name	Description	Default Position
hardware_status	Hardware Status		4
dimm_id	DIMM Id		
cpu	CPU		
channel	Channel		
slot	Slot		
size	Size(Mb)		
speed	Speed(MHz)		
manufacturer	Manufacturer		
serial	Serial		
original_serial	Original Serial		
part_number	Part #		
original_part_number	Original Part Number		
requires_service	Requires Service		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing CPUs in the System

Lists the CPUs in the XIV system.

```
cpu_list [ module=ComponentId  | cpu=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All CPUs in all modules.
cpu		Lists only a specific CPU.	N	A specific CPU.

This command lists the CPUs in the XIV system.

Example:

```
cpu_list
```

Output:

```
Component ID   Status   Currently Functioning   Hardware Status   CPU Number   Family
-------------- -------- ----------------------- ----------------- ------------ --------
1:CPU:10:1     OK       yes                     OK                1            Xeon
1:CPU:11:1     OK       yes                     OK                1            Xeon
1:CPU:12:1     OK       yes                     OK                1            Xeon
1:CPU:13:1     OK       yes                     OK                1            Xeon
1:CPU:1:1      OK       yes                     OK                1            Xeon
1:CPU:2:1      OK       yes                     OK                1            Xeon
1:CPU:3:1      OK       yes                     OK                1            Xeon
1:CPU:4:1      OK       yes                     OK                1            Xeon
1:CPU:5:1      OK       yes                     OK                1            Xeon
1:CPU:6:1      OK       yes                     OK                1            Xeon
1:CPU:7:1      OK       yes                     OK                1            Xeon
1:CPU:8:1      OK       yes                     OK                1            Xeon
1:CPU:9:1      OK       yes                     OK                1            Xeon
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
hardware_status	Hardware Status		4
number	CPU Number		5
family_string	Family		6
type_string	Type		
id	ID		
type	Type Code		
family	Family Code		
model	Model Code		
stepping	Stepping		
max_speed	Max Speed(MHz)		
current_speed	Current Speed(MHz)		
status_string	Status		
manufacturer	Manufacturer		
version	Version		
model_string	Model		
signature	Signature		
core_count	Cores		
core_enabled	Enabled Cores		
thread_count	Threads		
serial	Serial		
original_serial	Original Serial		
part_number	Part #		
original_part_number	Original Part Number		
requires_service	Requires Service		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing PCI Adapters in the System

Lists the PCI adapters in the XIV system.

```
pci_adapter_list [ module=ComponentId  | adapter=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All PCI adapters in all modules.
adapter		Lists only a specific adapter.	N	A specific adapter.

This command lists the PCI adapters in the XIV system.

Example:

```
pci_adapter_list module=1:module:1
```

Output:

```
<component_id value="1:PCI_Adapter:2:1"/>
                <status value="OK"/>
                <currently_functioning value="yes"/>
                <requires_service value=""/>
                <service_reason value=""/>
                <hardware_status value="OK"/>
                <number value="1"/>
                <class value="0600"/>
                <device value="3406"/>
                <vendor value="8086"/>
                <slot value="00:00.0"/>
                <sub_device value="0000"/>
                <sub_vendor value="8086"/>
                <revision value="22"/>
                <prog_if value=""/>
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing MaintenanceModules in the System

Lists the MaintenanceModules in the XIV system.

```
mm_list [ mm=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
mm		Lists only a specific mm.	N	A specific mm.

This command lists the MaintenanceModules in the XIV system.

Example:

```
mm_list -f all
```

Output:

```
Component ID            Status   Currently Functioning   Enabled   Version
----------------------- -------- ----------------------- --------- ----------
1:MaintenanceModule:1   OK       yes                     yes       MGMT-4.5


Temperature   Serial       Original Serial   Part #       Original Part Number
------------- ------------ ----------------- ------------ --------------------
49            0123456789   0123456789        0123456789   0123456789


Total Memory   Free Memory   Free disk (/)   Free disk (/var)   Link#1
-------------- ------------- --------------- ------------------ --------
932172         602096        39031456        201873624          yes


Link#2   Requires Service
-------- ------------------
yes      None
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
enabled	Enabled		
version	Version		
temperature	Temperature		
serial	Serial		
original_serial	Original Serial		
part_number	Part #		
original_part_number	Original Part Number		

Id	Name	Description	Default Position
total_memory	Total Memory		
free_memory	Free Memory		
free_disk_root	Free disk (/)		
free_disk_var	Free disk (/var)		
link_1	Link#1		
link_2	Link#2		
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing NICs in the System

Lists the NICs in the XIV system.

```
nic_list [ module=ComponentId  | nic=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All nics in all modules.
nic		Lists only a specific NIC.	N	A specific NIC.

This command lists the NICs in the XIV system.

Example:

```
nic_list -f all
```

Output:

```
root@nextra-MN00058-module-5:/# xcli.py nic_list -f all
Component ID   Status   Currently Functioning   Hardware Status   Device Name
-------------- -------- ---------------------- ----------------- -------------
1:NIC:4:1      OK       yes                    OK                eth0
1:NIC:4:10     OK       yes                    OK                eth9
1:NIC:4:2      OK       yes                    OK                eth1
1:NIC:4:3      OK       yes                    OK                eth2
1:NIC:4:4      OK       yes                    OK                eth3
1:NIC:4:5      OK       yes                    OK                eth4
1:NIC:4:6      OK       yes                    OK                eth5
1:NIC:4:7      OK       yes                    OK                eth6
1:NIC:4:8      OK       yes                    OK                eth7
1:NIC:4:9      OK       yes                    OK                eth8
1:NIC:5:1      OK       yes                    OK                eth0
1:NIC:5:10     OK       yes                    OK                eth9
1:NIC:5:2      OK       yes                    OK                eth1


Cont.:


Serial             Part #                       Requires Service
------------------ ---------------------------- ------------------
00:15:17:65:39:8c  8086_1096_0901e612_1.0-0     no
00:1b:21:29:e2:e2  8086_10bc_0901e612_5.10-2    no
00:15:17:65:39:8c  8086_1096_0901e612_1.0-0     no
00:1b:21:29:e2:d0  8086_10bc_0901e612_5.10-2    no
00:1b:21:29:e2:d0  8086_10bc_0901e612_5.10-2    no
00:1b:21:29:e2:d2  8086_10bc_0901e612_5.10-2    no
00:1b:21:29:e2:d2  8086_10bc_0901e612_5.10-2    no
00:1b:21:29:e2:e0  8086_10bc_0901e612_5.10-2    no
00:1b:21:29:e2:e0  8086_10bc_0901e612_5.10-2    no
00:1b:21:29:e2:e2  8086_10bc_0901e612_5.10-2    no
00:15:17:65:39:20  8086_1096_0901e612_1.0-0     no
00:1b:21:29:e2:ee  8086_10bc_0901e612_5.10-2    no
00:15:17:65:39:20  8086_1096_0901e612_1.0-0     no
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
hardware_status	Hardware Status		4
device_name	Device Name		5
serial	Serial		
original_serial	Original Serial		
part_number	Part #		
original_part_number	Original Part Number		
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	

User Category	Permission	Condition
Technicians	Allowed	

Listing Modules Intternal Temperatures

Lists the modules' internal temperatures in the XIV system.

```
module_temperature_list [ module=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All temperatures in all modules.

This command lists the modules' internal temperatures in the XIV system.

Example:

```
module_temperature_list -f all
```

Output:

```
Module        Ambient   Midplane   EM Card   Fan Controller   CPU 1   DIMM 2   DIMM 4   DIMM 6   PCIe   InfiniBand HCA   Fibre Channel
------------- --------- ---------- --------- ---------------- ------- -------- -------- -------- ------ ---------------- -------------
1:Module:13   24        23         28        19               34      32       31       31       34     77               <N/A>
1:Module:14   24        23         28        30               38      32       32       31       35     82               <N/A>
1:Module:2    21        23         27        33               33      31       31       31       34     77               <N/A>
1:Module:5    22        23         27        31               33      31       31       31       35     83               44
1:Module:8    22        23         27        24               36      31       31       30       35     79               49
```

Id	Name	Description	Default Position
component_id	Module		1
ses_temperatures.0	Ambient		2
ses_temperatures.1	Midplane		3
ses_temperatures.2	EM Card		4
ses_temperatures.3	Fan Controller		5
ses_temperatures.4	CPU 1		6
ses_temperatures.5	CPU 2		
ses_temperatures.6	DIMM 1		
ses_temperatures.7	DIMM 2		7
ses_temperatures.8	DIMM 3		
ses_temperatures.9	DIMM 4		8
ses_temperatures.10	DIMM 5		
ses_temperatures.11	DIMM 6		9
ses_temperatures.12	DIMM 7		
ses_temperatures.13	DIMM 8		
ses_temperatures.14	DIMM 9		

Id	Name	Description	Default Position
ses_temperatures.15	DIMM 10		
ses_temperatures.16	DIMM 11		
ses_temperatures.17	DIMM 12		
ses_temperatures.18	PCIe		10
ib_hca_temperature	InfiniBand HCA		11
sas_controller_temperature	SAS Controller		
fc_adapter_temperature.0	Fibre Channel Port fc-0		12
fc_adapter_temperature.1	Fibre Channel Port fc-1		
fc_adapter_temperature.2	Fibre Channel Port fc-2		13
fc_adapter_temperature.3	Fibre Channel Port fc-3		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Monitoring Rebuild or Redistribution Processes

Monitors the status of a rebuild or redistribute process.

```
monitor_redist
```

This command outputs the current rebuild or redistribution process. This command may show that no such process exists.

If such a process exists, the following information is shown:

- Type (adding new capacity, replacing failed component, phase-out, rebuild after failure)
- Initial capacity to copy
- Time started
- Capacity remaining to copy
- Time elapsed
- Percent completed
- Estimated time to completion

Id	Name	Description	Default Position
type	Type		1
initial_capacity_to_copy	Initial Capacity to Copy (GB)		2
capacity_remaining_to_copy	Capacity Remaining to Copy (GB)		3
percent_done	%done		4

Id	Name	Description	Default Position
time_started	Time Started		5
estimated_time_to_finish	Estimated Time to Finish		6
time_elapsed	Time Elapsed		7

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing Disk Status

Lists special disk statuses.

```
disk_list [ module=ComponentId  | disk=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All disks in all modules.
disk		Disk for which special statuses are to be listed.	N	All disks.

This command lists the statuses of the disk, including the following:

- Component generic status
- Disk capacity
- Model
- Serial

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
capacity	Capacity (GB)		4
target_status	Target Status		5
current_hardware_info.vendor	Vendor		6
current_hardware_info.model	Model		7
size	Size		8
current_hardware_info.serial	Serial		9
current_hardware_info.firmware	Firmware		10

Id	Name	Description	Default Position
current_hardware_info.part_number	Fru		11
current_hardware_info.group	Group		12
temperature	Temperature		13
original_hardware_info.vendor	Original Vendor		
original_hardware_info.model	Original Model		
original_hardware_info.serial	Original Serial		
original_hardware_info.part_number	Original Fru		
original_hardware_info.firmware	Original Firmware		
original_hardware_info.group	Original group		
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing Module Configuration

Lists the configuration of all or of the specified modules.

```
module_list [ module=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Lists the configuration of the specified module.	N	All modules

This command lists the following information for each module:

- Generic component status
- Module type
- Number of disks
- Number of FC ports
- Number of Ethernet ports for iSCSI

Additional information is available through running `module_list -t all` :

- Serial
- Original Serial
- Part Number

- Original Part Number

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
target_status	Target Status		4
type	Type		5
disk_bay_count	Data Disks		6
fc_port_count	FC Ports		7
ethernet_port_count	iSCSI Ports		8
temperature	Temperature		9
serial	Serial		
original_serial	Original Serial		
part_number	Part Number		
original_part_number	Original Part Number		
bmc_version	BMC		
bios_version	BIOS		
fpga_version	FPGA		
ses_version	SES		
pdb_firmware	PDB		
pcm_1_firmware	PSU-1		
pcm_2_firmware	PSU-2		
fan_controller_firmware	Fan Controller		
battery_firmware	Battery Firmware		
sas_version	SAS		
infiniband_hca_version	InfiniBand HCA		
requires_service	Requires Service		
service_reason	Service Reason		
memory_gb	Mem		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Reset Ethernet Interface

Reset ethernet interface

```
ethernet_interface_reset  interface=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
interface		Network interface to reset	Y	

Reset ethernet interface

Example:

```
ethernet_interface_reset interface=1:NIC:4:6
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- COMPONENT_IS_NOT_A_NIC
  Component must specify a network interface
- OUT_OF_BOUNDS_ETHERNET_INTERFACE
  Ethernet interface is out of bounds, bigger than the last ethernet interace index
- ILLEGAL_ETHERNET_INTERFACE_ROLE
  Only internal ethernet interfaces can be reset
- ETHERNET_INTERFACE_IS_ACTIVE
  Ethernet interface is active and used in network routing, cannot reset it

Check Modules Serial Connections

Check serial connections between modules.

```
serial_console_check
```

Check serial connections between modules and send events reflecting the connectivity status.

Example:

```
xcli  -u -c XIV1 serial_console_check
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Disallowed	

Lists Serial Consoles Statuses

List serial consoles

```
serial_consoles_list  [ monitoring_module_id=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
monitoring_module_id		List the status only for the specified module	N	All modules

List serial consoles

Example:

```
xcli  -u -c XIV1 serial_consoles_list
```

Output:

```
Monitoring Module   Desired Module   Connected Module   Status           Is Module Alive   Is HW Node Alive
------------------- ---------------- ------------------ ---------------- ----------------- ------------------
1:Module:1          1:Module:3       1:Module:3         GOOD             yes               yes
1:Module:15         1:Module:14      1:Module:14        GOOD             yes               yes
1:Module:2          1:Module:1       1:Module:1         GOOD             yes               yes
1:Module:3          1:Module:2       1:Module:2         NO_SERIAL_DATA   yes               yes
1:Module:4          1:Module:6       1:Module:6         GOOD             yes               yes
1:Module:6          1:Module:5       1:Module:5         MODULE_FAILED    no                no
1:Module:7          1:Module:9       1:Module:9         GOOD             yes               yes
1:Module:8          1:Module:7       1:Module:7         GOOD             yes               yes
1:Module:9          1:Module:8       1:Module:8         GOOD             yes               yes
```

Id	Name	Description	Default Position
monitoring_module_id	Monitoring Module		1
desired_module_id	Desired Module		2
connected_module_id	Connected Module		3
state	Status		4
module_alive	Is Module Alive		5
hw_node_alive	Is HW Node Alive		6

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	

User Category	Permission	Condition
Technicians	Disallowed	

Check File Systems Health State

Check file systems health state across modules

```
fs_check
```

Check file systems health state across modules and send events reflecting status.

Example:

```
fs_check
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Lists File Systems Statuses

List file systems

```
fs_list [ module_id=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module_id		List the file systems only for the specified module	N	All modules

List file systems

Example:

```
xcli  -u -c XIV1 fs_list
```

Output:

```
<module_id value="1:Module:2"/>
                <mount_point value="/"/>
                <device value="/dev/sda1"/>
                <type value="ext2"/>
                <total_size value="3783442432"/>
                <used_size value="687616000"/>
                <total_inodes value="469568"/>
                <used_inodes value="7715"/>
                <writable value="no"/>
                <good value="yes"/>
```

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Lists Visdors Statuses

List visdors

```
visdor_list  [ module_id=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module_id		List the status only for the specified module	N	All modules

List visdors

Example:

```
xcli  -u -c XIV1 visdor_list
```

Output:

```
TODO
```

Id	Name	Description	Default Position
module_id	Module		1
disk_size	Size		2
s0_mirroring_state	0 S		3
s0_total_blocks	0 B		4
s0c0_state	00S		5
s0c0_synced_blocks	00Sy		6

Id	Name	Description	Default Position
s0c0_allocd_blocks	00Al		7
s0c1_state	01S		8
s0c1_synced_blocks	01Sy		9
s0c1_allocd_blocks	01Al		10
s0c2_state	02S		11
s0c2_synced_blocks	02Sy		12
s0c2_allocd_blocks	02Al		13
s1_mirroring_state	0S		14
s1_total_blocks	0B		15
s1c0_state	10S		16
s1c0_synced_blocks	10Sy		17
s1c0_allocd_blocks	10Al		18
s1c1_state	11S		19
s1c1_synced_blocks	11Sy		20
s1c1_allocd_blocks	11Al		21
s1c2_state	12S		22
s1c2_synced_blocks	12Sy		23
s1c2_allocd_blocks	12Al		24
s2_mirroring_state	0S		25
s2_total_blocks	0B		26
s2c0_state	20S		27
s2c0_synced_blocks	20Sy		28
s2c0_allocd_blocks	20Al		29
s2c1_state	21S		30
s2c1_synced_blocks	21Sy		31
s2c1_allocd_blocks	21Al		32
s2c2_state	22S		33
s2c2_synced_blocks	22Sy		34
s2c2_allocd_blocks	22Al		35
s3_mirroring_state	0S		36
s3_total_blocks	0B		37
s3c0_state	30S		38
s3c0_synced_blocks	30Sy		39
s3c0_allocd_blocks	30Al		40
s3c1_state	31S		41
s3c1_synced_blocks	31Sy		42
s3c1_allocd_blocks	31Al		43
s3c2_state	32S		44
s3c2_synced_blocks	32Sy		45
s3c2_allocd_blocks	32Al		46

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Listing UPS Component Statuses

Lists the status of UPS components.

```
ups_list [ ups=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
ups		Lists the status only for the specified UPS.	N	All UPS systems.

This command lists the status of the components of UPSs. The following information is provided:

- Generic status
- Input power on: Y/N
- Battery charge level
- Last date of self-test
- Result of last self-test
- Is monitoring enabled
- Last calibration date
- result of last calibration
- Status of UPS
- Date of next self test
- Serial Number
- Load level percent
- Apparent load level percent

Additional information, available through running `ups_list -t all`, includes:

- Last Calibration Date
- Last Calibration Result
- Next Self Test
- Serial
- Original Serial
- Load % Watts
- Apparent Load % VA
- Minutes Left
- Temperature
- AOS Version

- Self-test Status
- Component Test Status
- Battery Date
- UPS Manufacture Date

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
input_power_on	Input Power On		4
runtime_remaining	Runtime Remaining		5
battery_charge_level	Battery Charge Level		6
last_self_test_date	Last Self Test Date		7
last_self_test_result	Last Self Test Result		8
is_enabled	Monitoring Enabled		9
ups_status	UPS Status		10
last_calibration_date	Last Calibration Date		
last_calibration_result	Last Calibration Result		
serial	Serial		
original_serial	Original Serial		
load_power_percent	Load % Watts		
apparent_load_power_percent	Apparent Load % VA		
power_consumption	Power Consumption		
predictive_power_load	Predictive Power Load %		
predictive_remaining_runtime	Predictive Remaining Runtime		
internal_temperature	Temperature		
aos_version	AOS Version		
self_test_status	Self-Test Status		
component_test_status	Component Test Status		
battery_year	Battery Year Born		
battery_week	Battery Week Born		
manufacture_date	UPS Manufacture Date		
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing Service Status

Lists all the service specific statuses.

```
service_list [ service=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
service		Service to be listed.	N	All services

This command lists the statuses that apply to services. The list includes the following information:

- Component generic status
- Service on/failed
- Comment (optional)

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
target_status	Target Status		4

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing PSUs in the System

Lists the PSUs in the XIV system.

```
psu_list [ module=ComponentId  | psu=ComponentId ]
```

Parameters:

Name	Type	Description	Mandatory	Default
module		Limits the listing to a specific module.	N	All PSUs in all modules.
psu		Lists only a specific PSU.	N	A specific PSU.

This command lists the PSUs in the XIV system.

Example:

```
xcli  -u  -c Nextra1 psu_list
```

Output:

```
Component ID   Status   Currently Functioning   Hardware Status
-------------- -------- ----------------------- -----------------
1:PSU:13:1     Failed   no                      Cable Failure
1:PSU:13:2     OK       yes                     OK
1:PSU:14:1     Failed   no                      Cable Failure
1:PSU:14:2     OK       yes                     OK
1:PSU:15:1     Failed   no                      Cable Failure
1:PSU:15:2     OK       yes                     OK
1:PSU:6:1      Failed   no                      Cable Failure
1:PSU:6:2      OK       yes                     OK
1:PSU:9:1      Failed   no                      Cable Failure
1:PSU:9:2      OK       yes                     OK
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
hardware_status	Hardware Status		4
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Stopping System Traces

Stops system traces.

```
traces_stop
```

Stops system traces.

Id	Name	Description	Default Position
module	Module		1
status	Status		2

Example:

```
xcli  -u -c Nextra1 traces_stop
```

Output:

```
Module        Status
------------- ---------
1:Module:1    Stopped
1:Module:2    Stopped
1:Module:3    Stopped
1:Module:4    Stopped
1:Module:5    Stopped
1:Module:6    Stopped
1:Module:7    Stopped
1:Module:8    Stopped
1:Module:9    Stopped
1:Module:10   Stopped
1:Module:11   Stopped
1:Module:12   Stopped
1:Module:13   Stopped
1:Module:14   Stopped
1:Module:15   Stopped
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Resuming System Traces

Resumes system traces.

```
traces_resume
```

Resumes system traces.

Id	Name	Description	Default Position
module	Module		1
status	Status		2

Example:

```
xcli  -u -c Nextra1 traces_resume
```

Output:

```
Module       Status
------------ ---------
1:Module:1   Running
1:Module:2   Running
1:Module:3   Running
1:Module:4   Running
1:Module:5   Running
1:Module:6   Running
1:Module:7   Running
1:Module:8   Running
1:Module:9   Running
1:Module:10  Running
1:Module:11  Running
1:Module:12  Running
1:Module:13  Running
1:Module:14  Running
1:Module:15  Running
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Listing Status of System Traces

Lists status of system traces.

```
traces_status_list
```

Lists status of system traces.

Id	Name	Description	Default Position
module	Module		1
status	Status		2

Example:

```
xcli  -u -c Nextra1 traces_status_list
```

Output:

```
Module       Status
------------ ---------
1:Module:1   Running
1:Module:2   Running
1:Module:3   Stopped
1:Module:4   Running
1:Module:5   Running
1:Module:6   Running
1:Module:7   Running
1:Module:8   Running
1:Module:9   Running
1:Module:10  Running
1:Module:11  Running
1:Module:12  Running
1:Module:13  Running
1:Module:14  Running
1:Module:15  Running
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Sending a System Logs File as an Email Attachment

Sends a system logs file as an email attachment.

```
system_logs_send_file
file=FileName
email_address=email
smtpgw=SMTPGatewayName
[ port=PortNumber ] [ sender_address=<SenderEmailAddress|DEFAULT> ] [ subject=SubjectFormat ]
```

Parameters:

Name	Type	Description	Mandatory	Default
smtpgw	Object name	Name of an internal SMTP gateway to use.	Y	
sender_address		Email address of the sender of the email. If not defined, the value email_sender_address is used (see Printing Configuration Parameters). If neither is defined, the command fails.	N	DEFAULT
file	String	Name of the file.	Y	
email_address		Email address to send the email to.	Y	

Name	Type	Description	Mandatory	Default
port	Integer	TCP port used in the gateway instead of the default port 25.	N	25
subject	Token String	Controls the formatting of the Email subject line. The tags {system_name} {machine_model} {machine_serial_number} {file} and {sender_address} can be used.	N	System Logs file {file} from {machine_model}-{machine_serial_number}

Sends a system logs file as an email attachment.

Example:

```
xcli  -u -c XIV1 system_logs_send_file file=system_xray_2009-09-10-1800.tar.bz2
email_address=ibm@ibm.com smtpgw=EmailServer
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- CANNOT_GET_SYSTEM_LOGS_COLLECTION_STATUS
  Cannot get status of collection of system logs
  Troubleshooting: Contact support
- CANNOT_READ_FROM_FILE
  Cannot read from file '*Filename*'
  Troubleshooting: Contact support
- SENDER_ADDRESS_NOT_DEFINED
  Sender address is not given and the default From Address is defined
- SMTPGW_NAME_DOES_NOT_EXIST
  SMTP name does not exist

Notifying the System of a Technician at Work

Notifies the system of a technician at work.

```
technician_work_in_progress
[ mode=<start|end|get> ] [ timeout=<[hh:]mm> ] [ comment=Comment ]
```

Parameters:

Name	Type	Description	Mandatory	Default
mode	Enumeration	Mode of the command. `start` resets the timeout. `end` notifies the system that the technician has finished their work. `get` only returns the time elapsed since the last resetting of the timeout (or 0 if a technician is not currently at work).	N	get
timeout		Timeout in either hh:mm format or a number of minutes. The timeout cannot exceed 23 hours and 59 minutes. Must be specified if `mode` is `start` and cannot be specified otherwise.	N	
comment	String	Comment to add to the events that pertain to the command. Must be specified if `mode` is `start` and cannot be specified otherwise.	N	none

Notifies the system of a technician at work.

Example:

```
xcli  -u -c XIV1 technician_work_in_progress
comment="We are starting to replace module"
mode=start timeout=1:30
```

Output:

```
Command executed successfully.
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- TECHNICIAN_WORK_TIMEOUT_CANNOT_BE_SPECIFIED
  Timeout can only be specified when technician work starts.
- TECHNICIAN_WORK_COMMENT_CANNOT_BE_SPECIFIED
  Comment can only be specified when technician work starts.
- TECHNICIAN_WORK_TIMEOUT_NOT_SPECIFIED
  Timeout must be specified when technician work starts.
- TECHNICIAN_WORK_COMMENT_NOT_SPECIFIED
  Comment must be specified when technician work starts.

Cancel UPS Calibration

Cancel UPS calibration

```
ups_cancel_calibration  ups=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
ups		The UPS to cancel calibration on	Y	

Cancel UPS calibration

Example:

```
xcli  -u -c XIV1 ups_cancel_calibration ups=1:UPS:1
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- UPS_IS_UNMONITORED
  The specified UPS is not monitored and commands cannot be run on it
  Troubleshooting: Contact support
- COMPONENT_DOES_NOT_EXIST
  Component does not exist

Check UPS Monitor Cables

Check UPS monitor cables

```
ups_check_monitor_cables  ups=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
ups		The UPS to check its monitor cables	Y	

Check UPS monitor cables

Example:

```
xcli  -u -c XIV1 ups_check_monitor_cables ups
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- UPS_IS_UNMONITORED
  The specified UPS is not monitored and commands cannot be run on it
  Troubleshooting: Contact support
- COMPONENT_DOES_NOT_EXIST
  Component does not exist
- UPS_ALREADY_CHECKING_MONITOR_CABLES
  UPS check monitor cables is already pending or in progress
  Troubleshooting: Wait for other check to complete and try again

Set the UPS Battery Date

Set the UPS battery date

```
ups_set_battery_date
ups=ComponentId battery_serial=string second_battery_serial=string
```

Parameters:

Name	Type	Description	Mandatory	Default
battery_serial	String	First battery serial number	Y	
second_battery_serial	String	Second battery serial number	Y	
ups		The UPS to set the batteries date on	Y	

Set the UPS batteries date

Example:

```
ups_set_battery_date ups=1:UPS:2
battery_serial=TV1002160118 second_battery_serial=QR0938160118
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- COMPONENT_DOES_NOT_EXIST
  Component does not exist
- UPS_BATTERY_SERIAL_INVALID
  The battery serial number is invalid
  Troubleshooting: Retype serial or contact support
- UPS_BATTERY_SERIAL_NOT_UNIQUE
  The battery serial number is identical to the other battery's serial number
  Troubleshooting: Retype serial or contact support

Start UPS Calibration

Start UPS calibration

```
ups_start_calibration  ups=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
ups		The UPS to start calibration on	Y	

Start UPS calibration

Example:

```
xcli  -u -c XIV1 ups_start_calibration ups
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- UPS_IS_UNMONITORED
  The specified UPS is not monitored and commands cannot be run on it
  Troubleshooting: Contact support
- COMPONENT_DOES_NOT_EXIST
  Component does not exist

Start UPS Self Test

Start UPS self test

```
ups_start_self_test  ups=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
ups		The UPS to test	Y	

Start UPS self test

Example:

```
xcli  -u -c XIV1 ups_start_self_test ups
```

Output:

```
@
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Completion Codes:

- UPS_IS_UNMONITORED
  The specified UPS is not monitored and commands cannot be run on it
  Troubleshooting: Contact support
- COMPONENT_DOES_NOT_EXIST
  Component does not exist
- UPS_ALREADY_SELF_TESTING
  UPS self-test is already in progress
  Troubleshooting: Contact support

Turn UPS Off

Turn UPS off

```
ups_turn_off  ups=ComponentId
```

Parameters:

Name	Type	Description	Mandatory	Default
ups		The UPS to turn off	Y	

Turn UPS off

Example:

```
xcli  -u -c XIV1 ups_turn_off ups
```

Access Control:

User Category	Permission	Condition
Storage administrator	Disallowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Allowed	

Warnings:

- ARE_YOU_SURE_YOU_WANT_TO_TURN_UPS_OFF
  Are you sure you want to turn the UPS output power off?
  Troubleshooting: Contact support

Completion Codes:

- UPS_IS_UNMONITORED
  The specified UPS is not monitored and commands cannot be run on it
  Troubleshooting: Contact support
- UPS_NOT_ENOUGH_SPARES
  There are not enough spare UPS's in the rack to safely complete the command
  Troubleshooting: Contact support
- COMPONENT_DOES_NOT_EXIST
  Component does not exist
- NOT_ALL_PSUS_OK
  There is one or more PSUs disconnected or failed, this may cause the requested action to cause module failures
  Troubleshooting: Check that all PSUs are properly wired, and ensure that none is failed
- UPS_MUST_BE_FAILED_FOR_SHUT_OFF
  The specified UPS is not failed and therefore cannot be shut down explicitly
  Troubleshooting: Contact support

Listing Fans in the System

Lists fans in the system.

```
fan_list
```

Lists fans in the system.

Example:

```
          xcli  -u  -c Nextra1 fan_list
```

Output:

```
Component ID   Status   Currently Functioning
------------- -------- ----------------------
1:Fan:1:1     OK       yes
1:Fan:1:10    OK       yes
1:Fan:1:2     OK       yes
1:Fan:1:3     OK       yes
1:Fan:1:4     OK       yes
1:Fan:1:5     OK       yes
1:Fan:1:6     OK       yes
1:Fan:1:7     OK       yes
1:Fan:1:8     OK       yes
1:Fan:1:9     OK       yes
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Listing SSDs that are Used as Flash Cache in the System

Lists SSDs used as flash cache in the system.

```
ssd_list
```

Lists SSDs used as flash cache in the system.

Example:

```
xcli  -u  -c Nextra1 ssd_list
```

Output:

```
Component ID   Status   Currently Functioning
-------------- -------- ----------------------
1:SSD:1:1      OK       yes
1:SSD:10:1     OK       yes
1:SSD:2:1      OK       yes
1:SSD:3:1      OK       yes
1:SSD:4:1      OK       yes
1:SSD:5:1      OK       yes
1:SSD:6:1      OK       yes
1:SSD:7:1      OK       yes
1:SSD:8:1      OK       yes
1:SSD:9:1      OK       yes
```

Id	Name	Description	Default Position
component_id	Component ID		1
status	Status		2
currently_functioning	Currently Functioning		3
capacity	Capacity (GB)		4
target_status	Target Status		5
current_hardware_info.vendor	Vendor		6
current_hardware_info.model	Model		7
size	Size		8
current_hardware_info.serial	Serial		9
current_hardware_info.firmware	Firmware		10
current_hardware_info.part_number	Fru		11
current_hardware_info.group	Group		12
temperature	Temperature		13
original_hardware_info.vendor	Original Vendor		
original_hardware_info.model	Original Model		
original_hardware_info.serial	Original Serial		
original_hardware_info.part_number	Original Fru		
original_hardware_info.firmware	Original Firmware		
original_hardware_info.group	Original group		
requires_service	Requires Service		
service_reason	Service Reason		

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Chapter 19. Statistics

The following sections describe the XIV Command Line Interface (XCLI) for getting system statistics. Other command that are relevant to this topic is: Obtaining Statistics On Past Sync Jobs

The sections are listed as follows:

- statistics_get(Retrieves performance statistics from the XIV system.)
- usage_get(Shows the usage history of a volume or a Storage Pool.)

Getting Performance Statistics

Retrieves performance statistics from the XIV system.

```
statistics_get [ perf_class=perfClassName | host=H |
host_iscsi_name=initiatorName | host_fc_port=WWPN |
target=RemoteTarget | remote_fc_port=WWPN |
remote_ipaddress=IPAdress | vol=VolName |
ipinterface=IPInterfaceName | local_fc_port=ComponentId ]
< start=TimeStamp | end=TimeStamp >
[ module=ComponentId ] count=N interval=IntervalSize
resolution_unit=<minute|hour|day|week|month>
```

Parameters:

Name	Type	Description	Mandatory	Default
host	Object name	Limits statistics to the specific host only.	N	All hosts
host_fc_port		FC address of the host port.	N	All ports.
target	Object name	Limits statistics to I/O generated by the specified remote target only (due to remote mirroring).	N	All targets.
remote_fc_port		Limits statistics to the specified host/remote FC port only.	N	All ports.
remote_ipaddress		IP address of the remote target port.	N	All ports.
host_iscsi_name	iSCSI initiator name	Limits statistics to the specified iSCSI initiator only.	N	All ports.
ipinterface	Object name	Limits statistics to the specified IP interface (relevant for iSCSI only).	N	All interfaces.
module		Limits statistics to the specified module only.	N	All modules.

Name	Type	Description	Mandatory	Default
local_fc_port		Limits statistics to I/O performed on the specified FC port only.	N	All ports.
vol	Object name	Limits statistics to the specified volume only.	N	All volumes.
start		Starting point for the statistics report.	N	
end		Ending point for the statistics report.	N	
count	Positive integer	Number of time points reported.	Y	
interval	Positive integer	The length of time in each statistic's time point. The resolution of this number is set in *resolution_unit*.	Y	
resolution_unit	Enumeration	Sets the unit of measurement for the length of each bin.	Y	
perf_class	Object name	Displays performance class aggregated statistics for bandwidth and IOPS.	N	All Performance classes.

This command lists I/O statistics. The *count* parameter sets the number of lines in the statistics report. Together, the *interval* and *resolution_unit* set the length of time for each statistics line. Either start or end timestamps must be provided. These timestamps set the time for the statistics report. Other parameters restrict statistics to a specific host, host port, volume, interface port and so on.

For each line of statistics, 48 numbers are reported, which represent all the combinations of reads/writes, hits/misses and I/O size reporting for each of the 16 options for bandwidth, IOPS and latency.

The syntax for the `start` and `end` fields is as follows: `Y-M-D[.[h[:m[:s]]]]`, where the ranges are as follows:

- Y - year (four digit)
- M - month (1-12)
- D - day (1-31)
- h - hour (0-23, with 0 as default)
- m - minute (0-59, with 0 as default)
- s - second (0-59, with 0 as default)

Note:

The year, month and day are separated by dashes, and the optional hours, minutes and seconds are separated by colons.

Output units:

- Very Large blocks - are >512KB
- Large blocks - are 64-512KB

- Medium blocks - are 8-64KB
- Small blocks - are 0-8KB
- The latency is in Microsecond
- The bandwidth is in KB

perf_class

- The perf_class parameter enables to display the performance class aggregated statistics for bandwidth and IOPS.

Id	Name	Description	Default Position
time	Time		1
failures	Failures		
aborts	Aborts		
read_hit_very_large_iops	Read Hit Very large - IOps		2
read_hit_very_large_latency	Read Hit Very large - Latency		3
read_hit_very_large_throughput	Read Hit Very large - Throughput		4
read_hit_large_iops	Read Hit Large - IOps		5
read_hit_large_latency	Read Hit Large - Latency		6
read_hit_large_throughput	Read Hit Large - Throughput		7
read_hit_medium_iops	Read Hit Medium - IOps		8
read_hit_medium_latency	Read Hit Medium - Latency		9
read_hit_medium_throughput	Read Hit Medium - Throughput		10
read_hit_small_iops	Read Hit Small - IOps		11
read_hit_small_latency	Read Hit Small - Latency		12
read_hit_small_throughput	Read Hit Small - Throughput		13
read_miss_very_large_iops	Read Miss Very large - IOps		14
read_miss_very_large_latency	Read Miss Very large - Latency		15
read_miss_very_large_throughput	Read Miss Very large - Throughput		16
read_miss_large_iops	Read Miss Large - IOps		17
read_miss_large_latency	Read Miss Large - Latency		18
read_miss_large_throughput	Read Miss Large - Throughput		19
read_miss_medium_iops	Read Miss Medium - IOps		20
read_miss_medium_latency	Read Miss Medium - Latency		21
read_miss_medium_throughput	Read Miss Medium - Throughput		22
read_miss_small_iops	Read Miss Small - IOps		23
read_miss_small_latency	Read Miss Small - Latency		24

Id	Name	Description	Default Position
read_miss_small_throughput	Read Miss Small - Throughput		25
write_hit_very_large_iops	Write Hit Very large - IOps		26
write_hit_very_large_latency	Write Hit Very large - Latency		27
write_hit_very_large_throughput	Write Hit Very large - Throughput		28
write_hit_large_iops	Write Hit Large - IOps		29
write_hit_large_latency	Write Hit Large - Latency		30
write_hit_large_throughput	Write Hit Large - Throughput		31
write_hit_medium_iops	Write Hit Medium - IOps		32
write_hit_medium_latency	Write Hit Medium - Latency		33
write_hit_medium_throughput	Write Hit Medium - Throughput		34
write_hit_small_iops	Write Hit Small - IOps		35
write_hit_small_latency	Write Hit Small - Latency		36
write_hit_small_throughput	Write Hit Small - Throughput		37
write_miss_very_large_iops	Write Miss Very large - IOps		38
write_miss_very_large_latency	Write Miss Very large - Latency		39
write_miss_very_large_throughput	Write Miss Very large - Throughput		40
write_miss_large_iops	Write Miss Large - IOps		41
write_miss_large_latency	Write Miss Large - Latency		42
write_miss_large_throughput	Write Miss Large - Throughput		43
write_miss_medium_iops	Write Miss Medium - IOps		44
write_miss_medium_latency	Write Miss Medium - Latency		45
write_miss_medium_throughput	Write Miss Medium - Throughput		46
write_miss_small_iops	Write Miss Small - IOps		47
write_miss_small_latency	Write Miss Small - Latency		48
write_miss_small_throughput	Write Miss Small - Throughput		49
time_in_seconds	Time (s)		50

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	

User Category	Permission	Condition
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Disallowed	

Completion Codes:

- BAD_TIME_FORMAT
  Bad time format. Should be YYYY-MM-DD[.HH[:MM[:SS]]]
- TARGET_PORT_BAD_ADDRESS
  Remote port address is illegal or does not belong to the remote target
- VOLUME_BAD_NAME
  Volume name does not exist
- STATS_TOO_MANY_SAMPLES
  Requested number of statistics samples is too high
- TARGET_BAD_NAME
  Target name does not exist
- COMPONENT_DOES_NOT_EXIST
  Component does not exist
- HOST_BAD_NAME
  Host name does not exist
- HOST_PORT_DOES_NOT_EXIST
  Port ID is not defined
- IPINTERFACE_DOES_NOT_EXIST
  IP Interface name does not exist
- PERF_CLASS_BAD_NAME
  Performance Class does not exist

Retrieving History Usage

Shows the usage history of a volume or a Storage Pool.

```
usage_get < vol=VolName | pool=PoolName    > [ start=StartTime | start_in_seconds=StartTime ]
          [ end=EndTime ] [ max=MaxEntries ]
```

Parameters:

Name	Type	Description	Mandatory	Default
vol	Object name	Volume for which usage statistics are retrieved.	N	
pool	Object name	Storage Pool for which usage statistics are retrieved.	N	
start		Starting time for usage history retrieval.	N	Creation time of the object.

Name	Type	Description	Mandatory	Default
end		Ending time for usage history retrieval.	N	Current time.
max	Integer	Maximum number of entries to retrieve.	N	No limit.
start_in_seconds	Integer	Starting time for usage history retrieval, in seconds since 12:00:00 AM, 1 January 1970.	N	Creation time of the object.

This command retrieves the usage history of a Storage Pool or volume, in units of one megabyte.

Id	Name	Description	Default Position
time	Time		1
volume_usage	Volume Usage (MiB)		2
snapshot_usage	Snapshot Usage (MiB)		3

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Disallowed	
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- VOLUME_BAD_NAME
  Volume name does not exist
- POOL_DOES_NOT_EXIST
  Storage Pool does not exist
- BAD_TIME_FORMAT
  Bad time format. Should be YYYY-MM-DD[.HH[:MM[:SS]]]
- END_BEFORE_START
  End Time should be later than Start Time
- VOLUME_IS_SNAPSHOT
  Operation is not permitted on snapshots

Chapter 20. Meta-data

The following sections describe the XIV Command Line Interface (XCLI) for meta-data handling.

The sections are listed as follows:

- metadata_set(Sets a meta-data of an object.)
- metadata_delete(Deletes a meta-data of an object.)
- metadata_list(Lists a meta-data of an object.)

Setting Meta Data

Sets a meta-data of an object.

```
metadata_set
object_type=<cg|cluster|dest|destgroup|host|pool|performanceclass|rule|
schedule|smsgw|smtpgw|target|user|user_group|vol>
name=Name key=Key value=Value
```

Parameters:

Name	Type	Description	Mandatory	Default
object_type	Enumeration	Type of object.	Y	
name	Object name	Name of object	Y	
key	String	Metadata key.	Y	
value	String	Metadata value	Y	

This command sets a new metadata key-value for the specified object. Value will override previous value if one exists.

Value can be an empty string. There can be up to 16 values, each limited to 128 bytes.

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	Metadata can be set for only volumes, snapshots, snapshot groups, clusters or hosts, and only for objects associated with the application administrator executing the command. Hosts or clusters should be associated with the user. Volumes should be mapped to a host or a cluster associated with the user. Snapshots or snapshot groups should be ones created by application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- OBJECT_BAD_NAME
  Referenced object does not exist.
- MAX_METADATA_OBJECTS_REACHED
  Maximal number of metadata objects has been reached.

Deleting Meta Data

Deletes a meta-data of an object.

```
metadata_delete
object_type=<cg|cluster|dest|destgroup|host|performanceclass|pool|rule|schedule|
smsgw|smtpgw|target|user|user_group|vol>
name=Name key=Key
```

Parameters:

Name	Type	Description	Mandatory	Default
object_type	Enumeration	Type of object.	Y	
name	Object name	Name of object	Y	
key	String	Metadata key.	Y	

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Conditionally Allowed	Metadata can be set for only volumes, snapshots, snapshot groups, clusters or hosts, and only for objects associated with the application administrator executing the command. Hosts or clusters should be associated with the user. Volumes should be mapped to a host or a cluster associated with the user. Snapshots or snapshot groups should be ones created by application administrator.
Read-only users	Disallowed	
Technicians	Disallowed	

Completion Codes:

- OBJECT_BAD_NAME
  Referenced object does not exist.
- METADATA_OBJECT_KEY_NOT_FOUND
  The specified metadata object does not exist.

Listing Meta Data

Lists a meta-data of an object.

```
metadata_list
[ object_type=<cg|cluster|dest|destgroup|host|performanceclass|pool|rule|schedule|
smsgw|smtpgw|target|user|user_group|vol> ]
 [ name=Name ] [ key=Key ]
```

Parameters:

Name	Type	Description	Mandatory	Default
object_type	Enumeration	Type of object.	N	All object types
name	Object name	Name of object	N	All objects
key	String	Metadata key.	N	List all keys and values.

This command lists all the value-key pairs for this object, or a specific one. The command fails if no key is defined.

Id	Name	Description	Default Position
object_type	Object Type		1
name	Name		2
key	Key		3
value	Value		4

Access Control:

User Category	Permission	Condition
Storage administrator	Allowed	
Application administrator	Allowed	
Read-only users	Allowed	
Technicians	Allowed	

Chapter 21. Events

VOLUME_CREATE

Severity	informational
Description	Volume was created with name '*volume.name*' and size *volume.size*GB in Storage Pool with name '*volume.pool_name*'.

VOLUME_CREATE_FAILED_TOO_MANY

Severity	warning
Description	Volume with name '*name*' could not be created. You are attempting to add more volumes than the system permits.
Troubleshooting	Delete volumes to allow new ones to be created.

VOLUME_CREATE_FAILED_BAD_SIZE

Severity	warning
Description	Volume with name '*name*' could not be created with size of *requested_size*GB. Volume size is not a multiple of the volume size quanta (16384 Partitions).
Troubleshooting	Set volume size that is an integer multiple of 16K (number of slices) partitions.

VOLUME_RENAME

Severity	informational
Description	Volume with name '*old_name*' and was renamed '*volume.name*'.

VOLUME_RESIZE

Severity	informational
Description	Volume with name '*volume.name*' was resized from *old_size*GB to *volume.size*GB.

SECONDARY_VOLUME_RESIZE

Severity	informational
Description	Secondary volume with name '*volume.name*' was resized by primary machine from *old_size*GB to *volume.size*GB.

VOLUME_DELETE

Severity	informational

Description	Volume with name '*volume.name*' was deleted.

VOLUME_FORMAT

Severity	informational
Description	Volume with name '*volume.name*' was formatted.

VOLUME_COPY

Severity	informational
Description	Volume with name '*source.name*' was copied to volume with name '*target.name*'.

VOLUME_LOCK

Severity	informational
Description	Volume with name '*volume.name*' was locked and set to 'read-only'.

VOLUME_UNLOCK

Severity	informational
Description	Volume with name '*volume.name*' was unlocked and set to 'writable'.

VOLUME_MOVE

Severity	informational
Description	Volume with name '*volume.name*' has been moved from Storage Pool '*orig_pool.name*' to Pool '*pool.name*'.

VOLUME_UNFORMAT

Severity	informational
Description	Volume with name '*volume.name*' was unformatted.

VOLUME_SET_FLASH_BYPASS

Severity	informational
Description	Flash Cache Bypass was set to be '*Bypass*' for Volume with name '*volume.name*'.

STATUS_AGENT_ERROR

Severity	critical
Description	Status Agent error: *message* (value=*value*).
Troubleshooting	Please contact support.

DISK_NEEDS_PHASEOUT

Severity	major
Description	*Disk ID* needs to be phased out.
Troubleshooting	Please contact your Administrator.

DISK_SHOULD_FAIL

Severity	major
Description	*Disk ID* is malfunctioning and should fail.
Troubleshooting	Please contact your Administrator.

DATA_REBUILD_STARTED

Severity	informational
Description	Rebuild process started because system data is not protected. *data_percent*% of the data must be rebuilt.

DATA_REBUILD_COMPLETED

Severity	informational
Description	Rebuild process completed. System data is now protected.

DATA_REBUILD_COULD_NOT_BE_COMPLETED

Severity	major
Description	Rebuild process could not be completed due to insufficient unused disk space. System data is not protected.
Troubleshooting	Replace failed drives, delete unused pools or decrease pool size where possible.

DATA_REDIST_STARTED

Severity	informational
Description	Starting data transfer to new disks.

DATA_REDIST_COMPLETED

Severity	informational
Description	Completed data transfer to new disks.

DATA_REBUILD_COMPLETED_REDIST_STARTED

Severity	informational
Description	Rebuild process completed. System data is now protected. Starting data transfer to new disks.

STORAGE_POOL_EXHAUSTED

Severity	major
Description	Pool '*pool*' is full. All volumes are locked.
Troubleshooting	Enlarge Storage Pool or move or delete volumes or Clones with Clone Deletion Priority 0.

STORAGE_POOL_UNLOCKED

Severity	major
Description	Pool '*pool*' has empty space. All volumes are unlocked.
Troubleshooting	

STORAGE_POOL_VOLUME_USAGE_INCREASED

Severity	variable
Description	Usage by volumes of Storage Pool with name '*pool.name*' has reached *current*%.
Troubleshooting	

STORAGE_POOL_VOLUME_USAGE_DECREASED

Severity	informational
Description	Usage by volumes of Storage Pool with name '*pool.name*' has decreased to *current*%.
Troubleshooting	

STORAGE_POOL_VOLUME_USAGE_TOO_HIGH

Severity	major
Description	Usage by volumes of Storage Pool with name '*pool.name*' has reached *current*% of the total pool size.
Troubleshooting	Increase pool size or decrease snapshot size.

STORAGE_POOL_VOLUME_USAGE_BACK_TO_NORMAL

Severity	informational
Description	Usage by volumes of Storage Pool with name '*pool.name*' is back to normal with *current*% of the total pool size.
Troubleshooting	

STORAGE_POOL_SNAPSHOT_USAGE_INCREASED

Severity	variable
Description	Usage by snapshots of Storage Pool with name '*pool.name*' has reached *current*%.

Troubleshooting	

STORAGE_POOL_SNAPSHOT_USAGE_DECREASED

Severity	informational
Description	Usage by snapshots of Storage Pool with name '*pool.name*' has decreased to *current*%.
Troubleshooting	

HOST_CONNECTED

Severity	informational
Description	Host '*host*' has connected to the system.
Troubleshooting	

HOST_DISCONNECTED

Severity	informational
Description	Host '*host*' has disconnected from the system.
Troubleshooting	

HOST_MULTIPATH_OK

Severity	informational
Description	Host '*host*' has redundant connections to the system. #paths=*npaths*
Troubleshooting	

HOST_NO_MULTIPATH_ONLY_ONE_PORT

Severity	informational
Description	Host '*host*' is connected to the system through only one of its ports. #paths=*npaths*
Troubleshooting	

HOST_NO_MULTIPATH_ONLY_ONE_MODULE

Severity	informational
Description	Host '*host*' is connected to the system through only one interface module. #paths=*npaths*
Troubleshooting	

SYSTEM_SPARES_ARE_LOW

Severity	major
Description	System capacity spares are *modules* modules and *disks* disks.

Troubleshooting	

SYSTEM_NO_SPARES

Severity	critical
Description	System has no spare disks
Troubleshooting	

POOL_CREATE

Severity	informational
Description	Storage Pool of size *pool.size*GB was created with name '*pool.name*'.

POOL_CREATE_THIN

Severity	informational
Description	Storage Pool of soft size *pool.soft_size*GB and hard_ size *pool.hard_size*GB was created with name '*pool.name*'.

POOL_CREATE_FAILED_TOO_MANY

Severity	warning
Description	Storage Pool with name '*name*' could not be created. You are attempting to add more Storage Pools than the system permits.
Troubleshooting	Delete Storage Pools to allow new ones to be created.

POOL_RENAME

Severity	informational
Description	Storage Pool with name '*old_name*' was renamed '*pool.name*'.

POOL_RESIZE

Severity	informational
Description	Storage Pool with name '*pool.name*' was resized from size *old_size*GB to *pool.size*GB.

POOL_RESIZE_THIN

Severity	informational
Description	Storage Pool with name '*pool.name*' was resized from soft size *old_soft_size*GB and hard size *old_hard_size*GB to soft size *pool.soft_size*GB and hard size *pool.hard_size*GB.

POOL_RESIZE_SNAPSHOTS

Severity	informational
Description	Snapshot size of Storage Pool with name '*pool.name*' was resized from size *old_size*GB to *pool.snapshot_size*GB.

POOL_CHANGE_LOCK_BEHAVIOR

Severity	informational
Description	Lock Behavior of Storage Pool with name '*pool.name*' is now '*state*'.

POOL_CONFIG_SNAPSHOTS

Severity	informational
Description	Management policy of Mirroring snapshots of Storage Pool with name '*pool.name*' has changed'.

POOL_DELETE

Severity	informational
Description	Storage Pool with name '*pool.name*' was deleted.

COMMAND_SERVICE_FAILED_TOO_MANY_TIMES

Severity	critical
Description	Command service *service name* was restarted *times* times within *seconds* seconds on module *module*
Troubleshooting	Please contact support.

COMMAND_SERVICE_EXECUTABLE_INACCESSIBLE

Severity	critical
Description	Command service *service name*'s executable was not found on module *module*
Troubleshooting	Please contact support.

FC_PORT_RESTART

Severity	variable
Description	FC port service *port* was restarted due to *code codestr*
Troubleshooting	Please contact support.

ISCSI_PORT_RESTART

Severity	variable
Description	ISCSI port service *port* was restarted due to *code codestr*
Troubleshooting	Please contact support.

FC_PORT_HAS_FAILED

Severity	major
Description	FC port service *port* has failed due to *code codestr* (attempt number *Number of retries*)
Troubleshooting	Please contact support.

ISCSI_PORT_HAS_FAILED

Severity	major
Description	ISCSI port service *port* has failed due to *code codestr* (attempt number *Number of retries*)
Troubleshooting	Please contact support.

REQUIREMENT_IS_MISSING

Severity	critical
Description	Requirement *requirement name* is missing

CRITICAL_THREAD_DID_NOT_HEARTBEAT

Severity	critical
Description	Thread named '*thread name*' in process '*process_name*' for node *node id* on module *module* did not heartbeat
Troubleshooting	Please contact support.

NODE_DID_NOT_HEARTBEAT

Severity	warning
Description	Node named '*process_name*' with id *node id* on module *module* did not heartbeat
Troubleshooting	Please contact support.

MODULE_STARTED_DOWNLOADING_VERSION

Severity	informational
Description	Module *Module ID* started downloading current version of the system

MODULE_FINISHED_DOWNLOADING_VERSION

Severity	informational
Description	Module *Module ID* finished downloading current version of the system. Downloaded total of *Number of files* files. Status: *Status*

MODULE_DOWNLOAD_TIMEOUT

Severity	warning
Description	Timeout expired trying to download current version of the system to module *Module ID* using interface *Interface*.
Troubleshooting	Please contact support.

ERROR_SETTING_UP_INTERFACE

Severity	major
Description	Error attempting setup Ethernet interface *Interface name* on module *Module ID*
Troubleshooting	Possible physical problem with Ethernet card. Contact support

MODULE_IS_MISSING_MEMORY

Severity	critical
Description	*Component ID* is missing memory. Actual memory size is *actual_mem* GB but should be *req_mem* GB.
Troubleshooting	Please contact your Administrator.

MODULE_IS_MISSING_REQUIRED_MEMORY

Severity	critical
Description	*Component ID* has less memory (*actual_mem* GB) than is defined for use (*req_mem* GB).
Troubleshooting	Please contact your Administrator.

MODULE_HAS_MORE_MEMORY_THAN_EXPECTED

Severity	informational
Description	*Component ID* has more memory than expected. actual memory size is : *actual_mem* GB ,should be : *req_mem* GB.
Troubleshooting	Please contact your Administrator.

NEW_TIME_CHANGE_IS_INVALID

Severity	warning
Description	Setting time to *Seconds* seconds and *USecs* Usecsonds is invalid and was denied.
Troubleshooting	Please contact your Administrator.

MIRROR_CREATE

Severity	informational

Description	A remote mirror was defined for Volume '*local volume name*'on Target '*target name*'. Remote Volume is '*remote volume name*'.

CG_MIRROR_CREATE

Severity	informational
Description	A remote mirror was defined for Consistency Group '*local CG name*'on Target '*target name*'. Remote Consistency Group is '*remote CG name*'.

MIRROR_CREATE_SLAVE

Severity	informational
Description	A remote mirror was defined by Target '*target name*' for Volume '*local volume name*'. Remote Volume is '*remote volume name*'.

CG_MIRROR_CREATE_SLAVE

Severity	informational
Description	A remote mirror was defined by Target '*target name*' for CG '*local CG name*'. Remote CG is '*remote CG name*'.

MIRROR_SCHEDULE_CHANGE

Severity	informational
Description	Schedule of remote mirror of '*local peer name*' is now '*schedule name*'.

MIRROR_CREATE_FAILED_TARGET_NOT_CONNECTED

Severity	warning
Description	Target could not be reached. Target with name '*target.name*' is currently not connected.
Troubleshooting	Connect the target system to this system.

REMOTE_OPERATION_FAILED_TIMED_OUT

Severity	warning
Description	Operation on remote machine timed out. Invoking '*Function Name*' on target '*Target Name*' timed out.
Troubleshooting	Retry operation. If problem persists contact support.

MIRROR_RESYNC_FAILED

Severity	major

Description	Synchronization of meta data with mirror failed. Configuration of remote mirror of volume '*local volume name*' on target '*target name*' does not match local configuration.
Troubleshooting	Make sure configuration on both machines is compatible and activate the mirror. If problem persists contact support.

MIRROR_RESYNC_FAILED_DUE_TO_THIN_PROVISIONING

Severity	major
Description	Synchronization of bitmaps with mirror failed. Not enough hard capacity left in Pool of volume '*mirror.local_volume_name*'.
Troubleshooting	Delete unnecessary volumes in pool or enlarge the pool's hard size.

MIRROR_SYNC_STARTED

Severity	informational
Description	Synchronization of remote mirror of volume '*local volume name*' on Target '*target name*' has started.

MIRROR_SYNC_ENDED

Severity	informational
Description	Synchronization of remote mirror of peer '*local peer name*' on target '*target name*' has ended.

MIRROR_CANNOT_CREATE_SYNC_JOB_TOO_MANY_VOLUMES

Severity	major
Description	Synchronization of remote mirror of peer '*local peer name*' on target '*target name*' can not be synced , insufficent volume available for this operation.

MIRROR_CANNOT_CREATE_LRS_TOO_MANY_VOLUMES

Severity	major
Description	Synchronization of remote mirror of peer '*local peer name*' on target '*target name*' can not be synced , insufficent volume available for this operation.

MIRROR_REESTABLISH_FAILED

Severity	major
Description	Mirror reestablish failed. Connection to remote mirror of peer '*local peer name*' on target '*target name*' could not be established. Remote action failed.

MIRROR_REESTABLISH_FAILED_CONFIGURATION_ERROR

Severity	major
Description	Mirror reestablish failed. Either configuration of remote mirror of peer '*local peer name*' on target '*target name*' does not match local configuration.
Troubleshooting	Make sure configuration on both machines is compatible and activate the mirror. If problem persists contact support.

MIRROR_ACTIVATE

Severity	informational
Description	The Remote Mirror of peer '*local peer name*' on Target '*target name*' was activated.

MIRROR_DEACTIVATE

Severity	informational
Description	The Remote Mirror of peer '*local peer name*' on Target '*target name*' was deactivated.

MIRROR_DEACTIVATE_SECONDARY_LOCKED

Severity	minor
Description	The Remote Mirror of peer '*local peer name*' on Target '*target name*' was deactivated since the Pool on the secondary machine was locked.

MIRROR_DEACTIVATE_CONFIGURATION_ERROR

Severity	minor
Description	The Remote Mirror of peer '*local peer name*' on Target '*target name*' was deactivated since the Mirror configuration on the slave machine has changed.

MIRROR_DELETE

Severity	informational
Description	The Remote Mirror relation of peer '*local peer name*' to a peer on Target '*target name*' was deleted.

MIRROR_REVERSE_ROLE_TO_SLAVE

Severity	informational
Description	Local peer '*local peer name*' is now Slave of a peer on Target '*target name*'.

MIRROR_REVERSE_ROLE_TO_MASTER

Severity	informational
Description	Local peer '*local peer name*' is now Master of a peer on Target '*target name*'.

MIRROR_REVERSE_ROLE_OF_PEER_WITH_LCS_TO_MASTER

Severity	informational
Description	Local peer '*local peer name*' is now Master of a peer on Target '*target name*' external last consistent snapshot should be deleted manually .

MIRROR_SWITCH_ROLES_TO_SLAVE

Severity	informational
Description	Local peer '*local peer name*' switched roles with peer on Target '*target name*'. It is now Slave.

MIRROR_SWITCH_ROLES_TO_MASTER

Severity	informational
Description	Local peer '*local peer name*' switched roles with peer on Target '*target name*'. It is now Master.

MIRROR_REESTABLISH_FAILED_TOO_MANY_VOLUMES

Severity	major
Description	Last Consistent Snapshot of Slave peer '*local peer name*' could not be created. Maximal number of Volumes are already defined.
Troubleshooting	Delete Volumes to allow new ones to be created. Activate Mirror on the Master Machine.

MIRROR_END_SYNC_FAILED_CONFIGURATION_ERROR

Severity	major
Description	Configuration of remote mirror of peer '*local peer name*' on target '*target name*' does not match local configuration.
Troubleshooting	Make sure configuration on both machines is compatible and activate the mirror. If problem persists contact support.

MIRROR_CHANGE_DESIGNATION

Severity	informational
Description	Local peer '*local peer name*' switched its designated role with peer on Target '*target name*'. It is now *designation*.

MIRROR_CANCEL_SNAPSHOT

Severity	informational
Description	All mirrored snapshots which were created for Mirror of peer '*local peer name*' and were not yet synchronized will not be mirrored in the remote machine.

MIRROR_SYNCHRONIZATION_TYPE_CHANGED

Severity	informational
Description	Synchronization of Mirror of peer '*local peer name*' is now '*mirror synchronization type*'.

DM_DEFINE

Severity	informational
Description	Data Migration was defined to Volume '*local volume name*' from Target '*target name*'.

OM_DEFINE

Severity	informational
Description	Online Migration was defined to Volume '*local volume name*' from Target '*target name*'.

DM_SYNC_STARTED

Severity	informational
Description	Migration to volume '*local volume name*' from Target '*target name*' has started.

DM_SYNC_ENDED

Severity	informational
Description	Migration to volume '*local volume name*' from target '*target name*' is complete.

DM_ACTIVATE

Severity	informational
Description	Migration to Volume '*local volume name*' from Target '*target name*' was activated.

DM_DEACTIVATE

Severity	informational
Description	Migration to Volume '*local volume name*' from Target '*target name*' was deactivated.

DM_DEACTIVATE_LUN_UNAVAILABLE

Severity	minor
Description	Migration to Volume '*local volume name*' from Target '*target name*' was deactivated since LUN is not available on one of the active paths to the target.

DM_START_MIGRATION

Severity	informational
Description	Migration to Volume '*local volume name*' from Target '*target name*' will now start automatically.

DM_DELETE

Severity	informational
Description	Definition of Data Migration to Volume '*local volume name*' from Target '*target name*' was deleted.

SCHEDULE_CREATE

Severity	informational
Description	Schedule was created with name '*schedule name*'.

SCHEDULE_UPDATE

Severity	informational
Description	Schedule with name '*schedule name*' was updated.

SCHEDULE_RENAME

Severity	informational
Description	Schedule with name '*old_name*' was renamed '*schedule name*'.

SCHEDULE_DELETE

Severity	informational
Description	Schedule with name '*schedule name*' was deleted.

MIRROR_RPO_OK

Severity	informational
Description	Mirror of local peer '*local peer name*' is now ahead of its specified RPO.

MIRROR_RPO_LAGGING

Severity	informational
Description	Mirror of local peer '*local peer name*' is now behind its specified RPO.

MIRROR_CHANGE_RPO

Severity	informational
Description	RPO or Mirror of local peer '*local peer name*' is now *RPO*.

MIRROR_IS_LAGGING_BEYOND_PERCENT_THRESHOLD

Severity	warning
Description	Last Replication Time of Mirror of local peer '*local peer name*' is *Last Replication Time*.

MIRROR_IS_LAGGING_BEYOND_ABSOLUTE_THRESHOLD

Severity	warning
Description	Last Replication Time of Mirror of local peer '*local peer name*' is *Last Replication Time*.

MAP_VOLUME

Severity	informational
Description	Volume with name '*volume.name*' was mapped to LUN '*LUN*' for *host_or_cluster* with name '*host*'.

UNMAP_VOLUME

Severity	informational
Description	Volume with name '*volume.name*' was unmapped from *host_or_cluster* with name '*host*'.

CLUSTER_DEFINE_EXCEPTION

Severity	informational
Description	LUN '*LUN*' was defined as having host specific mapping in cluster '*cluster*'.

CLUSTER_CANCEL_EXCEPTION

Severity	informational
Description	LUN '*LUN*' was defined as having uniform mapping in cluster '*cluster*'.

SPECIAL_TYPE_SET

Severity	informational
Description	Type of *host_or_cluster* with name '*host*' was set to '*type*'.

DATA_LOSS

Severity	critical
Description	Manager found data loss in *num_lost_slices* slices.
Troubleshooting	Please contact support.

SERVICE_FAILED_TO_PHASEIN

Severity	major
Description	*Component ID* failed to phase-in.
Troubleshooting	Please contact support.

SERVICE_FAILED_TO_RESTART

Severity	major
Description	*Component ID* failed to restart.
Troubleshooting	Please contact support.

MANAGER_RESIGNED_TO_LET_MODULE_PHASE_OUT

Severity	informational
Description	Previous manager resigned to let *Component ID* phase out.
Troubleshooting	

MODULE_FAILED

Severity	critical
Description	*Component ID* failed.
Troubleshooting	Please contact support.

NODE_FAILED

Severity	critical
Description	Node #*Node ID* of type *Node Type* on *Module Component ID* failed because of *failure_reason*.
Troubleshooting	Please contact support.

NODE_RESET

Severity	informational

Description	Node #*Node ID* of type *Node Type* on *Module Component ID* was reset.
Troubleshooting	

NODE_IS_NOT_UP

Severity	minor
Description	Node #*Node ID* of type *Node Type* on *Module Component ID* is not up.
Troubleshooting	Please contact support

MODULE_IS_NOT_UP

Severity	minor
Description	*Module Component ID* is not up.
Troubleshooting	Please contact support

SINGLETON_NODE_IS_NOT_UP

Severity	minor
Description	No singleton of type *Node Type* is up.
Troubleshooting	Please contact support

DISK_HAS_FAILED

Severity	variable
Description	Disk *Component ID* Failed.
Troubleshooting	Please contact your Administrator.

SSD_HAS_FAILED

Severity	major
Description	SSD *Component ID* Failed.
Troubleshooting	Please contact your Administrator.

DISK_INFO_EXTRA_EVENT

Severity	informational
Description	Disk *Component ID* extra information event.
Troubleshooting	

COMPONENT_TEST_OF_DISK_HAS_FAILED

Severity	major
Description	Test of *Component ID* has failed with error *Error*.
Troubleshooting	Please contact your Administrator.

DISK_INFO_LOAD_FAILED

Severity	major
Description	*Component ID* failed.
Troubleshooting	Please contact your Administrator.

DISK_STARTED_PHASEOUT

Severity	informational
Description	System started phasing out *Component ID*.
Troubleshooting	

DISK_STARTED_AUTO_PHASEOUT

Severity	minor
Description	System started automatic phasing out *Component ID*.
Troubleshooting	Please contact support.

DISK_STARTED_PHASEIN

Severity	informational
Description	System started phasing in *Component ID*.
Troubleshooting	

DISK_FINISHED_PHASEIN

Severity	informational
Description	System finished phasing in *Component ID*.
Troubleshooting	

DISK_FINISHED_PHASEOUT

Severity	informational
Description	System finished phasing out *Component ID*.
Troubleshooting	

SECOND_DISK_FAILURE

Severity	critical
Description	Disk *Component ID* failed during rebuild.
Troubleshooting	

DISK_RECOVERED

Severity	critical

Description	Disk *Component ID* is functioning again.
Troubleshooting	

MODULE_STARTED_PHASEOUT

Severity	informational
Description	System started phasing out *Component ID*.
Troubleshooting	

MODULE_INFO_PRE_EVENT

Severity	informational
Description	*Component ID* information pre event.
Troubleshooting	

MODULE_FINISHED_PHASEOUT

Severity	informational
Description	System finished phasing out *Component ID*.
Troubleshooting	

MODULE_STOPPED_PHASEOUT_DUE_TO_MANAGEMENT_REQUIREMENT

Severity	major
Description	System stopped phasing out *Component ID* due to management requirement.
Troubleshooting	

MODULE_PHASEOUT_FAILURE_REASON

Severity	informational
Description	System could not phaseout *Component ID* due to lack of nodes of type *Node Type*.
Troubleshooting	

START_WORK

Severity	informational
Description	System has entered ON state.

SYSTEM_HAS_ENTERED_MAINTENANCE_MODE

Severity	informational
Description	System has entered MAINTENANCE state [*Reason*]

SYSTEM_ENTERED_CHARGING_STATE

Severity	informational
Description	System cannot start work until it is sufficiently charged.

SYSTEM_LEFT_CHARGING_STATE

Severity	informational
Description	System is sufficiently charged.

USER_SHUTDOWN

Severity	major
Description	System is shutting down due to a user request.

EMERGENCY_SHUTDOWN_NOW

Severity	critical
Description	System is shutting down in emergency shutdown mode due to: *Emergency Shutdown Reason*.
Troubleshooting	Please contact your Administrator.

SHUTDOWN_PARAMS

Severity	major
Description	System action is '*Shutdown Action*'. Target state is '*Target State*'. Safemode is '*Safe Mode*'. UPS Sleep Time=*UPS sleep time in seconds* seconds.

DISK_STARTED_AUTO_PHASEIN

Severity	critical
Description	System started phasing in *Component ID* in order to ensure that data will not be unprotected. Phaseout of the containing service and module has been cancelled.
Troubleshooting	

SANITY_CHECK_FAILED

Severity	critical
Description	Sanity check failed.
Troubleshooting	Please contact support.

SYSTEM_HARD_CAPACITY_CHANGED

Severity	informational
Description	System's hard capacity is now *Capacity* GB.

SYSTEM_CAN_NOT_INCREASE_SPARES

Severity	informational
Description	System's spares can not be increased to *modules* modules and *disks* disks. *Capacity* GB should be freed.

SYSTEM_SOFT_CAPACITY_CHANGED

Severity	informational
Description	System's soft capacity is now *Capacity* GB.

MODULE_IS_MISSING_DATA_DISKS

Severity	major
Description	*Module ID* has *Num Found* of *Num Expected* data disks.

SERVICE_WAS_RESTARTED

Severity	informational
Description	*Module ID* was restarted.

DATA_SERVICE_STARTED_PHASEOUT

Severity	informational
Description	System started phasing out *Component ID*.
Troubleshooting	

DATA_SERVICE_FINISHED_PHASEOUT

Severity	informational
Description	System finished phasing out *Component ID*.
Troubleshooting	

CF_FAILED

Severity	major
Description	*Component ID* has failed. Hardware status: *Status*.
Troubleshooting	Please contact support.

DIMM_FAILED

Severity	major
Description	*Component ID* has failed. Hardware status: *Status*.
Troubleshooting	Please contact support.

CPU_FAILED

Severity	major
Description	*Component ID* has failed. Hardware status: *Status*.
Troubleshooting	Please contact support.

NIC_FAILED

Severity	major
Description	*Component ID* has failed. Hardware status: *Status*.
Troubleshooting	Please contact support.

MM_FAILED

Severity	major
Description	*Component ID* has failed. Hardware status: *Status*.
Troubleshooting	Please contact support.

POWER_SUPPLY_UNIT_STATUS_IS_OK

Severity	informational
Description	The status of *Component ID* is now OK.
Troubleshooting	Please contact support.

POWER_TO_MODULE_SHOULD_BE_DISCONNECTED_AND_RECONNECTED

Severity	informational
Description	*Component ID* should be disconnected completely from power supply and reconnected after 60 seconds in order to complete the firmware upgrade scheme.
Troubleshooting	

TIMEZONE_SET

Severity	informational
Description	Timezone of the system was set to *Timezone*.
Troubleshooting	

MODULE_FIRMWARE_UPGRADE_FAILED

Severity	warning
Description	*Module Component ID* has failed due to *failure_reason*
Troubleshooting	Please contact support

TECHNICIAN_WORK_STARTED

Severity	informational

Description	Technician work has started, expected to end at *End Time*. Comment: *Comment*.
Troubleshooting	

TECHNICIAN_WORK_ENDED

Severity	informational
Description	Technician work has ended after *Elapsed Time* minutes. Comment: *Comment*.
Troubleshooting	

TECHNICIAN_WORK_TIMED_OUT

Severity	warning
Description	Technician work has timed out after *Elapsed Time* minutes. Comment: *Comment*.
Troubleshooting	

UNKNOWN_MODULE_SERIAL_NUMBER

Severity	critical
Description	*Component ID* has an unknown serial number of *serial*.
Troubleshooting	Who generates this serial number?

ILLEGAL_MODULE_SERIAL_NUMBER

Severity	critical
Description	*Component ID* has an illegal serial number of *serial*.
Troubleshooting	Is this a Pre-GA module?

MODULE_ORIGINAL_SERIAL_CLEANED

Severity	major
Description	*Component ID* had an illegal original serial number of *Original Serial* which was changed to *Clean Original Serial*.
Troubleshooting	Is this a Pre-GA module?

MODULE_ORIGINAL_PART_NUMBER_CLEANED

Severity	major
Description	*Component ID* had an illegal original part number of *Original Serial* which was changed to *Clean Original Serial*.
Troubleshooting	Is this a Pre-GA module?

ILLEGAL_MODULE_PART_NUMBER

Severity	critical

Description	*Component ID* has an illegal part number of *part_number*.
Troubleshooting	Is there a problem with the IPMI of the module?

MODULE_CHANGE_DETECTED

Severity	major
Description	*Component ID* has been changed from a serial of *old_serial* to *new_serial*.
Troubleshooting	Was this module actually replaced?

CF_CHANGE_DETECTED

Severity	major
Description	*Component ID* has had the CF changed from a serial of *old_serial* to *new_serial*.
Troubleshooting	Was this CF actually replaced?

DIMM_CHANGE_DETECTED

Severity	major
Description	*Component ID* has been changed from a serial of *old_serial* to *new_serial*.
Troubleshooting	Was this DIMM actually replaced?

CPU_CHANGE_DETECTED

Severity	major
Description	*Component ID* has been changed from a serial of *old_serial* to *new_serial*.
Troubleshooting	Was this CPU actually replaced?

MM_CHANGE_DETECTED

Severity	major
Description	*Component ID* has been changed from a serial of *old_serial* to *new_serial*.
Troubleshooting	Was this MM actually replaced?

NIC_CHANGE_DETECTED

Severity	major
Description	*Component ID* has been changed from a serial of *old_serial* to *new_serial*.
Troubleshooting	Was this NIC actually replaced?

FC_CHANGE_DETECTED

Severity	major
Description	*Component ID* has been changed from a *Old Model* with a serial of *old_serial* to a *New Model* with a serial of *new_serial*.
Troubleshooting	Was this fiber channel port actually replaced?

VPD_CHANGE_DETECTED

Severity	informational
Description	Change in VPD *VPD Name* to a value of '*VPD Value*'.
Troubleshooting	NA. This information is for the event center.

MFG_CHANGE_DETECTED

Severity	informational
Description	Change in MFG *MFG Name* to a value of '*MFG Value*'.
Troubleshooting	NA. This information is for the event center.

MM_CONFIG_CHANGE_DETECTED

Severity	informational
Description	Change in MM *MM Name* to a value of '*MM Value*'.
Troubleshooting	NA. This information is for the event center.

DISK_SMALLER_THAN_SYSTEM_DISK_SIZE

Severity	major
Description	Disk *Component ID* has a size of *New size*GB which is smaller than system disk size *System size*GB.

DISK_LARGER_THAN_SYSTEM_DISK_SIZE

Severity	variable
Description	Disk *Component ID* has a size of *New size*GB which is larger than system disk size *System size*GB.

DISK_MODEL_DIFFERENT_THAN_SYSTEM_MODEL

Severity	major
Description	Disk *Component ID* of model *Disk model*, by vendor *Disk vendor*, differs from system disk by vendor *System vendor* and model *System model*.

DISK_MODEL_DIFFERENT_THAN_MODULE_DISK_MODEL

Severity	major

Description	Disk *Component ID* of model *Disk model*, by vendor *Disk vendor*, differs from module's disk model *Module model*, by vendor *Module vendor*.

FIRST_DISK_MODEL_IN_MODULE

Severity	informational
Description	Disk *Component ID* of model *Disk model*, by vendor *Disk vendor*, was the first to be added to a module with an inter-module disk intermix policy, this will require all other disks to have the same model and vendor.

FLASH_CACHE_ENABLE

Severity	informational
Description	Flash Cache feature enabled. SSDs can now be installed.
Troubleshooting	

FLASH_CACHE_DISABLE

Severity	informational
Description	Flash Cache feature disabled.
Troubleshooting	

HOST_DEFINE

Severity	informational
Description	Host of type *host.type* was defined with name '*host.name*'.

HOST_UPDATE

Severity	informational
Description	Host named '*host.name*' was updated.

CLUSTER_CREATE

Severity	informational
Description	Cluster was defined with name '*cluster.name*'.

HOST_DEFINE_FAILED_TOO_MANY

Severity	warning
Description	Host with name '*name*' could not be defined. You are attempting to define more hosts than the system permits.
Troubleshooting	Delete Hosts to allow new ones to be defined.

CLUSTER_CREATE_FAILED_TOO_MANY

Severity	warning
Description	Cluster with name '*name*' could not be defined. You are attempting to define more Clusters than the system permits.
Troubleshooting	Delete Clusters to allow new ones to be defined.

HOST_RENAME

Severity	informational
Description	Host with name '*old_name*' was renamed '*host.name*'.

CLUSTER_RENAME

Severity	informational
Description	Cluster with name '*old_name*' was renamed '*cluster.name*'.

HOST_DELETE

Severity	informational
Description	Host with name '*host.name*' was deleted.

CLUSTER_DELETE

Severity	informational
Description	Cluster with name '*cluster.name*' was deleted.

HOST_ADD_PORT

Severity	informational
Description	Port of type *type* and ID '*port_name*' was added to Host with name '*host.name*'.

CLUSTER_ADD_HOST

Severity	informational
Description	Host with name '*host.name*' was added to Cluster with name '*cluster.name*'.

HOST_REMOVE_PORT

Severity	informational
Description	Port of type *type* and ID '*port_name*' was removed from Host with name '*host.name*' was deleted.

CLUSTER_REMOVE_HOST

Severity	informational
Description	Host with name '*host.name*' was removed from Cluster with name '*cluster.name*'.

DESTINATION_DEFINE

Severity	informational
Description	Destination with name '*name*' was defined.

DESTINATION_UPDATE

Severity	informational
Description	Destination with name '*name*' was updated.

DESTINATION_DELETE

Severity	informational
Description	Destination with name '*name*' was deleted.

DESTINATION_RENAME

Severity	informational
Description	Destination with name '*old name*' was renamed '*new name*'.

DESTINATION_GROUP_CREATE

Severity	informational
Description	Destination Group with name '*name*' was created.

DESTINATION_GROUP_DELETE

Severity	informational
Description	Destination Group with name '*name*' was deleted.

DESTINATION_GROUP_RENAME

Severity	informational
Description	Destination Group with name '*old name*' was renamed '*new name*'.

DESTINATION_GROUP_ADD_DESTINATION

Severity	informational
Description	Destination with name '*destination name*' was added to destination group '*destgroup name*'.

DESTINATION_GROUP_REMOVE_DESTINATION

Severity	informational
Description	Destination with name '*destination name*' was removed from destination group '*destgroup name*'.

RULE_CREATE

Severity	informational
Description	Rule with name '*name*' was created.

RULE_UPDATE

Severity	informational
Description	Rule with name '*name*' was updated.

RULE_DELETE

Severity	informational
Description	Rule with name '*name*' was deleted.

RULE_RENAME

Severity	informational
Description	Rule with name '*old name*' was renamed '*new name*'.

SMTP_GATEWAY_DEFINE

Severity	informational
Description	SMTP gateway with name '*name*' was defined.

SMTP_GATEWAY_UPDATE

Severity	informational
Description	SMTP gateway with name '*name*' was updated.

SMTP_GATEWAY_DELETE

Severity	informational
Description	SMTP gateway with name '*name*' was deleted.

SMTP_GATEWAY_RENAME

Severity	informational
Description	SMTP gateway with name '*old name*' was renamed '*new name*'.

SMTP_GATEWAY_PRIORITIZE

Severity	informational
Description	SMTP gateways were prioritized; the new order is *order*.

SMTP_GATEWAY_FAILED

Severity	major
Description	SMTP gateway with name '*name*' has failed. It will not be used until *Retry Time*.

SMTP_GATEWAY_VIA_NODE_FAILED

Severity	warning
Description	Sending event *Event Code* (*Event Index*) through *SMTP Gateway* via *Module ID* has failed; Error message: '*Error Message*'.

SMS_GATEWAY_DEFINE

Severity	informational
Description	SMS gateway with name '*name*' was defined.

SMS_GATEWAY_UPDATE

Severity	informational
Description	SMS gateway with name '*name*' was updated.

SMS_GATEWAY_DELETE

Severity	informational
Description	SMS gateway with name '*name*' was deleted.

SMS_GATEWAY_RENAME

Severity	informational
Description	SMS gateway with name '*old name*' was renamed '*new name*'.

SMS_GATEWAY_PRIORITIZE

Severity	informational
Description	SMS gateways were prioritized; the new order is *order*.

EVENTS_WERE_DISCARDED

Severity	variable
Description	*Number of events* pending events of maximal severity '*maximal severity*' were discarded because of overload.
Troubleshooting	Please contact support.

CONS_GROUP_CREATE

Severity	informational
Description	Consistency Group with name '*cg.name*' was created.

CONS_GROUP_CREATE_FAILED_TOO_MANY

Severity	warning
Description	Consistency Group with name '*name*' could not be created. You are attempting to add more Consistency Groups than the system permits.
Troubleshooting	Delete Consistency Groups to allow new ones to be created.

CONS_GROUP_RENAME

Severity	informational
Description	Consistency Group with name '*old_name*' was renamed '*cg.name*'.

CONS_GROUP_DELETE

Severity	informational
Description	Consistency Group with name '*cg.name*' was deleted.

CONS_GROUP_ADD_VOLUME

Severity	informational
Description	Volume with name '*volume.name*' was added to Consistency Group with name '*cg.name*'.

SLAVE_CONS_GROUP_ADD_VOLUME

Severity	informational
Description	Volume with name '*volume.name*' was added to Consistency Group with name '*cg.name*' by its remote peer.

CONS_GROUP_REMOVE_VOLUME

Severity	informational

Description	Volume with name '*volume.name*' was removed from Consistency Group with name '*cg.name*'.

SLAVE_CONS_GROUP_REMOVE_VOLUME

Severity	informational
Description	Volume with name '*volume.name*' was removed from Consistency Group with name '*cg.name*' by its remote peer.

CONS_GROUP_SNAPSHOTS_CREATE

Severity	informational
Description	Snapshot Group for Consistency Group with name '*cg.name*' was created with name '*cs_name*'.

CONS_GROUP_SNAPSHOTS_CREATE_FAILED_TOO_MANY

Severity	warning
Description	Snapshot Group for Consistency Group '*cg.name*' could not be created. You are attempting to add more Volumes than the system permits.
Troubleshooting	Delete Volumes to allow new ones to be created.

CONS_GROUP_SNAPSHOTS_OVERWRITE

Severity	informational
Description	Snapshot Group named '*cs_name*' was overriden for Consistency Group with name '*cg.name*'.

SLAVE_CONS_GROUP_SNAPSHOTS_CREATE

Severity	informational
Description	Mirrored Snapshot Group for Consistency Group with name '*cg.name*' was created with name '*cs_name*'.

SLAVE_CONS_GROUP_SNAPSHOTS_OVERWRITE

Severity	informational
Description	Mirrored Snapshot Group named '*cs_name*' was overriden for Consistency Group with name '*cg.name*'.

MIRROR_CONS_GROUP_SNAPSHOTS_CREATE

Severity	informational
Description	Mirrored Snapshot Group for Consistency Group with name '*cg.name*' was created with name '*cs_name*'.

MIRROR_CONS_GROUP_SNAPSHOTS_OVERWRITE

Severity	informational
Description	Mirrored Snapshot Group named '*cs_name*' was overriden for Consistency Group with name '*cg.name*'.

MIRROR_SNAPGROUP_CREATE_FAILED

Severity	minor
Description	Remote snapshot group named '*snapshot group name*' was not created successfully. Error code is '*error*'

SNAPSHOT_GROUP_RESTORE

Severity	informational
Description	Volumes were restored from Snapshot Group with name '*cs_name*'.

SNAPSHOT_GROUP_RENAME

Severity	informational
Description	Snapshot Group with name '*cs_name*' were renamed to '*new_name*'.

SNAPSHOT_GROUP_DUPLICATE

Severity	informational
Description	All Snapshots in Snapshot Group with name '*cs_name*' were duplicated. Duplicate Snapshot Group is named '*new_cs_name*'.

SNAPSHOT_GROUP_FORMAT

Severity	informational
Description	All Snapshots in Snapshot Group with name '*cs_name*' were formatted'.

SNAPSHOT_GROUP_DELETE

Severity	informational
Description	All Snapshots in Snapshot Group with name '*cs_name*' were deleted.

SNAPSHOT_GROUP_CHANGE_PRIORITY

Severity	informational
Description	Deletion Priority of all Snapshots in Snapshot Group with name '*cs_name*' were changed from '*old priority*' to '*new priority*'.

SNAPSHOT_GROUP_LOCK

Severity	informational
Description	All Snapshots in Snapshot Group with name '*cs_name*' were locked.

SNAPSHOT_GROUP_UNLOCK

Severity	informational
Description	All Snapshots in Snapshot Group with name '*cs_name*' were unlocked.

SNAPSHOT_GROUP_DELETED_DUE_TO_POOL_EXHAUSTION

Severity	informational
Description	All Snapshots in Snapshot Group with name '*snapshot.sg_name*' have been deleted because Storage Pool with name '*snapshot.pool_name*' is full.
Troubleshooting	

SNAPSHOT_GROUP_DISBAND

Severity	informational
Description	Snapshot Group with name '*cs_name*' was dismantled. All Snapshots which belonged to that Snapshot Group should be accessed directly.

CONS_GROUP_MOVE

Severity	informational
Description	Consistency Group with name '*cg.name*' has been moved from Storage Pool '*orig_pool.name*' to Pool '*pool.name*'.

TARGET_DEFINE

Severity	informational
Description	Target was defined named '*target.name*'.

TARGET_DEFINE_FAILED_TOO_MANY

Severity	warning
Description	Target could not be defined. You are attempting to define more targets than the system permits.
Troubleshooting	Delete targets to allow new ones to be defined.

TARGET_RENAME

Severity	informational

Description	Target named '*old_name*' was renamed '*target.name*'.

TARGET_DELETE

Severity	informational
Description	Target named '*target.name*' was deleted.

TARGET_ALLOW_ACCESS

Severity	informational
Description	Target '*target.name*' is allowed to access this machine.

TARGET_PORT_ADD

Severity	informational
Description	Port '*port_name*' was added to target named '*target.name*'.

TARGET_PORT_REMOVE

Severity	informational
Description	Port '*port_name*' was removed from target named '*target.name*'.

TARGET_PORT_ACTIVATE

Severity	informational
Description	Port '*port_name*' in target named '*target.name*' was activated.

TARGET_PORT_DEACTIVATE

Severity	informational
Description	Port '*port_name*' was deactivated in target named '*target.name*'.

TARGET_CONNECTIVITY_CREATE

Severity	informational
Description	Port '*Connection Remote Port Address*' of target named '*Connection Target Name*' is connected to the system through *Local FC Port*.

TARGET_ISCSI_CONNECTIVITY_CREATE

Severity	informational
Description	Port '*Connection Remote Port Address*' of target named '*Connection Target Name* is connected to the system through ip interface '*Local IP interface*'.

TARGET_CONNECTIVITY_CREATE_FAILED_TOO_MANY

Severity	warning
Description	Port could not be connected to the system. You are attempting to define more connections than the system permits.
Troubleshooting	Delete Connections to allow new ones to be created.

TARGET_CONNECTIVITY_DELETE

Severity	informational
Description	Port '*Connection Remote Port Address*' of target named '*Connection Target Name*' was disconnected from *Local FC Port*.

TARGET_ISCSI_CONNECTIVITY_DELETE

Severity	informational
Description	Port '*Connection Remote Port Address*' of target named '*Connection Target Name*' was disconnected from ip interface '*Local IP interface*'.

TARGET_CONNECTIVITY_ACTIVATE

Severity	informational
Description	Connectivity between Port '*Connection Remote Port Address*' of target named '*Connection Target Name*' and *Local FC Port* was activated.

TARGET_ISCSI_CONNECTIVITY_ACTIVATE

Severity	informational
Description	Connectivity between Port '*Connection Remote Port Address*' of target named '*Connection Target Name*' and ip interface '*Local IP interface*' was activated.

TARGET_CONNECTIVITY_DEACTIVATE

Severity	informational
Description	Connectivity between Port '*Connection Remote Port Address*' of target named '*Connection Target Name*' and *Local FC Port* was deactivated.

TARGET_ISCSI_CONNECTIVITY_DEACTIVATE

Severity	informational

Description	Connectivity between Port '*Connection Remote Port Address*' of target named '*Connection Target Name*' and ip interface '*Local IP interface*' was deactivated.

TARGET_CONNECTION_ESTABLISHED

Severity	informational
Description	Target named '*target.name*' is accessible through remote service *module_id*.

TARGET_CONNECTION_DISCONNECTED

Severity	minor
Description	Target named '*target.name*' is no longer accessible through remote service *module_id*.

TARGET_DISCONNECTED

Severity	major
Description	Target named '*target.name*' is no longer accessible through any gateway module.

TARGET_LINK_DOWN_BEYOND_THRESHOLD

Severity	major
Description	Target named '*target.name*' is not accessible for a long time.

SNAPSHOT_CREATE

Severity	informational
Description	Snapshot named '*snapshot.name*' was created for volume named '*volume.name*'.

SNAPSHOT_OVERWRITE

Severity	informational
Description	Snapshot named '*snapshot.name*' was overriden for volume named '*volume.name*'.

SNAPSHOT_FORMAT

Severity	informational
Description	Snapshot named '*snapshot.name*' was formatted.

SNAPSHOT_CREATE_FAILED_TOO_MANY

Severity	warning

Description	Snapshot for volume named '*volume.name*' could not be created. You are attempting to add more volumes than the system permits.
Troubleshooting	Delete volumes to allow new ones to be created.

SNAPSHOT_DUPLICATE

Severity	informational
Description	Snapshot named '*snapshot.name*' was created as duplicate of Snapshot named '*original_snapshot.name*'.

SNAPSHOT_DUPLICATE_FAILED_TOO_MANY

Severity	warning
Description	Snapshot named '*snapshot.name*' could not be duplicated. You are attempting to add more volumes than the system permits.
Troubleshooting	Delete volumes to allow new ones to be created.

SNAPSHOT_RESTORE

Severity	informational
Description	Volume named '*volume.name*' was restored from Snapshot named '*snapshot.name*'.

SNAPSHOT_CHANGE_PRIORITY

Severity	informational
Description	Snapshot Delete Priority of Snapshot named '*snapshot.name*' was changed from '*old_priority*' to '*snapshot.delete_priority*'.
Troubleshooting	

SNAPSHOT_DELETED_DUE_TO_POOL_EXHAUSTION

Severity	warning
Description	Snapshot named '*snap.name*' has been deleted because Storage Pool named '*snap.pool_name*' is full.
Troubleshooting	

MIRROR_SNAPSHOT_CREATE

Severity	informational
Description	Mirrored Snapshot named '*snapshot.name*' was created for volume named '*volume.name*'.

MIRROR_SNAPSHOT_CREATE_FAILED

Severity	minor
Description	Remote snapshot named '*snapshot name*' was not created successfully. Error code is '*error*'

MIRROR_SNAPSHOT_OVERWRITE

Severity	informational
Description	Mirrored Snapshot named '*snapshot.name*' was overriden for volume named '*volume.name*'.

MIRROR_SLAVE_SNAPSHOT_CREATE

Severity	informational
Description	Mirrored Snapshot named '*snapshot.name*' was created for volume named '*volume.name*'.

MIRROR_SLAVE_SNAPSHOT_OVERWRITE

Severity	informational
Description	Mirrored Snapshot named '*snapshot.name*' was overriden for volume named '*volume.name*'.

CACHE_ALLOCATION_NO_READ_CACHE

Severity	critical
Description	Cache had no read-cache pages available for allocation.
Troubleshooting	Look at traces for more details.

INVALID_ASYNC_ASSOC

Severity	critical
Description	Can not start async job without next job. volume uid *volume uid*
Troubleshooting	

INVALID_DATA_GENERATION_ID

Severity	critical
Description	Rejected write with id *write id* on volume *volume nr* for lba *lba*. Expected id is *expected id*
Troubleshooting	

CACHE_HAS_LESS_MEMORY

Severity	warning

Description	Data module has less memory than expected. node=*node* - *gb_missing* GB missing.
Troubleshooting	some of the DIMMs might have failed

UNUSUAL_CONF_LOCK_TIME

Severity	warning
Description	very long conf-lock duration. node=*node*, duration_msec=*duration*,
Troubleshooting	look at traces for more details.

XDRP_FLAGS_ON_AND_NO_MIRROR

Severity	critical
Description	partition *partition number* on volume *Volume* has xdrp flags but master volume *master volume* has no mirroring.
Troubleshooting	

FAILED_TO_ALLOC_FOR_REMOTE_FLAG

Severity	critical
Description	Failed to allocate partition number *partition number* on volume *volume* disk *disk id* when trying to mark bits for remote sync.
Troubleshooting	

FAILED_ALLOC_IN_REBUILD

Severity	critical
Description	Failed to allocate partition number *Partition Number* on volume *volume number* disk *disk id* during REBUILD.
Troubleshooting	

ACQUIRED_INVALID_PARTIION

Severity	critical
Description	Acquired invalid partition number *Partition Number* on volume *volume number*, flags *partition flags* reference count *reference count*.
Troubleshooting	

INVALID_PARTITION_STATIC_FLAG

Severity	critical
Description	Partition static flag doesn't match requested metadata static flag. Partition number *Partition number* volume *volume number* flags *partition flags* metadata flags *metadata flags*.

Troubleshooting	

SUSPECT_DATA_LOSS

Severity	critical
Description	Suspected data loss on Partition *Disk ID*, volume=*Volume*, logical-partition=*Logical Partition Number*, physical-partition=*Physical Partition Number*.
Troubleshooting	Verify that data is unreadable. Use backup data to recover.

SCRUBBING_CHECKSUM_DIFF

Severity	critical
Description	Scrubbing checksum diff. Primary: *Primary Disk*, checksum=*Primary Checksum* p_phy_part_nr=*p_phy_part_nr*; Secondary: *Secondary Disk* checksum=*Secondary Checksum* s_phy_part_nr=*s_phy_part_nr*; Volume=*Volume*, partition=*Logical Partition Nunber*.
Troubleshooting	Compare data on primary and secondary.

SCRUBBING_CHECKSUM_DIFF_RETRY_COUNT

Severity	critical
Description	Scrub passed partition *number of retries* times and found diffs *number of times diff found* times. primary: *Primary Disk* secondary: *Secondary Disk* volume=*Volume*, partition=*Logical Partition Nunber*.
Troubleshooting	Compare data on primary and secondary.

SCRUBBING_REMOTE_DIGEST_DIFF

Severity	critical
Description	Scrubbing found different digests in local and remote.disk *disk Tracks Diff Count* tracks are different. First diff track *Track* local: (*Local Digest 0*, *Local Digest 1*) Remote: (*Remote Digest 0*, *Remote Digest 1*), volume=*Volume*, partition=*Logical Partition Number*.
Troubleshooting	Compare data on primary and secondary.

SCRUBBING_FORMATTED_NOT_ZERO

Severity	critical
Description	Scrubbing found formatted partition with non zero checksum on *Disk ID*, partition=*phy_part_nr*, checksum=*checksum*.
Troubleshooting	Compare data on primary and secondary.

MEDIUM_ERROR_IN_DATA_MIGRATION

Severity	critical
Description	Medium error in data migration into volume '*Volume Name*' at LBA *LBA* for *Length* blocks.
Troubleshooting	Remote machine indicated Medium Error when read.

DISK_ERROR_SENSE_INFORMATION

Severity	minor
Description	Disk *Disk ID* had sense information indicating an error: *Sense Key Number*/*Sense Code Number 1*/*Sense Code Number 2* (FRU=*FRU Code*) *Sense Key - Sense Code*.
Troubleshooting	Comes together with other disk errors

DISK_MEDIUM_ERROR

Severity	variable
Description	Media errors on *Disk ID*, start LBA=*Start LBA*, last LBA=*Last LBA*, command=*command*, latency=*latency* msec.
Troubleshooting	

SSD_MEDIUM_ERROR

Severity	informational
Description	Media errors on *Disk ID*, start LBA=*Start LBA*, last LBA=*Last LBA*, command=*command*, latency=*latency* msec.
Troubleshooting	

SSD_DATA_INTEGRITY_ERROR_DETECTED

Severity	minor
Description	Read from SSD *Disk ID* failed the integrity check due to *Reason*, Page Number=*Page Number*
Troubleshooting	

ZERO_LENGTH_IO

Severity	warning
Description	Media errors on node=*node*, interface=*interface*, volume=*volume*, LBA=*LBA*, blk_cnt=*Block Count*.
Troubleshooting	

DISK_ABNORMAL_ERROR

Severity	major

Description	Unit attentions or aborts in the last 30 minutes on *Disk ID*, start lba=*start_lba*, last lba=*last_lba*, command =*command*, latency=*latency* msec.
Troubleshooting	

DISK_LONG_LATENCY

Severity	variable
Description	Long latencies on disk I/Os in the last 30 minutes on *Disk ID*, start LBA=*Start LBA*, last LBA=*Last LBA*, command =*command*, latency=*latency* msec.
Troubleshooting	

BUFFER_POOL_EMPTY

Severity	major
Description	The memory pool of cache buffers in node=*node* is exhausted. All *pool_size* buffers are allocated.
Troubleshooting	

DISK_BAD_PERFORMANCE

Severity	major
Description	Bad performance on *Disk ID*, I/O count=*I/O Count*, transferred kbytes=*kbytes*,seconds=*seconds*.
Troubleshooting	

ORPHANED_ASYNC_PARTITION

Severity	warning
Description	An active async job (*Job ID*) running on cache *node* disk *Disk ID* found partition *Logical partition number* of source and target snapshots to be the same partition. Master volume=*Master Volume*.
Troubleshooting	

USER_DEFINED

Severity	informational
Description	A user with name '*Name*' and category *Category* was defined.
Troubleshooting	

USER_DELETED

Severity	informational
Description	A user with name '*Name*' and category *Category* was deleted.

Troubleshooting	

USER_RENAMED

Severity	informational
Description	User with name '*Old Name*' was renamed '*New Name*'.
Troubleshooting	

USER_UPDATED

Severity	informational
Description	User with name '*Name*' was updated.
Troubleshooting	

USER_ADDED_TO_USER_GROUP

Severity	informational
Description	User '*User Name*' was added to user group '*User Group Name*'.
Troubleshooting	

USER_REMOVED_FROM_USER_GROUP

Severity	informational
Description	User '*User Name*' was removed from user group '*User Group Name*'.
Troubleshooting	

USER_GROUP_CREATED

Severity	informational
Description	A user group with name '*Name*' was created.
Troubleshooting	

USER_GROUP_DELETED

Severity	informational
Description	A user group with name '*Name*' was deleted.
Troubleshooting	

USER_GROUP_RENAMED

Severity	informational
Description	User group with name '*Old Name*' was renamed '*New Name*'.
Troubleshooting	

ACCESS_TO_HOST_GRANTED_TO_USER_GROUP

Severity	informational
Description	User group '*User Group Name*' was granted access to host '*Host Name*'.
Troubleshooting	

ACCESS_OF_USER_GROUP_TO_HOST_REMOVED

Severity	informational
Description	Access of User group '*User Group Name*' to host '*Host Name*' was removed.
Troubleshooting	

ACCESS_TO_CLUSTER_GRANTED_TO_USER_GROUP

Severity	informational
Description	User group '*User Group Name*' was granted access to cluster '*Cluster Name*'.
Troubleshooting	

ACCESS_OF_USER_GROUP_TO_CLUSTER_REMOVED

Severity	informational
Description	Access of User group '*User Group Name*' to cluster '*Cluster Name*' was removed.
Troubleshooting	

LDAP_AUTHENTICATION_ACTIVATED

Severity	informational
Description	LDAP authentication activated.
Troubleshooting	

LDAP_AUTHENTICATION_DEACTIVATED

Severity	warning
Description	LDAP authentication deactivated.
Troubleshooting	

LDAP_CONFIGURATION_CHANGED

Severity	warning
Description	LDAP configuration has changed.
Troubleshooting	

LDAP_CONFIGURATION_RESET

Severity	warning
Description	LDAP configuration has reset.
Troubleshooting	

USER_LOGIN_HAS_SUCCEEDED

Severity	informational
Description	User '*User Name*' from IP '*Client Address*' successfully logged into the system.
Troubleshooting	

USER_LOGIN_HAS_FAILED

Severity	warning
Description	User '*User Name*' from IP '*Client Address*' failed logging into the system.
Troubleshooting	

USER_HAS_FAILED_TO_RUN_COMMAND

Severity	warning
Description	User '*User Name*' from IP '*Client Address*' failed authentication when trying to run command '*Command Line*'.
Troubleshooting	

LDAP_SERVER_INACCESSIBLE

Severity	minor
Description	LDAP server *FQDN* is inaccessible.
Troubleshooting	

LDAP_SERVER_ACCESSIBLE

Severity	informational
Description	LDAP server *FQDN* is now accessible.
Troubleshooting	

LDAP_SSL_CERTIFICATE_ABOUT_TO_EXPIRE

Severity	warning
Description	SSL Certificate of LDAP server '*Server FQDN*' is about to expire on *Expiration Date* (*Counter* notification).
Troubleshooting	

LDAP_SERVER_WAS_ADDED

Severity	informational
Description	LDAP server '*Server FQDN*' was added to the system.
Troubleshooting	

LDAP_SERVER_WAS_REMOVED

Severity	informational
Description	LDAP server '*Server FQDN*' was removed from the system.
Troubleshooting	

CR_KEY_SETUP_OK

Severity	informational
Description	Challenge-response key was successfully set on all modules in the system.
Troubleshooting	

CR_KEY_UPGRADE_NOT_DONE

Severity	warning
Description	Challenge-response key was not upgraded on the system since a valid key has been previously set.
Troubleshooting	

CR_KEY_SETUP_FAILED

Severity	major
Description	Failed to set challenge-response key on module '*Component ID*'.
Troubleshooting	

SSH_REVOKE_KEY_OK

Severity	informational
Description	Authorized SSH key ending with '*Tail of Authorized SSH key*' was successfully revoked for user '*Unix Account Name*' on all modules in the system.
Troubleshooting	

SSH_REVOKE_KEY_FAILED

Severity	major
Description	Failed to revoke authorized SSH key ending with '*Tail of Authorized SSH key*' for user '*Unix Account Name*' on module '*Component ID*'.

Troubleshooting	

COMPONENT_TEST_HAS_FAILED

Severity	minor
Description	Test of *Component ID* has failed. Failure reason: *Failure Reason*.
Troubleshooting	Please contact support.

COMPONENT_TEST_SUCCEEDED

Severity	informational
Description	Test of *Component ID* succeeded.
Troubleshooting	Please contact support.

MODULE_COMPONENT_TEST_STARTED

Severity	informational
Description	Test of *Component ID* started.
Troubleshooting	

COMPONENT_WAS_PHASED_OUT

Severity	informational
Description	*Component ID* was phased-out.
Troubleshooting	

COMPONENT_WAS_FAILED

Severity	informational
Description	Component *Component ID* was marked as failed.
Troubleshooting	

COMPONENT_FAILURE_WAS_CANCELED

Severity	informational
Description	Component *Component ID* failure status was reset.
Troubleshooting	

COMPONENT_WAS_PHASED_IN

Severity	informational
Description	*Component ID* was phased-in.
Troubleshooting	

COMPONENT_WAS_EQUIPPED

Severity	informational
Description	*Component ID* was equipped.
Troubleshooting	

COMPONENT_WAS_UNEQUIPPED

Severity	informational
Description	*Component ID* was unequipped.
Troubleshooting	

INTERFACE_SERVICES_ACTIVATED

Severity	informational
Description	Interface services of *Module ID* were activated.
Troubleshooting	

INTERFACE_SERVICES_DEACTIVATED

Severity	informational
Description	Interface services of *Module ID* were deactivated.
Troubleshooting	

MIRRORING_CONNECTIVITY_TO_NON_XIV_TARGET

Severity	warning
Description	Gateway Node #*Node ID*: connection to *target's UID*:*target's connection index* mirroring connection was established, but being ignored because the remote end is not an XIV target or is not properly configured
Troubleshooting	Please make sure the target's designation is correct, that the connection's parameters identify the intended system and that the intended system has a target_port defined for this system.

DM_CONNECTIVITY_TO_XIV_TARGET

Severity	warning
Description	Gateway Node #*Node ID*: connection to *target's UID*:*target's connection index* DM connection was established, but being ignored because the remote end is an XIV target configured for mirroring, rather than a host
Troubleshooting	Please make sure the target's designation is correct, that the connection's parameters identify the intended system and that the intended system has a host defined for this system (and not a target_port).

DISK_CHANGE_WAS_DETECTED

Severity	informational
Description	*Component ID* has been changed from a *Old Model* with a serial of *Old Serial* and with a firmware of *Old Firmware* to a *New Model* with a serial of *New Serial* and with a firmware of *New Firmware*.
Troubleshooting	Confirm that the disk replacement was intended.

TAKEN_OVER

Severity	informational
Description	Module *Module ID* has taken over as *Singleton Node ID*.

EMERGENCY_ROOT_ACCESS

Severity	warning
Description	Emergency login to 'root' account on module '*Component ID*' from '*IP Address*' using key number '*Authorized Key Number*'.
Troubleshooting	

EMERGENCY_CONSOLE_ACCESS

Severity	warning
Description	Emergency login to '*Unix Account Name*' account on module '*Component ID*' from tty '*TTY Device*'.
Troubleshooting	

CR_BYPASS_ACCESS

Severity	warning
Description	*Command that bypasses CR mechanism* access to '*Unix Account Name*' account on module '*Component ID*' from '*IP Address*'.
Troubleshooting	

CLEAR_FACTORY_SETTINGS_STARTED

Severity	informational
Description	Started clear factory settings.
Troubleshooting	Please contact support.

CLEAR_FACTORY_SETTINGS_FINISHED

Severity	informational
Description	Finished clear factory settings.
Troubleshooting	Please contact support.

CLEAR_FACTORY_SETTINGS_FAILED

Severity	critical
Description	Failed to finish clear factory settings.
Troubleshooting	Please contact support.

IB_SWITCH_CONFIG_FAILED

Severity	warning
Description	*Component ID* could not be configured; *reason*
Troubleshooting	Please contact support

IB_SWITCH_IS_NOT_ANSWERING

Severity	warning
Description	*Component ID* is not answering
Troubleshooting	Please contact support

IB_SWITCH_BEGAN_ANSWERING

Severity	informational
Description	*Component ID* began answering after a period it did not

IB_SWITCH_HAS_POWER_FAILURE

Severity	warning
Description	Power supply #*PS Number* failure for *Component ID*.
Troubleshooting	Check power cables

IB_SWITCH_POWER_RESTORED

Severity	informational
Description	Power supply #*PS Number* restored for *Component ID*.

IB_SWITCH_HAS_FAN_FAILURE

Severity	warning
Description	Fan #*fan* failure for *Component ID*.
Troubleshooting	Check fans, replace switch

IB_SWITCH_FAN_RESTORED

Severity	informational
Description	Fan #*fan* restored for *Component ID*.

IB_SWITCH_HAS_TEMPERATURE

Severity	variable
Description	*Component ID* - temperature of *temperature sesnsor* is *temperature* degrees.
Troubleshooting	Please contact support.

IB_SWITCH_HAS_VOLTAGE

Severity	variable
Description	Voltage #*voltage number* is *Voltage* Milli Volt and deviation from expected voltage is *Voltage Deviation* Milli Volt (which is *Voltage Deviation Percent*%) for *Component ID*.
Troubleshooting	Check voltage, replace switch

IB_SWITCH_BAD_INDICATION

Severity	warning
Description	We got bad indication of type *Indication* for *Component ID*.
Troubleshooting	Check switch

IB_SWITCH_BAD_MANAGEMENT_WIRING

Severity	warning
Description	The wiring for IB switch management is incorrect. IB switch *Component ID* should be connected to module *Component ID*
Troubleshooting	Check wiring

IB_SWITCH_FIRMWARE_INCOMPATIBLE

Severity	warning
Description	The firmware version of '*Component ID*' is '*New Version*'. It should be '*Old Version*'. Firmware will be updated. It may take a while.
Troubleshooting	Wait for IB switch to complete initialization.

IB_SWITCH_FIRMWARE_UPDATED

Severity	informational
Description	The firmware version of '*Component ID*' was updated to '*New Version*'.
Troubleshooting	None.

IB_SWITCH_PORT_POWER_UP_FAILED

Severity	minor

Description	Power up failed for port '*Component ID*'
Troubleshooting	Please contact support

IB_SWITCH_PORT_ACTIVATION_FAILED

Severity	minor
Description	Power up failed for port '*Component ID*'
Troubleshooting	Please contact support

MODULE_HAS_ACQUIRED_DHCP_ADDRESS

Severity	informational
Description	Module *Module ID* acquired DHCP address as part of the module equip process

UPS_IS_NOT_OK

Severity	major
Description	*Component ID* is currently not functioning, Reason: *Problem Code*.
Troubleshooting	Please contact support.

UPS_IS_OK

Severity	warning
Description	*Component ID* is currently functioning.
Troubleshooting	

UPS_RACK_STATUS_CHANGE

Severity	informational
Description	Rack *Rack ID* UPSs are in the following states: UPS:1=*UPS 1 State* UPS:2=*UPS 2 State* UPS:3=*UPS 3 State*.

UPS_WAS_RECONFIGURED

Severity	informational
Description	New configuration was uploaded to *Component ID*.

UPS_WAS_NOT_RECONFIGURED

Severity	warning
Description	Unable to load new configuration to *Component ID*.

UPS_NEEDS_A_FIRMWARE_UPGRADE

Severity	informational
Description	UPS *Component ID* needs firmware upgrade

AOS_FILE_UPLOADED_TO_UPS

Severity	informational
Description	AOS bios file was uploaded to *Component ID*.

SUMX_FILE_UPLOADED_TO_UPS

Severity	informational
Description	SUMX application file was uploaded to *Component ID*.

UPS_SELF_TEST_HAS_STARTED

Severity	informational
Description	A UPS self-test was started on UPS *Component ID*.

UPS_SELF_TEST_HAS_PASSED

Severity	informational
Description	A UPS self-test has passed on UPS *Component ID*.

UPS_SELF_TEST_HAS_FAILED

Severity	major
Description	A UPS self-test has failed on UPS *Component ID*.

UPS_SELF_TEST_WAS_SKIPPED

Severity	warning
Description	A UPS self-test for UPS *Component ID* has been skipped since not all UPS's are OK.

UPS_SELF_TEST_IS_POSSIBLY_INACCURATE

Severity	informational
Description	A UPS self-test for *Component ID* might be inaccurate, capacity is *Battery Capacity* and is lower or equal to the minimum capacity *Minimum Capacity for Self Test*.

UPS_NEEDS_A_MANUAL_SELF_TEST

Severity	warning
Description	*Component ID* finished component test but it requires a manual self-test.

Troubleshooting	A component test should include self-testing, due to network link failure to the UPS a manual self-test is needed by waiting for full charge of the UPS and then pressing the UPS self-test button.

UPS_WAS_SUCCESSFULLY_UPGRADED

Severity	informational
Description	A UPS firmware upgrade has been successfully completed on UPS *Component ID*.

UPS_UPGRADE_HAS_FAILED

Severity	warning
Description	A UPS firmware upgrade has failed on UPS *Component ID*.

UPS_WILL_BE_CONFIGURED_NOW

Severity	informational
Description	UPS *Component ID* will be loaded with new configuration file due to *Configure Reason*.

UPS_CHANGE_DETECTED

Severity	informational
Description	*Component ID* has been changed from a serial of *old_serial* to *new_serial*.
Troubleshooting	If UPS replacement was intended, there is no problem.

UPS_SELF_TEST_TIMED_OUT

Severity	warning
Description	*Component ID* self-test failed to complete in reasonable time.
Troubleshooting	

UPS_CLOCK_OUT_OF_SYNC

Severity	minor
Description	*Component ID* clock is more than a day out of sync
Troubleshooting	If it repeats, contact support

UPS_POWER_LOAD_PERCENT_TOO_HIGH

Severity	major
Description	UPS *Component ID* has power load percent of *Power Load Percent*.

Troubleshooting	If it repeats, contact support

UPS_POWER_LOAD_PERCENT_OK

Severity	minor
Description	The power load percent of UPS *Component ID* is now OK.
Troubleshooting	

UPS_REMAINING_RUNTIME_TOO_LOW

Severity	critical
Description	UPS *Component ID* has a remaining runtime of *Remaining Runtime* minutes, this value might not be enough for an emergency shutdown in case of a power failure.
Troubleshooting	Contact support

UPS_REMAINING_RUNTIME_OK

Severity	minor
Description	UPS *Component ID* has a remaining runtime of *Remaining Runtime* minutes, this value should be enough for an emergency shutdown in case of a power failure.
Troubleshooting	

UPS_PREDICTIVE_REMAINING_RUNTIME_TOO_LOW

Severity	major
Description	UPS *Component ID* has a remaining runtime of *Remaining Runtime* minutes, but the time will drop to *Predictive Remaining Runtime* minutes in case one of the other UPSes stops working.
Troubleshooting	Contact support

UPS_PREDICTIVE_REMAINING_RUNTIME_OK

Severity	informational
Description	UPS *Component ID* has a remaining runtime of *Remaining Runtime* minutes, the time will drop to *Predictive Remaining Runtime* minutes in case one of the other UPSes stops working.
Troubleshooting	Contact support

ATS_STATUS_UNSTABLE

Severity	informational
Description	Two consecutive readouts from *Component ID* were not equal.

Troubleshooting	If this persists contact support.

ATS_BAD_REPLY

Severity	warning
Description	Invalid reply from ATS *Component ID*, possible ATS failure.
Troubleshooting	

ATS_SET_INPUT_LINE

Severity	informational
Description	ATS *Component ID* input line will be set to J*Input Line*.
Troubleshooting	

ATS_SET_INPUT_LINE_FAILURE

Severity	warning
Description	Failed setting ATS *Component ID* input line to J*Input Line*.
Troubleshooting	Try running command again, make sure input line wasn't switched by using ats_list and/or looking at the ATS LEDs. If all fail, switch the lines manually by disconnecting one input line and reconnecting it.

ATS_SET_INPUT_TO_DOWN_LINE

Severity	warning
Description	Line J*Input Line* of ATS *Component ID* is down, will not switch input line.
Troubleshooting	Make sure the target input line is up and functioning and try again.

ATS_NO_REDUNDANCY

Severity	warning
Description	Line J*Input Line* of ATS *Component ID* is down, there is no input line redundancy.
Troubleshooting	Contact support

UPS_HAS_TEMPERATURE

Severity	variable
Description	*Component ID* - temperature is *temperature* degrees. Serial *serial*.
Troubleshooting	Please contact support.

UPS_CALIBRATION_PENDING

Severity	informational
Description	UPS calibration is pending for *Componend ID*.

UPS_CALIBRATION_STARTED

Severity	informational
Description	UPS *Origin* calibration started for *Componend ID*.

UPS_CALIBRATION_PASSED

Severity	informational
Description	UPS calibration passed for *Componend ID*.

UPS_CALIBRATION_FAILED

Severity	major
Description	UPS calibration failed for *Componend ID*.

UPS_CALIBRATION_CANCELED

Severity	informational
Description	UPS calibration canceled for *Componend ID*, due to *Origin* cancel.

UPS_DISABLED

Severity	informational
Description	*Component ID* has been disabled (will not be monitored).

UPS_ENABLED

Severity	informational
Description	*Component ID* has been enabled.

UPS_NETWORK_LINK_UP

Severity	warning
Description	Network link to *Component ID* was regained.
Troubleshooting	

UPS_NETWORK_LINK_IS_DOWN

Severity	critical
Description	Network link to UPS *Component ID* is down.
Troubleshooting	Please contact support.

UPS_SERIAL_LINK_UP

Severity	warning
Description	Serial link to *Component ID* was regained.
Troubleshooting	

UPS_SERIAL_LINK_DOWN

Severity	warning
Description	Serial link to UPS *Component ID* is down.
Troubleshooting	Please contact support.

UPS_CABLE_CHECK_FAILED

Severity	minor
Description	Cable check of *Component ID* failed, either its serial or network cables are crosswired with *Hostname*.
Troubleshooting	Either the cable is disconnected or network and serial cables are miswired.

UPS_CABLE_CHECK_PASSED

Severity	informational
Description	Cable check of *Component ID* passed.

UPS_CABLE_CHECK_CONNECTION_FAILED

Severity	minor
Description	Cable check of *Component ID* failed, cannot connect to *Failed Link* link.
Troubleshooting	Failed to access the UPS through serial or network link, contact support.

ATS_LINK_UP

Severity	warning
Description	Link to ATS *Component ID* was regained.
Troubleshooting	

ATS_LINK_DOWN

Severity	warning
Description	Link to ATS *Component ID* is down.
Troubleshooting	Please contact support.

ATS_LINE_INPUT_IS_OFF

Severity	major
Description	ATS *Component ID* input line J*Line* turned off.
Troubleshooting	

ATS_LINE_INPUT_IS_ON

Severity	informational
Description	ATS *Component ID* input line J*Line* turned on.
Troubleshooting	

ATS_LINE_OUTPUT_OFF

Severity	major
Description	ATS *Component ID* output line *Name* turned off.
Troubleshooting	Please contact support.

ATS_LINE_OUTPUT_ON

Severity	informational
Description	ATS *Component ID* output line *Name* turned on.
Troubleshooting	

ATS_SOURCE_HAS_SWITCHED

Severity	informational
Description	ATS *Component ID* source line switched from J*Previous* to J*Current*.
Troubleshooting	

ATS_SOURCE_HAS_SWITCHED_FOR_OUTLET

Severity	informational
Description	ATS *Component ID* source line for outlet P*Outlet*switched from J*Previous* to J*Current*.
Troubleshooting	

ATS_INPUT_LINE_OVER_CURRENT

Severity	warning
Description	Over-Current on ATS *Component ID* input line J*Line, Phase*.
Troubleshooting	Please contact support.

ATS_INPUT_LINE_CURRENT_RECOVERY

Severity	informational
Description	Recovered from over-current on ATS *Component ID* input line J*Line, Phase*.
Troubleshooting	

ATS_OUTLET_OVER_CURRENT

Severity	warning
Description	Over-Current on ATS *Component ID* outlet P*Outlet*.
Troubleshooting	Please contact support.

ATS_OUTLET_CURRENT_RECOVERY

Severity	informational
Description	Recovered from over-current on ATS *Component ID* outlet P*Outlet*.
Troubleshooting	

ATS_FAILED

Severity	minor
Description	ATS *Component ID* exhibits a failure state.
Troubleshooting	Please contact support.

ATS_RECOVERED

Severity	informational
Description	ATS *Component ID* exited from the failure state.
Troubleshooting	

MODULE_NO_IP_CONNECTIVITY

Severity	warning
Description	There is no IP connectivity to failed *Component Id*.
Troubleshooting	Information sent to event center in case of module failure.

MODULE_NO_BMC_CONNECTIVITY

Severity	warning
Description	There is no BMC connectivity to failed *Component Id*.
Troubleshooting	Information sent to event center in case of module failure.

MODULE_FAILED_WAS_POWERED_OFF

Severity	critical
Description	The failed module *Failed module* has been powered off.
Troubleshooting	Information sent to event center in case of module failure.

MODULE_FAILED_WAS_NOT_POWERED_OFF

Severity	critical
Description	The failed module *Failed module* has not been powered off as a failsafe due to *Failed IPMI module* not having IPMI set.
Troubleshooting	Information sent to event center in case of module failure.

MODULE_FAILED_COULD_NOT_BE_POWERED_OFF

Severity	critical
Description	The failed module *Failed module* could not be powered off.
Troubleshooting	Information sent to event center in case of module failure.

MODULE_FAILED_SHOULD_BE_POWERED_OFF

Severity	critical
Description	The failed module *Failed module* should be powered off based upon *Log String*.
Troubleshooting	Information sent to event center in case of module failure.

MODULE_SDR_INFO

Severity	critical
Description	*Component ID* IPMI SDR info.

MSR_CPU_REG_INFO

Severity	critical
Description	*Component ID* MSR CPU registers info.

MODULE_SDR_EVENT_FAILURE

Severity	critical
Description	*Component ID* IPMI SDR Event Error.

MODULE_SEL_LOG

Severity	critical
Description	*Component ID*:[*Index*] *Log string*.
Troubleshooting	Please contact support.

MODULE_MCH_DATA

Severity	critical
Description	*Component ID*:[*Bus.Device.Function*] *Count* lines *Log string*.
Troubleshooting	Please contact support.

MODULE_FAILURE_DATA

Severity	critical
Description	*Component ID*: *Count* lines *Log string*.
Troubleshooting	Please contact support.

CONNECTION_TO_MAINTENANCE_MODULE_IS_OK

Severity	informational
Description	The Maintenance module can now be reached from *Component ID*.
Troubleshooting	Please contact support

NO_CONNECTION_TO_MAINTENANCE_MODULE

Severity	critical
Description	The Maintenance module can not be reached from *Component ID*.
Troubleshooting	Please contact support

MODULE_TEMPERATURE_INCONSISTENT_WITH_OTHERS

Severity	warning
Description	*Component ID* external temperature not consistent with other modules.

SYSTEM_TEMPERATURE_IS_HIGH

Severity	warning
Description	System temperature is *System Temperature*C, which is high. It approaches the maximal allowable value.
Troubleshooting	Cool the system down.

SYSTEM_TEMPERATURE_IS_HIGH_AND_STABILIZING

Severity	warning
Description	System temperature is *System Temperature*C. It is stabilizing, but still close to the maximal allowable value.
Troubleshooting	Cool the system down.

SYSTEM_TEMPERATURE_IS_CRITICALLY_HIGH

Severity	critical
Description	System temperature is *System Temperature*C, which is critically high. Shutting down the system.
Troubleshooting	Contact support.

SYSTEM_TEMPERATURE_IS_CRITICALLY_HIGH_SHUTDOWN_IMMEDIATELY

Severity	critical
Description	System temperature is *System Temperature*C - which is critically high - but automatic shutdown is disabled. Shut down the system immediately!
Troubleshooting	Cool the system down immediately or shut down the system using 'shutdown -y' and contact support.

SYSTEM_TEMPERATURE_IS_TOO_HIGH_AND_STABILIZING

Severity	major
Description	System temperature is *System Temperature*C. It is stabilizing, but is still higher than the maximal allowable value.
Troubleshooting	Contact support.

SYSTEM_TEMPERATURE_IS_TOO_HIGH

Severity	major
Description	System temperature is *System Temperature*C, which is higher than the maximal allowable value.
Troubleshooting	Contact support.

SYSTEM_TEMPERATURE_IS_OK_NOW

Severity	informational
Description	System temperature is *System Temperature*C, which is within allowed limits.
Troubleshooting	

SYSTEM_TEMPERATURE_RISES_SUSPICIOUSLY_FAST

Severity	warning

Description	System temperature rises suspiciously fast. Check air conditioning system.
Troubleshooting	Check air conditioning system or contact support.

SERVICE_MODE_OF_SYSTEM_HAS_CHANGED

Severity	variable
Description	Service mode of system has changed. The urgency of service actions has changed from *Previous Maintenance Urgency* to *Maintenance Urgency*

MEMORY_COMMITMENT_IS_NEAR_LIMIT

Severity	warning
Description	*module* is *difference* KB below memory commit limit - a low margin.
Troubleshooting	Please contact support

MEMORY_COMMITMENT_OK

Severity	informational
Description	*module* is *difference* KB below memory commit limit - returned to a safe margin.
Troubleshooting	There is no problem at the moment.

HAS_TOO_MANY_PROCESSES

Severity	critical
Description	*module* has *processes* processes running.
Troubleshooting	Please contact support

DISK_FIRMWARE_NOT_UPGRADEABLE

Severity	major
Description	*Component ID* - failed firwmare upgrade.
Troubleshooting	Please contact support.

DISK_FAILED_SHORT_STANDARD_TEST

Severity	major
Description	*Component ID* - Failed short standard test.
Troubleshooting	Please contact support.

DISK_BMS_ERROR_DETECTED

Severity	informational

Description	*Component ID* - BMS error detected: *Sense Key/Additional Sense Code/Additional Sense Code Qualifier Sense Key - Sense Code*.
Troubleshooting	Please contact support.

SATA_SMART_STATUS_READING_FAILED

Severity	warning
Description	reading SMART attributes of Disk ID failed. SMART trip value=
Troubleshooting	Please contact support.

DISK_SMART_STATUS_BAD

Severity	critical
Description	*Component ID* - SMART status: Bad.
Troubleshooting	Please contact support.

DISK_SMART_STATUS_GOOD

Severity	informational
Description	*Component ID* - SMART status: Good.
Troubleshooting	Please contact support.

DISK_SMART_READING_FAILED

Severity	warning
Description	*Component ID* - SMART reading failed.
Troubleshooting	Please contact support.

DISK_SMART_READING_OK

Severity	informational
Description	*Component ID* - SMART reading OK.
Troubleshooting	Please contact support.

SES_STATUS_IS_ABNORMAL_NOW

Severity	warning
Description	On *module* SES component '*Sensor Name*' is in state '*State*'.
Troubleshooting	Please contact support.

SES_ALARM_IS_SIGNALING

Severity	warning
Description	On *module* alarm of type '*Component type*' is signaling.

Troubleshooting	Please contact support.

SES_ALARM_NO_LONGER_SIGNALING

Severity	informational
Description	On *module* alarm of type '*Component type*' is no longer signaling.
Troubleshooting	Please contact support.

SES_DOOR_LATCH_UNLOCKED

Severity	warning
Description	The door latch on module *module* is unlocked.
Troubleshooting	Please contact support.

SES_PDB_FAILURE

Severity	major
Description	The PDB on module *module* has failed.
Troubleshooting	Please contact support.

SES_PDB_WARNING_ON

Severity	warning
Description	The PDB on module *module* displays some warning conditions.
Troubleshooting	Please contact support.

SES_PDB_IS_WORKING

Severity	informational
Description	The PDB module *module* is working now.
Troubleshooting	

SES_BMC_ERROR_SIGNAL

Severity	warning
Description	The BMC on module *module* signals an error.
Troubleshooting	Please contact support.

SES_BMC_IS_OK_NOW

Severity	informational
Description	The BMC on module *module* is OK now.
Troubleshooting	

SES_ALARM_LED_IS_SIGNALING

Severity	warning
Description	On *module* alarm of type '*Component type* (*LED type*)' is signaling.
Troubleshooting	Please contact support.

SES_ALARM_LED_NO_LONGER_SIGNALING

Severity	informational
Description	On *module* alarm of type '*Component type* (*LED type*)' is no longer signaling.
Troubleshooting	Please contact support.

SES_EXPANDER_RESET

Severity	warning
Description	The SES expander on *module* has been reset. Reset type was: *Reset type*.
Troubleshooting	Please contact support.

COMPONENT_TEMPERATURE_IS_NORMAL

Severity	informational
Description	*Component ID* temperature is *temperature*. The temperature is normal.

COMPONENT_TEMPERATURE_IS_HIGH

Severity	warning
Description	*Component ID* temperature is *temperature*. The temperature is high.

COMPONENT_TEMPERATURE_IS_HIGH_AND_STABILIZING

Severity	warning
Description	*Component ID* temperature is *temperature*. The temperature is stabilizing, but still high.

COMPONENT_TEMPERATURE_IS_ABNORMALLY_HIGH

Severity	minor
Description	*Component ID* temperature is *temperature*. The temperature is abnormally high.

COMPONENT_TEMPERATURE_IS_ABNORMALLY_HIGH_AND_STABILIZING

Severity	minor

Description	*Component ID* temperature is *temperature*. The temperature is stabilizing, but still abnormally high.

COMPONENT_TEMPERATURE_IS_VERY_HIGH

Severity	major
Description	*Component ID* temperature is *temperature*. The temperature is very high and may effect on component performance or even damage it.

COMPONENT_TEMPERATURE_IS_VERY_HIGH_AND_STABILIZING

Severity	major
Description	*Component ID* temperature is *temperature*. The temperature is stabilizing, but still very high.

COMPONENT_TEMPERATURE_IS_EXTREMELY_HIGH

Severity	critical
Description	*Component ID* temperature is *temperature*. The temperature is extremely high. The component may immediately fail and permanent damage may occur.

COMPONENT_TEMPERATURE_IS_RISING

Severity	warning
Description	*Component ID* temperature is *temperature*. Temperature is rising.

COMPONENT_TEMPERATURE_IS_STABILIZING

Severity	warning
Description	*Component ID* temperature is *temperature*. Temperature is stabilizing.

DISK_MEDIA_PRE_SCAN_ON

Severity	warning
Description	*Component ID* - Disk media pre scan is ON.
Troubleshooting	Please contact support.

DISK_MEDIA_PRE_SCAN_OFF

Severity	informational
Description	*Component ID* - Disk media pre scan is OFF.
Troubleshooting	Please contact support.

SES_FAN_HAS_SPEED_CHANGED

Severity	informational
Description	*Fan* speed changed from *Previous RPM* RPM to *New RPM* RPM.

SES_FAN_STATUS_OK

Severity	informational
Description	*Fan* is now OK.

SES_FAN_STATUS_BAD

Severity	warning
Description	*Fan* is failed or off.

SES_PSU_STATUS_HAS_CHANGED

Severity	variable
Description	*psu* changed state from *old_state* to *new state*.

SES_AMBIENT_TEMPERATURE_SEVERITY_CHANGED

Severity	variable
Description	Module *module sensor desc* reports (*reading* degree C) *state desc*.
Troubleshooting	Adjust ambient temperature at this module intake.

SES_TEMPERATURE_SEVERITY_CHANGED

Severity	variable
Description	Module *module sensor desc* reports (*reading* degree C) *state desc*.
Troubleshooting	Please contact support.

SES_TEMPERATURE_OK

Severity	informational
Description	Module *module sensor desc* reports (*reading* degree C) *state desc*.
Troubleshooting	

SES_VERSION_UNEXPECTED

Severity	warning
Description	SES on *Component* - unexpected enclosure management code-level, found *Major.Minor.Level* which is old and should be upgraded

Troubleshooting	Please contact support.

PDB_FIRMWARE_VERSION_UNEXPECTED

Severity	warning
Description	PDB firmware on *Component* - unexpected code-level, found *Major.Minor* which is old and should be upgraded
Troubleshooting	Please contact support.

PCM_FIRMWARE_VERSION_UNEXPECTED

Severity	warning
Description	PCM-*Id* firmware on *Component* - unexpected code-level, found *Major.Minor* which is old and should be upgraded
Troubleshooting	Please contact support.

FAN_CONTROLLER_FIRMWARE_VERSION_UNEXPECTED

Severity	warning
Description	Fan controller firmware on *Component* - unexpected code-level, found *Major.Minor.Level.Build* (configuration *Major.Minor.Level*) which is old and should be upgraded
Troubleshooting	Please contact support.

IPMI_BMC_FIRMWARE_VERSION_UNEXPECTED

Severity	warning
Description	IPMI BMC firmware on *Module* - version *fmajor.fminor.faux* is old and should be upgraded
Troubleshooting	Please contact support.

BIOS_VERSION_IS_UNEXPECTED

Severity	warning
Description	BIOS on *Module* version *fmajor.fminor.faux* is old and should be upgraded
Troubleshooting	Please contact support.

FPGA_VERSION_IS_UNEXPECTED

Severity	warning
Description	FPGA on *Module* version *fmajor.fminor.faux* is old and should be upgraded
Troubleshooting	Please contact support.

INFINIBAND_HCA_VERSION_UNEXPECTED

Severity	warning
Description	InfiniBand HCA on *Module* version *Major.Minor.Build* is old and should be upgraded
Troubleshooting	Please contact support.

IPMI_BMC_IS_IN_UNEXPECTED_STATE

Severity	warning
Description	IPMI BMC firmware on *Module* is in unexpected state, possibly non-responsive
Troubleshooting	Please contact support.

IPMI_WATCHDOG_HAS_ERRORS

Severity	major
Description	IPMI watchdog on *Module* experienced command errors.
Troubleshooting	Please contact support.

SAS_VERSION_IS_UNEXPECTED

Severity	warning
Description	SAS Controller Firmware version on module *Module* version *actual* is old and should be upgraded
Troubleshooting	Please contact support.

SAS_CONTROLLER_FAULT

Severity	warning
Description	SAS Controller Firmware on *component ID* faulted with code *Fault Code*
Troubleshooting	Please contact support.

IPMI_NOT_WORKING

Severity	critical
Description	IPMI is not working on *Module*.
Troubleshooting	Please contact support.

IPMI_USER_SETUP_FAILED

Severity	major
Description	Error setting up IPMI USER for module *Module*.
Troubleshooting	Contact support.

IPMI_LAN_SETUP_FAILED

Severity	major
Description	Error setting up IPMI LAN channel *Channel* for module *Module*.
Troubleshooting	Contact support.

IPMI_SEL_ENTRY_CRIT

Severity	critical
Description	*Entry Name* SEL entry on *component ID Date Time* with data d0=*d0* d1=*d1* d2=*d2* dir=*direction*.
Troubleshooting	Please contact support.

IPMI_SEL_ENTRY_INFO

Severity	informational
Description	*Entry Name* SEL entry on *component ID Date Time* with data d0=*d0* d1=*d1* d2=*d2* dir=*direction*.
Troubleshooting	Please contact support.

IPMI_SEL_ENTRY_NEW

Severity	major
Description	*Entry Name* SEL entry on *component ID Date Time* SType=*sensor_type* SNum=*sensor_number* with data d0=*d0* d1=*d1* d2=*d2* dir=*direction*.
Troubleshooting	Please contact support.

FC_PORT_HAS_UNEXPECTED_FIRMWARE

Severity	minor
Description	fc port *Component* firmware version is old and should be upgraded: *active firmware* instead of *correct firmware*.
Troubleshooting	Please contact support.

KDB_HALT

Severity	critical
Description	*Component ID* was stopped on KDB.
Troubleshooting	Please contact support.

KDB_LOG

Severity	critical
Description	*Component ID* : *Line Count* lines *Log string*
Troubleshooting	Please contact support.

MCE_LOG

Severity	critical
Description	*Component ID* : *Log string*.
Troubleshooting	Please contact support.

NETWORK_LINK_IS_NOW_DOWN

Severity	major
Description	Network interface *Interface Role #Interface Index* on *Component ID* - link disconnected.
Troubleshooting	Please contact support.

NETWORK_LINK_IS_NOW_UP

Severity	informational
Description	Network interface *Interface Role #Interface Index* on *Component ID* - link regained.
Troubleshooting	Please contact support.

NETWORK_LINK_NO_DATA

Severity	minor
Description	Network interface *Interface Role #Interface Index* on *Component ID* - link has no data flowing through for the last *Time Not flowing* seconds.
Troubleshooting	Please contact support.

NETWORK_LINK_NO_DATA_LONG

Severity	major
Description	Network interface *Interface Role #Interface Index* on *Component ID* - link has no data flowing through for the last *Time Not flowing* seconds.
Troubleshooting	Please contact support.

NETWORK_LINK_HAS_DATA

Severity	warning
Description	Network interface *Interface Role #Interface Index* on *Component ID* - link has data flowing through again.
Troubleshooting	Please contact support.

NETWORK_LINK_WAS_RESET_CONSECUTIVELY

Severity	major
Description	Network interface *Interface Role #Interface Index* on *Component ID* - link was reset consecutively .

NETWORK_LINK_PARTIAL_LOSS

Severity	variable
Description	Network interface *Interface Role #Interface Role Index* on *Component ID* has partial packet loss at a rate of *Packet Error Rate*.
Troubleshooting	Please contact support.

COMPONENT_NETWORK_LINK_IS_DOWN

Severity	major
Description	Network interface to *Connected Component* on *Component ID* - link disconnected.
Troubleshooting	Please contact support.

COMPONENT_NETWORK_LINK_IS_UP

Severity	informational
Description	Network interface to component *Connected Component* on *Component ID* - link regained.
Troubleshooting	Please contact support.

ETHERNET_INTERFACE_RESET

Severity	informational
Description	Network interface *Component ID* was reset.
Troubleshooting	

CF_PARTITION_INCONSISTENT

Severity	major
Description	Some of the partitions on the compact flash on *Component ID* have inconsistencies
Troubleshooting	The compact flash has inconsistencies on some of it's partitions.

UPS_WARMSTART

Severity	informational
Description	*Component ID* did a warmstart
Troubleshooting	Normally this is fine, if there is another issue at around the same time, it is worth mentioning this event to the support

CPU_LOCKUP

Severity	major
Description	*Component ID* had a lockup on CPU #*locked_cpu*

Troubleshooting	Please contact support.

FS_CORRUPTED

Severity	warning
Description	Filesystem *Device* of *Module* is corrupted
Troubleshooting	Please contact support.

FS_GOOD

Severity	informational
Description	Filesystem *Device* of *Module* is ok
Troubleshooting	Please contact support.

SERIAL_CONSOLE_LINK_DOWN

Severity	warning
Description	Serial console link of *Target Module* read by *Source Module* is down, due to *Failure Reason*.
Troubleshooting	Please contact support.

SERIAL_CONSOLE_LINK_MISWIRED

Severity	warning
Description	Serial console link of *Target Module* read by *Source Module* is miswired, we expected module id *Target Module ID* but received *Received Module ID*.
Troubleshooting	Please contact support.

SERIAL_CONSOLE_LINK_CORRECT

Severity	informational
Description	Serial console link of *Target Module* read by *Source Module* is now correct.
Troubleshooting	Please contact support.

PROCESS_CORE_DUMP

Severity	warning
Description	Process *Process Name* with pid *Process ID* killed by signal *Signal* on module *Module Component ID*.

SAS_LINK_STATE_CHANGE

Severity	variable
Description	SAS link *SAS Type*[*ID*] on module *Module* changed state from *State* to *State*.

Troubleshooting	Please contact support.

SAS_LINK_SPEED_CHANGE

Severity	variable
Description	SAS link *SAS Type*[*ID*] on module *Module* speed changed from *Old Speed* to *New Speed*.
Troubleshooting	Please contact support.

SAS_LINK_ERRORS

Severity	major
Description	SAS link *SAS Type*[*ID*] on module *Module* has too many errors, *Delta* since last sample.
Troubleshooting	Please contact support.

SAS_LINK_NO_MORE_ERRORS

Severity	informational
Description	SAS link *SAS Type*[*ID*] on module *Module* no longer has errors, *Delta* since last sample.
Troubleshooting	

ERROR_ON_BOOT_DEVICE

Severity	major
Description	Boot device failure on module *Module*.
Troubleshooting	Please contact support.

ERROR_ON_REMOTE_BOOT_DEVICE

Severity	major
Description	Boot device failure on module *Module*.
Troubleshooting	Please contact support.

CPU_LAPIC_IDLE

Severity	major
Description	*Component ID* is nearing NMI_CPU problem on CPU *#locked_cpu*
Troubleshooting	Please contact support.

FRU_PRODUCT_INFO_AREA_CHECKSUM_UNREADABLE

Severity	critical
Description	FRU product information area checksum on module *Component ID* can't be read.

Troubleshooting	Please contact support.

FRU_PRODUCT_INFO_AREA_CHECKSUM_IS_INCORRECT

Severity	critical
Description	FRU product information area checksum on module *Component ID* is incorrect and can't be automatically fixed.
Troubleshooting	Please contact support.

FRU_PRODUCT_INFO_AREA_CHECKSUM_WAS_INCORRECT

Severity	warning
Description	FRU product information area checksum on module *Component ID* was incorrect and had to be reset.
Troubleshooting	

DIMM_COMPLIANCE_CHECK_FAILED

Severity	critical
Description	Installed DIMMs on module *Component ID* do not conform to the specification: *Failure reason*
Troubleshooting	Please contact support.

DIMM_COMPLIANCE_CHECK_DIMM_FAILED

Severity	critical
Description	DIMM in slot *DIMM id*, part number '*Part number*', on module *Component ID* does not conform to the specification.
Troubleshooting	Please contact support.

CPU_COMPLIANCE_CHECK_FAILED

Severity	critical
Description	Installed processor on module *Component ID* does not conform to the specification.
Troubleshooting	Please contact support.

PCI_ADAPTER_COMPLIANCE_CHECK_FAILED

Severity	critical
Description	Specification compliance check failed for PCI adapters on module *Component ID*.
Troubleshooting	Please contact support.

PCI_ADAPTER_COMPLIANCE_CHECK_ADAPTER_FAILED

Severity	critical
Description	PCI adapter on module *Component ID* does not conform to the specification. Adapter details: '*Description*'.
Troubleshooting	Please contact support.

PCIE_SLOT_COMPLIANCE_CHECK_FAILED

Severity	critical
Description	PCIE slot on module *Component ID* does not conform to the specification.
Troubleshooting	Please contact support.

PCIE_SLOT_COMPLIANCE_CHECK_SLOT_FAILED

Severity	critical
Description	PCIE slot *ID* on module *Component ID* does not conform to the specification.
Troubleshooting	Please contact support.

CF_COMPLIANCE_CHECK_FAILED

Severity	critical
Description	Installed compact flash card on module *Component ID* does not conform to the specification.
Troubleshooting	Please contact support.

CF_BIGGER_THAN_EXPECTED

Severity	warning
Description	Installed compact flash card on module *Component ID* has a size of *Size*GB which is bigger than the expected size of *Spec Size*GB.
Troubleshooting	Please contact support.

SSD_COMPLIANCE_CHECK_FAILED

Severity	critical
Description	Installed SSD on module *Component ID* does not conform to the specification.
Troubleshooting	Please contact support.

SSD_BIGGER_THAN_EXPECTED

Severity	warning

Description	Installed SSD on module *Component ID* has a size of *Size*GB which is bigger than the expected size of *Spec Size*GB.
Troubleshooting	Please contact support.

MODULE_DOWNLOAD_FAILED

Severity	minor
Description	Failure occured trying to download current version of the system to module *Module ID*, failure reason: *Reason*.
Troubleshooting	Please contact support.

ERROR_ON_SATA_HOST

Severity	major
Description	SATA device failure on *Module*.
Troubleshooting	Please contact support.

MEMORY_ECC_ERRORS_DETECTED

Severity	warning
Description	Memory ECC errors were detected on *Module*.
Troubleshooting	Please contact support.

PCIE_LINK_FATAL_ERROR

Severity	major
Description	A fatal error was detected on a PCIe link in *Module*.
Troubleshooting	Please contact support.

PCIE_LINK_ERROR

Severity	warning
Description	An error was detected on a PCIe link in *Module*.
Troubleshooting	Please contact support.

GEM_STATE_DUMPED

Severity	informational
Description	The GEM state on *Module* was dumped, reason: *Reason*.
Troubleshooting	

DISK_WAS_TURNED_OFF

Severity	minor
Description	Disk *Component ID* was turned off.

Troubleshooting	Please contact your Administrator.

DISK_WAS_TURNED_ON

Severity	informational
Description	Disk *Component ID* was turned on.
Troubleshooting	

INTERFACE_NODE_CHOKING

Severity	warning
Description	Interface node #*Node* has long Cache latency. Entered choked state *choke_time* msec ago.
Troubleshooting	Please contact support.

INTERFACE_NODE_UNCHOKING

Severity	variable
Description	Interface node #*Node* is leaving choked state after *choke_time* msec.
Troubleshooting	Please contact support.

INTERFACE_CHOKE_REPORT

Severity	informational
Description	Interface node #*Node* choked for a total of *choke_time* msecs in the last *report_period* minutes. The longest choke was of *longest_choke* msecs.
Troubleshooting	Please contact support.

VERY_LONG_LATENCY_TO_CACHE

Severity	variable
Description	Interface #*Node* has long latencies to the caches for *interval* seconds. Longest latency is *longest_latency* msecs to node *cache*
Troubleshooting	Please contact support.

LONG_LATENCY_TO_CACHE

Severity	variable
Description	Interface #*Node* had long latencies to the caches for *interval* msecs. Longest latency is *longest_latency* msecs to node *cache*
Troubleshooting	Please contact support.

TASK_MANAGEMENT_FUNCTION_RECEIVED

Severity	minor
Description	Interface node #*Node* got task management function *task_management_function_code* from Host *host_name* at *port_type* port *port_name* to volume *volume*.
Troubleshooting	

PERF_CLASS_RESOURE_EXHAUSTION

Severity	warning
Description	Exhausted all allowed resources for performance classes on *Module Id*, BUSY until resources available.

CONNECTED_HOSTS_LIMIT_REACHED

Severity	informational
Description	Number of connected Hosts was reached for port '*port_id*' in Module *Module Id*.

QoS_HAS_BEEN_TRIGGERED

Severity	informational
Description	Queues on port '*port_id*' in Module *Module Id* caused QoS to be activated.

INODE_CONNECTED_TO_ALL_CACHES

Severity	informational
Description	Interface '*node_id*' is connected to all cache nodes.

IO_FAILURES_TO_ALL_CACHES

Severity	warning
Description	Interface node #*Node* got bad statuses from all caches during the last *failure_duration* seconds (last *failure_count* IOs) and therefore killed itself.

PERF_CLASS_RATE_AT_LIMIT

Severity	informational
Description	Performance class '*perf_class*' on *Module Id* reached its limit of *Limit Limit Name*, IOs being throttled.

PARTIAL_WRITE

Severity	warning

Description	Interface node #*Node* reports partial write on lba *lba*, primary failed=*primary_failed*, secondary failed=*secondary_failed*, remote failed=*remote_failed*.

IPINTERFACE_CREATE

Severity	informational
Description	A new iscsi IP interface was defined with name '*interface name*' on module *module* with ports '*port list*' and IP address *IP address*

IPINTERFACE_DELETE

Severity	informational
Description	ISCSI IP interface with name '*interface name*' was deleted

IPINTERFACE_RENAME

Severity	informational
Description	ISCSI IP interface with name '*old name*' and was renamed '*interface name*'

IPINTERFACE_ADD_PORT

Severity	informational
Description	Port #*port index* was added to ISCSI IP interface with name '*interface name*'

IPINTERFACE_REMOVE_PORT

Severity	informational
Description	Port #*port index* was removed from ISCSI IP interface with name '*interface name*'

IPINTERFACE_UPDATE

Severity	informational
Description	ISCSI IP interface with name '*interface name*' was updated. Its IP address is *IP address*

IPINTERFACE_UPDATE_MANAGEMENT

Severity	informational
Description	Management IP interfaces were updated. Management IPs are *IP addresses*

IPINTERFACE_UPDATE_MANAGEMENT_IPV6

Severity	informational
Description	Management IP interfaces were updated. Management IPv6 addresses are *IPv6 addresses*

IPINTERFACE_UPDATE_VPN

Severity	informational
Description	VPN IP interfaces were updated. VPN IPs are *IP addresses*

IPINTERFACE_UPDATE_VPN_IPV6

Severity	informational
Description	VPN IPv6 interfaces were updated. VPN IPv6 addresses are *IP addresses*

AUXILIARY_INTERNAL_PORTS_ENABLED

Severity	informational
Description	*Port Count* auxiliary internal Ethernet ports were enabled

AUXILIARY_INTERNAL_PORTS_DISABLED

Severity	informational
Description	*Port Count* auxiliary internal Ethernet ports were disabled

EMAIL_HAS_FAILED

Severity	variable
Description	Sending event *Event Code* (*Event Index*) to *Destination List* via *SMTP Gateway* failed. Module: *Module ID*; Error message: '*Error Message*'; timeout expired: *Timeout Expired?*.
Troubleshooting	Please contact support.

SMS_HAS_FAILED

Severity	variable
Description	Sending event *Event Code* (*Event Index*) to *Destination List* via *SMS Gateway* and *SMTP Gateway* failed. Module: *Module ID*; Error message: '*Error Message*'; timeout expired: *Timeout Expired?*.
Troubleshooting	Please contact support.

EMAIL_NOT_SENT

Severity	variable

Description	Sending event *Event Code* (*Event Index*) to *Destination List* via *SMTP Gateway* was waived because of failed SMTP gateway. It will be not be used until *Retry Time*.
Troubleshooting	Please contact support.

SMS_NOT_SENT

Severity	variable
Description	Sending event *Event Code* (*Event Index*) to *Destination List* via *SMS Gateway* and *SMTP Gateway* was waived because of failed SMTP gateway. It will be not be used until *Retry Time*.
Troubleshooting	Please contact support.

HEARTBEAT_EMAIL_HAS_FAILED

Severity	minor
Description	Sending heartbeat to *Destination Name* via *SMTP Gateway* failed. Module: *Module ID*; Error message: '*Error Message*'; timeout expired: *Timeout Expired?*.
Troubleshooting	Please contact support.

HEARTBEAT_SMS_HAS_FAILED

Severity	minor
Description	Sending heartbeat to *Destination Name* via *SMS Gateway* and *SMTP Gateway* failed. Module: *Module ID*; Error message: '*Error Message*'; timeout expired: *Timeout Expired?*.
Troubleshooting	Please contact support.

TEST_EMAIL_HAS_FAILED

Severity	minor
Description	Sending test to *Destination Name* via *SMTP Gateway* failed. Module: *Module ID*; Error message: '*Error Message*'; timeout expired: *Timeout Expired?*.
Troubleshooting	Please contact support.

TEST_SMS_HAS_FAILED

Severity	minor
Description	Sending test to *Destination Name* via *SMS Gateway* and *SMTP Gateway* failed. Module: *Module ID*; Error message: '*Error Message*'; timeout expired: *Timeout Expired?*.
Troubleshooting	Please contact support.

EVENTS_WERE_NOT_SAVED

Severity	variable
Description	Node #*Node* could not save *Num Lost* events of maximal severity *Maximal Severity*.
Troubleshooting	Please contact support.

EVENT_TEST

Severity	variable
Description	Event *Index* of *Count* test events (description: *Description*; severity: *Severity*; node: *Node*).
Troubleshooting	

CUSTOM_EVENT

Severity	variable
Description	*Description*
Troubleshooting	

MM_EVENT

Severity	variable
Description	Maintenance Module *Category* event : *Description*
Troubleshooting	Events coming from the Maintenance Module

TRACES_DUMPING

Severity	informational
Description	*Description*
Troubleshooting	

SYSTEM_LOGS_COLLECTION

Severity	informational
Description	*Description*
Troubleshooting	

USB_TO_SERIAL_CONNECTED_TO_WRONG_MODULE

Severity	warning
Description	The serial port *Serial Port* on module *Source Module* should be connected to *Target Module* but it is not.
Troubleshooting	Connect the serial cable to the correct module.

ALL_USB_TO_SERIAL_CONNECTED_CORRECTLY

Severity	informational
Description	All USB to serial cables are correctly connected to their designated modules.
Troubleshooting	

FAILED_SAVING_EVENTS

Severity	warning
Description	Module *Module* failed saving events locally.
Troubleshooting	Please contact support.

INTERCONNECT_TIMED_OUT

Severity	major
Description	Node #*Node ID* of type *Node Type* on *Module Component ID* could not create an iscsi connection to Node #*Node ID* of type *Node Type* on *Module Component ID* for *Timeout* seconds.
Troubleshooting	Please contact support.

EVENTS_WERE_LOST

Severity	variable
Description	*Number of events* Events of maximal severity '*maximal severity*' were lost due to overload.
Troubleshooting	Please contact support.

EVENTS_WERE_SUPPRESSED

Severity	variable
Description	*Number of Events Event Code* Events of maximal severity '*maximal severity*' were suppressed in the last *period* minutes.
Troubleshooting	

NODE_HALTED

Severity	critical
Description	Node #*Node* has halted.
Troubleshooting	Please contact support

UPGRADE_MODULES_SW_NOT_IDENTICAL

Severity	warning
Description	File lists of different platform nodes are not identical to each other. Differing module is *differing_module*

Troubleshooting	Please contact support

UPGRADE_SOFTWARE_DOWNLOAD_FINISHED

Severity	informational
Description	Finished downloading software needed for upgrade to version *version*. Upgrade consequence is *consequence*
Troubleshooting	

UPGRADE_FILE_LIST_RETRIEVAL_FAILED

Severity	critical
Description	Could not receive new verions' files list from repository. error code is *error*.
Troubleshooting	Contact support

UPGRADE_STARTS

Severity	informational
Description	System starting an upgrade.
Troubleshooting	

PRE_UPGRADE

Severity	informational
Description	System preparing an upgrade procedure type *type* .
Troubleshooting	

UPGRADE_IS_OVER

Severity	informational
Description	System went up after an upgrade.
Troubleshooting	

IOS_RESTORED_AFTER_HOT_UPGRADE

Severity	informational
Description	System is able to perform I/Os after a hot upgrade.
Troubleshooting	

UPGRADE_NO_NEW_FILES_FOR_UPGRADE

Severity	warning
Description	Repository version does not contain any new files. current version *current_version* new version is *new_version*
Troubleshooting	Contact support

UPGRADE_DOWNLOAD_REPOSITORY_COPY

Severity	critical
Description	Mirroring needed files from repository failed. Mirroring module is *mirroring_module* repository IP is *repository_ip* error is *error*
Troubleshooting	Contact support

UPGRADE_LOCAL_VERSION_DOWNLOAD_FAILED

Severity	critical
Description	Failure to distribute new sofware internally. Error code is *error* .
Troubleshooting	Contact support

UPGRADE_WAS_CANCELLED

Severity	informational
Description	Upgrade was cancelled with reason *reason* .
Troubleshooting	Contact support

HOT_UPGRADE_ABORTED

Severity	critical
Description	Hot upgrade aborted with reason *reason*.
Troubleshooting	Contact support

HOT_UPGRADE_HAS_FAILED

Severity	critical
Description	Hot upgrade failed while *errorneous_state*.
Troubleshooting	Contact support

PRE_UPGRADE_SCRIPT_INVOCATION_FAILED

Severity	critical
Description	Invocation of pre-upgrade script failed with error *error*.
Troubleshooting	Contact support

POST_UPGRADE_SCRIPT_INVOCATION_FAILED

Severity	critical
Description	Invocation of post-upgrade script failed with error *error*.
Troubleshooting	Contact support

UPGRADE_IS_NOT_ALLOWED

Severity	critical
Description	One or more of the pre-upgrade validations failed.
Troubleshooting	Fix the problems pointed out it previous events and revalidate.

PRE_UPGRADE_VALIDATION_FAILED

Severity	critical
Description	One of the pre-upgrade validations failed with status *error*.
Troubleshooting	Contact support

UPGRADE_IS_ALLOWED

Severity	informational
Description	All of the pre-upgrade validations passed successfully.
Troubleshooting	

POST_UPGRADE_SCRIPT_STARTED

Severity	informational
Description	Post-upgrade script started.
Troubleshooting	

POST_UPGRADE_SCRIPT_FINISHED

Severity	informational
Description	Post-upgrade script finished successfully.
Troubleshooting	

PRE_UPGRADE_SCRIPT_DISAPPROVES

Severity	critical
Description	Upgrade cannot commence because some of the vlidations in the pre-upgrade script failed. Explanation: *explanation*.
Troubleshooting	Correct the system state according to the explanation and try again

POST_UPGRADE_SCRIPT_REPORTED_FAILURE

Severity	critical
Description	Post upgrade script reported failure. Script output: *explanation*.
Troubleshooting	Correct the system state according to the explanation and try again

FILE_TOO_LARGE

Severity	critical
Description	File *Filename* with size *Size* is too large for the current system limits, upgrades and installs can fail.
Troubleshooting	If file is not part of the system, delete it and regenerate file list. If it is part of the system, increase the limit.

UPS_HAS_FAILED

Severity	critical
Description	*Component ID* failed.
Troubleshooting	Please contact support.

SHOULD_BE_EMERGENCY_SHUTDOWN

Severity	critical
Description	An emergency shutdown has been detected, but UPS control is disabled. Shutdown reason: *Shutdown Reason*.
Troubleshooting	Solve the UPS problem immediately or shut the system down using 'shutdown -y' and contact support.

UPS_IS_ON_BATTERY

Severity	major
Description	*Component ID* switched to battery power.
Troubleshooting	Check power input.

UPS_ON_UTILITY_POWER

Severity	informational
Description	*Component ID* switched back to utility power.

UPS_IS_IN_BYPASS

Severity	major
Description	*Component ID* entered bypass state.
Troubleshooting	Please contact support.

UPS_OUT_OF_BYPASS

Severity	informational
Description	*Component ID* went out of bypass state.

UPS_IS_TURNED_OFF

Severity	critical
Description	*Component ID* was turned off and does not supply output power.

UPS_TURNED_ON

Severity	informational
Description	*Component ID* was turned on.

UPS_INITIALIZATION_TIMED_OUT

Severity	informational
Description	*Component ID* Initialization timed out.

ADMINISTRATOR_PROCESS_FAILURE

Severity	warning
Description	Administrator process *Process ID* failed with error *Error Code*. The last command was *Command Type* (ID: *Command ID*, in progress: *Command in Progress*).
Troubleshooting	Please contact support

ADMINISTRATOR_PROCESS_UNAVAILABLE

Severity	warning
Description	Command dispatch to administrator failed with timeout. Command was *Command Type* (ID: *Command ID*).
Troubleshooting	Please contact support

METADATA_SET

Severity	warning
Description	*Object type* with name '*Object name*' has new metadata value.
Troubleshooting	

METADATA_DELETE

Severity	warning
Description	Metadata object deleted for *Object type* with name '*Object name*'.
Troubleshooting	

PATCH_SCRIPT_ADDED

Severity	informational

Description	Added patch *Patch Name*.
Troubleshooting	Was patch supposed to have been added.

PATCH_SCRIPT_DELETED

Severity	informational
Description	Deleted patch *Patch Name*.
Troubleshooting	

REMOTE_SUPPORT_CONNECTED

Severity	informational
Description	System connected to remote support center *Destination*.

UNABLE_TO_CONNECT_TO_REMOTE_SUPPORT

Severity	minor
Description	System is unable to connect to any remote support center.

REMOTE_SUPPORT_CONNECTION_LOST

Severity	variable
Description	Connection to remote support center *Destination* failed while the connection was in state *Disconnected Session State*.

REMOTE_SUPPORT_TIMEOUT

Severity	variable
Description	Connection to remote support center *Destination* timed out while the connection was in state *Disconnected Session State*.

REMOTE_SUPPORT_IMMINENT_TIMEOUT

Severity	minor
Description	System is about to disconnect busy connection to remote support center *Destination*.

REMOTE_SUPPORT_DISCONNECTED

Severity	variable
Description	System disconnected from remote support center *Destination* while the connection was in state *Disconnected Session State*.

REMOTE_SUPPORT_CLIENT_MOVED

Severity	informational
Description	The remote support client moved from *Old Module* to *New Module*.

REMOTE_SUPPORT_CLIENT_NO_AVAILABLE_MODULES

Severity	minor
Description	No live modules with *Port Type* ports are available to run the remote support client.

ELICENSE_ACCEPTED

Severity	informational
Description	Electronic license was accepted by '*Approver Name*'.
Troubleshooting	

ELICENSE_VIOLATION

Severity	warning
Description	Latest version of the electronic license was not approved.
Troubleshooting	Please approve the electronic license.

MASTER_SM_CHOSEN

Severity	informational
Description	Subnet manager on module '*Component ID*' becomes master.
Troubleshooting	

MODULE_IB_PORTS_DOWN

Severity	warning
Description	SM: all infiniband ports on module '*Component ID*' are down.
Troubleshooting	

MODULE_SM_PRIO_CHANGED

Severity	informational
Description	SM: SM priority changed on module '*Component ID*' from '*Priority*' to '*Priority*'. Change reason: '*Change Reason*'.
Troubleshooting	

MASTER_SM_RESCAN

Severity	informational

Description	Master SM on module '*Component ID*' has reloaded configuration and rescans network.
Troubleshooting	

IB_MODULE_MISWIRE

Severity	warning
Description	Infiniband miswire: Port '*Port Number*' of module *Component ID*' should be connected to '*Switch Port*'. Disallowed GUID '*GUID of IB Device* (*Component ID*)' is connected instead.
Troubleshooting	

IB_SWITCH_MISWIRE

Severity	warning
Description	Infiniband miswire: '*Switch ID*' with GUID '*Switch GUID*' should be connected to '*Switch Port*'. Disallowed GUID '*GUID of IB Device* (*Component ID*)' is connected instead.
Troubleshooting	

IB_LINK_UP

Severity	informational
Description	Link on '*Component ID* (*Component ID*)' is up.
Troubleshooting	

IB_LINK_DOWN

Severity	warning
Description	Link on '*Component ID* (*Component ID*)' is down.
Troubleshooting	

IB_MISSING_LINK

Severity	warning
Description	Link on '*Component ID* (*Component ID*)' is missing.
Troubleshooting	

IB_BAD_CONFIGURATION

Severity	major
Description	Bad IB configuration values found. Given values are '*IB component ID*'. Max values are '*IB component ID*'. Min values are '*IB component ID*'.
Troubleshooting	

IB_BAD_PORT_PERFORMANCE

Severity	variable
Description	Bad Port Performance: too many errors of type '*Counter Name*' on '*Component ID*. Action taken: '*Action Taken*''
Troubleshooting	

IB_BAD_LINK_PERFORMANCE

Severity	warning
Description	Bad Link Performance: link width is '*Link Width*' link speed is '*Link Speed*' on '*Component ID*'
Troubleshooting	

IB_SWITCH_MALFUNCTION

Severity	major
Description	Found a malfunction in switch '*Component ID*'. Will shutdown the switch when possible (when redundant link will be available).
Troubleshooting	

IB_SWITCH_IS_MISSING

Severity	warning
Description	An Infiniband switch is missing '*Component ID*'.
Troubleshooting	

IB_MISSING_SWITCH_FOUND

Severity	informational
Description	An Infiniband switch '*Component ID*' which was missing is now found.
Troubleshooting	

INFINIBAND_ERROR

Severity	major
Description	Failed to load infiniband stack on module *Module ID*. Error is: *Error description*.
Troubleshooting	Possible physical problem with module. Contact support.

INFINIBAND_PORT_ERROR

Severity	major
Description	Failed to bring up Infiniband port *HCA Port Number* on module *Module ID*. Error is: *Error description*.
Troubleshooting	Possible physical problem with module. Contact support.

IB_PORT_MOVED

Severity	informational
Description	Infinibind module port '*module_port*' moved from '*from_port*' to '*to_port*'.

COMPONENT_REQUIRES_SERVICING

Severity	major
Description	Component *Component ID* requires service: *Component Required Service*, due to: *Component Service Reason*. The urgency of this service is *Maintenance Urgency*

COMPONENT_REQUIRES_IMMEDIATE_SERVICING

Severity	major
Description	Component *Component ID* which previously had it's service deferred now requires immediate service: *Component Required Service*, due to: *Component Service Reason*

COMPONENT_REQUIRED_SERVICE_CLEARED

Severity	informational
Description	Component *Component ID* does NOT require service anymore

PERF_CLASS_MAX_IO_RATE_UPDATED

Severity	informational
Description	Performance Class *name* max IO rate was changed to *IO rate*

PERF_CLASS_MAX_BW_RATE_UPDATED

Severity	informational
Description	Performance Class *name* max BW rate was changed to *BW rate*

PERF_CLASS_CREATE

Severity	informational
Description	Performance Class with name '*name*' was created

PERF_CLASS_DELETE

Severity	informational

Description	Performance Class with name '*name*' was deleted

PERF_CLASS_ADD_HOST

Severity	informational
Description	Host with name '*host_name*' was added to Performance Class with name '*name*'

PERF_CLASS_REMOVE_HOST

Severity	informational
Description	Host with name '*host_name*' was removed from Performance Class with name '*name*'

Chapter 22. Return Codes

The following are the return codes.

Return Code	Error Description
0	Success.
1	Command execution failed.
2	No connection to the system.
3	Password is required.
4	Password does not match system password.
7	Command not allowed from this client.
8	Bad XCLI option.
9	Internal XCLI error.

Chapter 23. Glossary

This glossary includes terms and definitions for IBM® XIV® Storage System.

This glossary includes selected terms and definitions from:

- The *American National Standard Dictionary* for Information Systems, ANSI X3.172–1990, copyright 1990 by the American National Standards Institute (ANSI), 11 West 42nd Street, New York, New York 10036. Definitions derived from this book have the symbol (A) after the definition.
- IBM Terminology, which is available online at the IBM Terminology website (www.ibm.com/software/globalization/terminology/index.jsp). Definitions derived from this source have the symbol (GC) after the definition.
- The *Information Technology Vocabulary* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions derived from this book have the symbol (I) after the definition. Definitions taken from draft international standards, committee drafts, and working papers that the ISO/IEC JTC1/SC1 is developing have the symbol (T) after the definition, indicating that final agreement has not been reached among the participating National Bodies of SC1.

This glossary uses the following cross-reference forms:

See Refers the reader to one of two kinds of related information:

- A term that is the expanded form of an abbreviation or acronym. This expanded form of the term contains the full definition.
- A synonym or more preferred term

See also
Refers the reader to one or more related terms.

Contrast with
Refers the reader to a term that has an opposite or substantively different meaning.

A

access To obtain computing services or data.

In computer security, a specific type of interaction between a subject and an object that results in flow of information from one to the other.

Active Directory
Microsoft Active Directory (AD) provides directory (lookup), DNS and authentication services.

alerting event
An event that triggers recurring event notifications until it is cleared.

allocated storage
The space that is allocated to volumes but not yet assigned. Contrast with *assigned storage*.

API See *application programming interface (API)*.

application program interface (API)
An interface that allows an application program that is written in a high-level language to use specific data or functions of the operating system or another program.

assigned storage
The space that is allocated to a volume and that is assigned to a port.

Asynchronous interval
Denotes, per given coupling, how often the master runs a new sync job.

authorization level
The authorization level determines the permitted access level to the various functions of the IBM XIV Storage Management GUI:

Read only
Only viewing is allowed.

Full Enables access to all the configuration and control functions, including shutdown of the system. This level requires a password.

auto-delete priority
As the storage capacity reaches its limits, snapshots are automatically deleted to make more space. The deletion takes place according to the value set for each snapshot, as follows:

1 last to be deleted

4 first to be deleted

Each snapshot is given a default auto delete priority of *1* at creation.

B

basic mode
A means of entering XCLI commands on the XCLI client that requires specifying IP address and login information for each command. Additional output formatting options are available in basic mode.

best effort mode
A mode of remote mirroring in which I/O operation is not suspended when communication between a primary and secondary volume is broken.

C

call home
A communication link established between the storage product and a service provider. The storage product can use this link to call IBM or to another service provider when it requires service. With access to the machine, service personnel can perform service tasks, such as viewing error logs and problem logs or initiating trace and dump retrievals.

clearing events
The process of stopping the recurring event notification of alerting events.

CLI The IBM XIV command-line interface (XCLI). See *command-line interface (CLI)*

command-line interface (CLI)
The nongraphical user interface used to interact with the system through set commands and functions. The IBM XIV command-line interface (XCLI) for the IBM XIV Storage System.

completion code
The returned message sent as a result of running CLI commands.

consistency group
A cluster of specific volumes that can all be snapshotted simultaneously as a group, thus creating a synchronized snapshot. The volumes in a consistency group are grouped into a single volume set. The volume set can be snapshotted into multiple snapshot sets under the specific consistency group. See also *snapshot set*, *volume set*.

coupling
A primary volume and a secondary volume connected together through mirroring definitions.

D

data availability
The degree to which data is available when needed. Availability is typically measured as a percentage of time in which the system is able to respond to data requests (for example, 99.999% available).

data module
A module dedicated to data storage. A fully populated rack contains nine dedicated data modules, each with 12 disks.

default storage pool
The default storage pool when a volume is created.

destination
See *event destination*.

E

escalation
A process in which event notifications are sent to a wider list of event destinations because the event was not cleared within a certain time.

event destination
An address for sending event notifications.

event notification rule
A rule that determines which users are to be notified, for which events and by what means.

event notification
The process of notifying a user about an event.

event A user or system activity that is logged (with an appropriate message).

F

fabric The hardware that connects workstations and servers to storage devices in a SAN. The SAN fabric enables any-server-to-any-storage device connectivity through the use of Fibre Channel switching technology.

FC-AL Also known as arbitrated loop. A Fibre Channel topology that requires no Fibre Channel switches. Devices are connected in a one-way loop fashion.

FC-HBA
Fibre Channel host bus adapter.

FC See *Fibre Channel*.

Fibre Channel
Serial data transfer architecture developed by a consortium of computer and mass storage device manufacturers and now being standardized by ANSI.

functional area
One of the high-level groupings of icons (functional modules) of the left pane in the IBM XIV Storage Management GUI screen (for example, Monitor, Configuration, or Volume management). See *functional module*.

functional module
One of the icons of a functional area, on the left pane in the IBM XIV Storage Management GUI screen. For example, System (under Monitor) or Hosts and LUNs (under Configuration). See *functional area*.

G

Graphical user interface (GUI)
On-screen user interface supported by a mouse and a keyboard.

GUI See *graphical user interface (GUI)*.

H

H/W Hardware.

HBA Host bus adapter.

host interface module
The interface data module serves external host requests with the ability to store data. A fullypopulated rack has six interface data modules.

host A port name of a host that can connect to the system. The system supports Fibre Channel and iSCSI hosts.

I

I/O input/output.

image snapshot
A snapshot that has never been unlocked. It is the exact image of the master volume it was copied from, at the time of its creation. See also *snapshot*.

interactive mode
A means of entering XCLI commands on the XCLI client in which the IP address, user, and password information does not need to be specified for each command.

Internet Protocol
Specifies the format of packets (also called datagrams), and their addressing schemes. See also *Transmission Control Protocol (TCP)*.

IOPs input/output (I/O) per second.

IP See *Internet Protocol*.

iSCSI Internet SCSI. An IP-based standard for linking data storage devices over a network and transferring data by carrying SCSI commands over IP networks.

L

latency
Amount of time delay between the moment an operation is issued, and the moment it is committed.

LDAP Lightweight Directory Access Protocol.

LDAP attribute
A property of an LDAP object, with a single or multiple values. A special object attribute is designated by an LDAP administrator to hold user group memberships values corresponding to XIV roles.

LDAP authentication
A method for authenticating users by validating the submitted credentials against data stored on an LDAP directory.

LDAP directory
A hierarchical database stored on an LDAP server and accessed through LDAP calls.

LDAP server
A server that provides directory services through LDAP.

LDAP status
The status of an LDAP server.

line cord
The electrical connection between the ac power source and the automatic transfer switch (ATS).

load balancing
Even distribution of load across all components of the system.

locking
Setting a volume (or snapshot) as unwritable (read-only).

LUN map
A table showing the mappings of the volumes to the LUNs.

LUN Logical unit number. Exports a systems volume into a registered host.

M

mandatory mode
A mode of remote mirroring in which I/O operation stops whenever there is no communication to the secondary volume.

master volume
A volume that has snapshots is called the master volume of its snapshots.

MIB Management Information Base. A database of objects that can be monitored by a network management system. SNMP managers use standardized MIB formats to monitor SNMP agents.

Microsoft Active directory
See *Active Directory*

mirror volume
A volume that contains a backup copy of the original volume.

mirroring
See *remote mirroring*.

modified State
A snapshot state. A snapshot in modified state can never be used for restoring its master volume.

multipathing
Enables host interface modules direct access to any volume.

P

peer Denotes a constituent side of a coupling. Whenever a coupling is defined, a designation is specified for each peer - one peer is designated primary and the other is designated secondary.

pool See *storage pool*.

power cord
The electrical connection between the uninterruptible power supply and the automatic transfer switch (ATS).

primary volume
A volume that is mirrored for backup on a remote storage system.

R

rack The cabinet that stores all of the hardware components of the system.

remote mirroring
The process of replicating a volume on a remote system.

remote target connectivity
A definition of connectivity between a port set of a remote target and a module on the local storage system.

remote target
An additional storage system used for mirroring, data migration, and so on.

role The actual role that the peer is fulfilling as a result of a specific condition, either a master or a slave.

rule See *event notification rule*.

S

SAN Storage area network.

SCSI Small computer system interface.

secondary volume
A volume that serves as a backup of a primary volume.

Simple Network Monitor Protocol
A protocol for monitoring network devices. See also *MIB*, *SNMP agent*, *SNMP manager*, *SNMP trap*.

SMS gateway
An external server that is used to send SMSs.

SMTP gateway
An external host that is used to relay email messages through the SMTP protocol.

snapshot set
The resulting set of synchronized snapshots of a volume set in a consistency group. See also *consistency group*, *Volume set*.

snapshot
A point-in-time snapshot or copy of a volume. See also *image snapshot*.

SNMP agent
A device that reports information through the SNMP protocol to SNMP managers.

SNMP manager
A host that collects information from SNMP agents through the SNMP protocol.

SNMP trap
An SNMP message sent from the SNMP agent to the SNMP manager, where the sending is initiated by the SNMP agent and not as a response to a message sent from the SNMP manager.

SNMP
See *Simple Network Monitor Protocol*.

snooze
The process of sending recurring event notifications until the events are cleared.

storage pool
A reserved area of virtual disk space serving the storage requirements of the volumes.

Sync Job
A synchronization procedure run by the master at specified user-defined intervals, entailing synchronization between the master and the slave.

synchronization
The process of making the primary volume and secondary volume identical after a communication downtime or upon the initialization of the mirroring.

T

target See *remote target*.

TCP/IP
See *Transmission Control Protocol*, *Internet Protocol*.

thin provisioning
The ability to define logical volume sizes that are much larger than the physical capacity installed on the system.

Transmission Control Protocol
Transmission Control Protocol (TCP) on top of the Internet Protocol (IP) establishes a virtual connection between a destination and a source over which streams of data can be exchanged. See also *IP*.

trap See *SNMP trap*.

U

unassociated volume
A volume that is not associated with a consistency group. See *Consistency group*.

uninterruptible power supply
Provides battery backup power for a determined period of time, particularly to enable the system to power down in a controlled manner, on the occurrence of a lengthy power outage.

V

volume cloning
Creating a snapshot from a volume.

volume set
A cluster of specific volumes in a consistency group, which can all be snapshotted simultaneously, thus, creating a synchronized snapshot of all of them. The volume set can be snapshotted into multiple snapshot sets of the specific consistency group. See also *Snapshot set*, *Volume set*.

volume
A logical address space, having its data content stored on the systems disk drives. A volume can be virtually any size as long as the total allocated storage space of all volumes does not exceed the net capacity of the system. A volume can be exported to an attached host through a LUN. A volume can be exported to multiple hosts simultaneously. See also *Storage pool*, *Unassociated volume*.

W

WWPN
Worldwide port name

X

XCLI IBM XIV command-line interface (XCLI) command set. See *command-line interface*.

XCLI client
The system on which the XCLI command is entered.

XCLI identification parameters
Parameters that identify the user issuing the command and the XIV system (if any) on which the command is to run. XCLI identification parameters can be specified:
- By entering them at the beginning of an interactive mode session
- In a configuration file
- When running a command in basic mode

- When running a list of commands as a batch

XCLI system command
An XCLI command that is sent to the XIV system for processing.

XCLI utility command
An XCLI command that is issued on the XCLI client. An XCLI utility command is not sent to an XIV system for processing. XCLI utility commands are used for setting up configurations on the XCLI client and for queries (for example, of software version) that can be processed on the client.

XDRP The disaster recovery program for the XIV – The remote mirror feature of the XIV.

XIV mapping
An association of data on the LDAP server (a specific LDAP attribute) and data on the XIV system. The mapping is used to determine which access rights to grant to an authenticated LDAP user.



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