

Contents

	Page
USAGE	12
DISCLAIMER	13
Current Revision	13
Contact SNIA	13
FEEDBACK AND INTERPRETATIONS	13
INTENDED AUDIENCE	14
VERSIONING POLICY	14
Revision History	14
About SNIA	20
Acknowledgements	20
1 Abstract	23
2 Scope	24
2.1 Document Goals	24
2.2 Audience Assumptions	25
3 Normative References	26
3.1 Overview	26
3.2 Approved references	26
3.3 References under development	28
3.4 Other references	28
4 Terms and Definitions	29
4.1 Overview	29
4.2 Swordfish-specific Terms	29
4.2.1 Definitions	29
4.2.2 Symbols and abbreviated terms	30
4.3 Reference to Redfish terms	30
4.4 Keywords (normative language terms)	30
5 Swordfish Overview	32
5.1 Introduction	32
5.2 Relation to Redfish	32
5.3 Storage System Models	33
5.4 The ServiceRoot and ServiceContainer entities	37
5.4.1 Overview	37
5.4.2 The Storage resource collection	37

5.4.3	The Systems resource collection	38
5.4.4	The Chassis resource collection	38
5.4.5	The StorageSystems resource collection	38
5.5	Swordfish model overview	39
5.5.1	The Storage resource	39
5.5.2	The StorageController resource	40
5.5.3	The Endpoint resource	40
5.5.4	The Endpoint Collection resource	40
5.5.5	The ConsistencyGroup resource	40
5.5.6	The ConsistencyGroup Collection resource	40
5.5.7	The StorageGroup resource	40
5.5.8	The StoragePool resource	41
5.5.9	The Volume resource	41
5.5.10	The FileSystem resource	42
6	Features and Profiles	43
6.1	Overview	43
6.2	Requirement for SupportedFeatures	43
6.3	EnergyStar for Storage Feature	44
6.4	Class of Service Feature	44
6.4.1	Overview	44
6.4.2	Class of Service Model	44
6.4.3	ServiceRoot Additions	49
6.4.4	The StorageService resource	49
7	Schema Considerations	53
7.1	Schema Introduction	53
7.1.1	Overview	53
7.1.2	Swordfish Extension of the Redfish ServiceRoot	53
7.2	Default values and NULLABLE attributes	53
7.3	Common schema annotations	54
7.4	Property implementation requirements	56
7.5	Schema repository	56
7.6	Referencing other schemas	56
8	Implementation requirements	57
8.1	Security	57
8.2	General constraints	57
8.2.1	Redfish elements	57

8.2.2	Storage Events	57
8.3	Discovering Swordfish resources	58
8.4	ClassOfService requirements	59
8.5	StorageSystems requirements	59
8.6	Entity Sets	60
8.7	Addressing entities within a collection	60
8.8	Addressing members of a ResourceCollection	60
8.9	HTTP status codes	61
8.9.1	Overview	61
8.9.2	Create	61
8.9.3	Update, Replace, Delete	62
8.9.4	Actions	63
9	Swordfish type definitions	65
9.1	Overview	65
9.2	Introduction	65
9.3	Universal properties	65
9.4	Frequently used properties	67
9.5	Common Swordfish Objects	69
9.5.1	Capacity	69
9.5.2	CapacityInfo	70
9.5.3	Identifier	71
9.5.4	IOStatistics	74
9.5.5	IOWorkload	77
9.5.6	IOWorkloadComponent	78
9.5.7	Location	80
9.5.8	Oem	97
9.5.9	ReplicaInfo	97
9.5.10	ReplicaRequest	119
9.5.11	Schedule	120
9.5.12	Status	125
9.6	Swordfish Schema Types	133
9.6.1	CapacitySource 1.2.0	133
9.6.2	CapacitySourceCollection	138
9.6.3	ClassOfService 1.2.0	140
9.6.4	ClassOfServiceCollection	145
9.6.5	ConsistencyGroup 1.1.0	147
9.6.6	ConsistencyGroupCollection	163
9.6.7	DataProtectionLineOfService 1.3.0	165

9.6.8	DataProtectionLoSCapabilities 1.2.0	174
9.6.9	DataSecurityLineOfService 1.1.1	182
9.6.10	DataSecurityLoSCapabilities 1.2.0	190
9.6.11	DataStorageLineOfService 1.3.1	199
9.6.12	DataStorageLoSCapabilities 1.2.2	205
9.6.13	FeaturesRegistry 1.1.1	211
9.6.14	FileShare 1.2.0	214
9.6.15	FileShareCollection	225
9.6.16	FileSystem 1.2.2	227
9.6.17	FileSystemCollection	239
9.6.18	HostedStorageServices	241
9.6.19	IOConnectivityLineOfService 1.2.1	243
9.6.20	IOConnectivityLoSCapabilities 1.2.0	250
9.6.21	IOPerformanceLineOfService 1.1.1	256
9.6.22	IOPerformanceLoSCapabilities 1.3.0	260
9.6.23	LineOfService 1.1.0	263
9.6.24	LineOfServiceCollection	265
9.6.25	NVMeDomain 1.1.0	267
9.6.26	NVMeDomainCollection	271
9.6.27	NVMeFirmwareImage 1.1.0	273
9.6.28	SpareResourceSet 1.0.1	276
9.6.29	StorageGroup 1.5.0	280
9.6.30	StorageGroupCollection	296
9.6.31	StoragePool 1.7.1	298
9.6.32	StoragePoolCollection	335
9.6.33	StorageReplicaInfo 1.4.0	338
9.6.34	StorageService 1.5.0	340
9.6.35	StorageServiceCollection	355
9.6.36	StorageSystemCollection	357
9.6.37	Volume 1.8.0	359
9.6.38	VolumeCollection	410
Annex A: Bibliography	413	
A.1 Overview	413	
A.2 Informational references	413	

List of Tables

1	Revision history	15
2	Contributors	21
3	Approved normative references	26
4	References under development	28
5	Swordfish terms	29
6	Redfish terms	30
7	Normative language terms	31
8	Default and Nullable Interaction	54
9	Schema annotations	54
10	Universal properties	65
11	Frequent properties	67
12	Capacity properties	69
13	CapacityInfo properties	70
14	Identifier properties	72
15	DurableNameFormat property values	73
16	IOStatistics properties	75
17	IOWorkload properties	77
18	IOWorkloadComponent properties	78
19	IOAccessPattern property values	80
20	Location properties	81
21	LocationType property values	95
22	Orientation property values	95
23	RackOffsetUnits property values	96
24	Reference property values	96
25	Oem properties	97
26	ReplicaInfo properties	98
27	ConsistencyState property values	109
28	ConsistencyStatus property values	109
29	ConsistencyType property values	110
30	ReplicaFaultDomain property values	110
31	ReplicaPriority property values	110
32	ReplicaProgressStatus property values	111
33	ReplicaReadOnlyAccess property values	113
34	ReplicaRecoveryMode property values	113
35	ReplicaRole property values	114
36	ReplicaState property values	114

37	ReplicaType property values	116
38	ReplicaUpdateMode property values	117
39	RequestedReplicaState property values	117
40	UndiscoveredElement property values	119
41	ReplicaRequest properties	120
42	Schedule properties	121
43	EnabledDaysOfWeek property values	123
44	EnabledMonthsOfYear property values	124
45	Status properties	125
46	Health property values	131
47	HealthRollup property values	131
48	Severity property values	131
49	State property values	132
50	CapacitySource 1.2.0 properties	134
51	CapacitySourceCollection properties	139
52	ClassOfService 1.2.0 properties	141
53	ClassOfServiceCollection properties	145
54	ConsistencyGroup 1.1.0 properties	148
55	AssignReplicaTarget action parameters	156
56	CreateReplicaTarget action parameters	157
57	RemoveReplicaRelationship action parameters	158
58	ResumeReplication action parameters	159
59	ReverseReplicationRelationship action parameters	160
60	SplitReplication action parameters	160
61	SuspendReplication action parameters	161
62	ConsistencyMethod property values	161
63	ConsistencyType property values	162
64	ReplicaType property values	162
65	ReplicaUpdateMode property values	163
66	ConsistencyGroupCollection properties	164
67	DataProtectionLineOfService 1.3.0 properties	166
68	CreateReplicas action parameters	171
69	RecoveryGeographicObjective property values	172
70	RecoveryTimeObjective property values	173
71	ReplicaType property values	174
72	DataProtectionLoSCapabilities 1.2.0 properties	174
73	SupportedRecoveryGeographicObjectives property values	180
74	SupportedRecoveryTimeObjectives property values	181

75	SupportedReplicaTypes property values	181
76	DataSecurityLineOfService 1.1.1 properties	182
77	AntivirusScanPolicies property values	186
78	ChannelEncryptionStrength property values	187
79	DataSanitizationPolicy property values	187
80	HostAuthenticationType property values	188
81	MediaEncryptionStrength property values	188
82	SecureChannelProtocol property values	189
83	UserAuthenticationType property values	189
84	DataSecurityLoSCapabilities 1.2.0 properties	191
85	SupportedAntivirusScanPolicies property values	195
86	SupportedChannelEncryptionStrengths property values	196
87	SupportedDataSanitizationPolicies property values	196
88	SupportedHostAuthenticationTypes property values	197
89	SupportedMediaEncryptionStrengths property values	198
90	SupportedSecureChannelProtocols property values	198
91	SupportedUserAuthenticationTypes property values	199
92	DataStorageLineOfService 1.3.1 properties	200
93	AccessCapabilities property values	203
94	ProvisioningPolicy property values	204
95	RecoveryTimeObjectives property values	205
96	DataStorageLoSCapabilities 1.2.2 properties	206
97	SupportedAccessCapabilities property values	209
98	SupportedProvisioningPolicies property values	210
99	SupportedRecoveryTimeObjectives property values	210
100	FeaturesRegistry 1.1.1 properties	211
101	FileShare 1.2.0 properties	214
102	DefaultAccessCapabilities property values	223
103	FileShareQuotaType property values	224
104	FileSharingProtocols property values	224
105	WritePolicy property values	225
106	FileShareCollection properties	226
107	FileSystem 1.2.2 properties	228
108	AccessCapabilities property values	238
109	CharacterCodeSet property values	238
110	FileSystemCollection properties	239
111	HostedStorageServices properties	241
112	IOConnectivityLineOfService 1.2.1 properties	244

113	AccessProtocols property values	246
114	IOConnectivityLoSCapabilities 1.2.0 properties	250
115	SupportedAccessProtocols property values	253
116	IOPerformanceLineOfService 1.1.1 properties	257
117	IOPerformanceLoSCapabilities 1.3.0 properties	260
118	LineOfService 1.1.0 properties	264
119	LineOfServiceCollection properties	266
120	NVMeDomain 1.1.0 properties	268
121	NVMeDomainCollection properties	272
122	NVMeFirmwareImage 1.1.0 properties	274
123	NVMeDeviceType property values	276
124	SpareResourceSet 1.0.1 properties	276
125	StorageGroup 1.5.0 properties	281
126	AccessCapability property values	294
127	AccessState property values	295
128	AuthenticationMethod property values	295
129	StorageGroupCollection properties	296
130	StoragePool 1.7.1 properties	299
131	AddDrives action parameters	326
132	RemoveDrives action parameters	328
133	SetCompressionState action parameters	329
134	SetDeduplicationState action parameters	329
135	SetEncryptionState action parameters	330
136	NVMePoolType property values	330
137	PoolType property values	331
138	SupportedPoolTypes property values	331
139	SupportedProvisioningPolicies property values	332
140	SupportedRAIDTypes property values	332
141	StoragePoolCollection properties	336
142	StorageReplicaInfo 1.4.0 properties	338
143	StorageService 1.5.0 properties	340
144	SetEncryptionKey action parameters	354
146	StorageServiceCollection properties	355
147	StorageSystemCollection properties	357
148	Volume 1.8.0 properties	360
149	AssignReplicaTarget action parameters	391
150	ChangeRAIDLayout action parameters	392
151	CreateReplicaTarget action parameters	394

152	Initialize action parameters	395
153	RemoveReplicaRelationship action parameters	396
154	ResumeReplication action parameters	397
155	ReverseReplicationRelationship action parameters	398
156	SplitReplication action parameters	398
157	SuspendReplication action parameters	399
158	AccessCapabilities property values	399
159	EncryptionTypes property values	400
160	InitializeMethod property values	400
161	InitializeType property values	401
162	LBAFormatsSupported property values	401
163	ProvisioningPolicy property values	402
164	RAIDType property values	402
165	ReadCachePolicy property values	406
166	ReplicaType property values	406
167	ReplicaUpdateMode property values	407
168	VolumeType property values	407
169	VolumeUsage property values	408
170	WriteCachePolicy property values	408
171	WriteCacheState property values	409
172	WriteHoleProtectionPolicy property values	409
173	VolumeCollection properties	411

List of Figures

1	Model Overview	32
2	Logical Subsystem in Swordfish Standalone Configuration	34
3	Swordfish Standalone Configuration Example	35
4	Logical Subsystem in Swordfish Integrated Configuration	36
5	Swordfish Integrated Configuration Example	37
6	Logical Subsystem in Integrated Service Configuration	45
7	Integrated Service Configuration Example	46
8	Logical Subsystem in Standalone Service Configuration	47
9	Standalone Service Configuration Example	48