

STORAGE DEVELOPER CONFERENCE



*BY Developers FOR Developers*

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A SNIA<sup>®</sup> Event

# Drive Adoption of Your Products with the Swordfish Conformance Test Program

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# What is Swordfish CTP?

- **Swordfish CTP:**

- A vendor-neutral test suite to validate conformance to the SNIA Swordfish Specification as well as conformance to the DMTF Redfish Specification
- Uses the Redfish specification, Swordfish Specification and published Swordfish Profiles to determine compliance
  - Profiles define required subsets of functionality that implementations can advertise as customer “Features”
  - Each Feature corresponds to key customer functionality and is advertised to clients
- Built using open source tools
  - Leverage pre-built tools: Redfish test framework; Redfish-URI-Validator; Redfish-Service-Validator; Redfish-Protocol-Validator; Redfish-interop-validator
  - Custom tools built to extend, verifying Swordfish-specific requirements: Swordfish Features test; Swordfish Capacity Source test
- Targeting a completely automated test submission, validation and publication process

# Why Do SNIA Swordfish CTP?

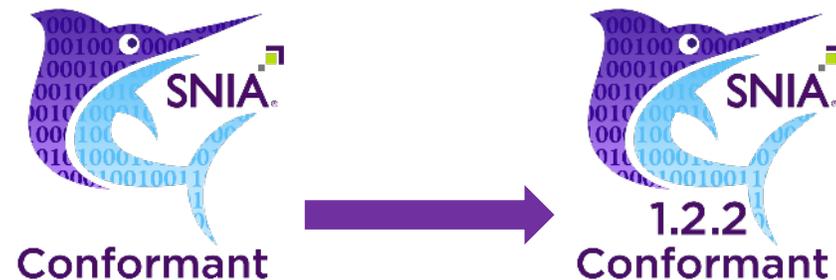
- **Vendor/Manufacturer benefits:**
  - Reduced integration costs with partners
  - Meet customer demand for standards-based solutions
  
- **End User/Customer benefits:**
  - Objective testing verified in a vendor-neutral manner
  - Ensured product conformance to industry standards
  - Lower cost of ownership
  - Help to prevent vendor lock-in
  - Improved interoperability of multi-vendor products

# Test Submission Model

- Self-test and validation
  - Participants run tests against their own equipment / software, submit test results to SNIA / SMI to validate and post on the Swordfish site as certified results
  - Current process: “Testing the tests” – companies working directly with CTP lead and testers to simplify process, debug issues
    - Process will be completely automated (with audit process) – results submitted through online portal, processed through automatic validation process, then automatic results created for review before publishing

# CTP Logo and Version

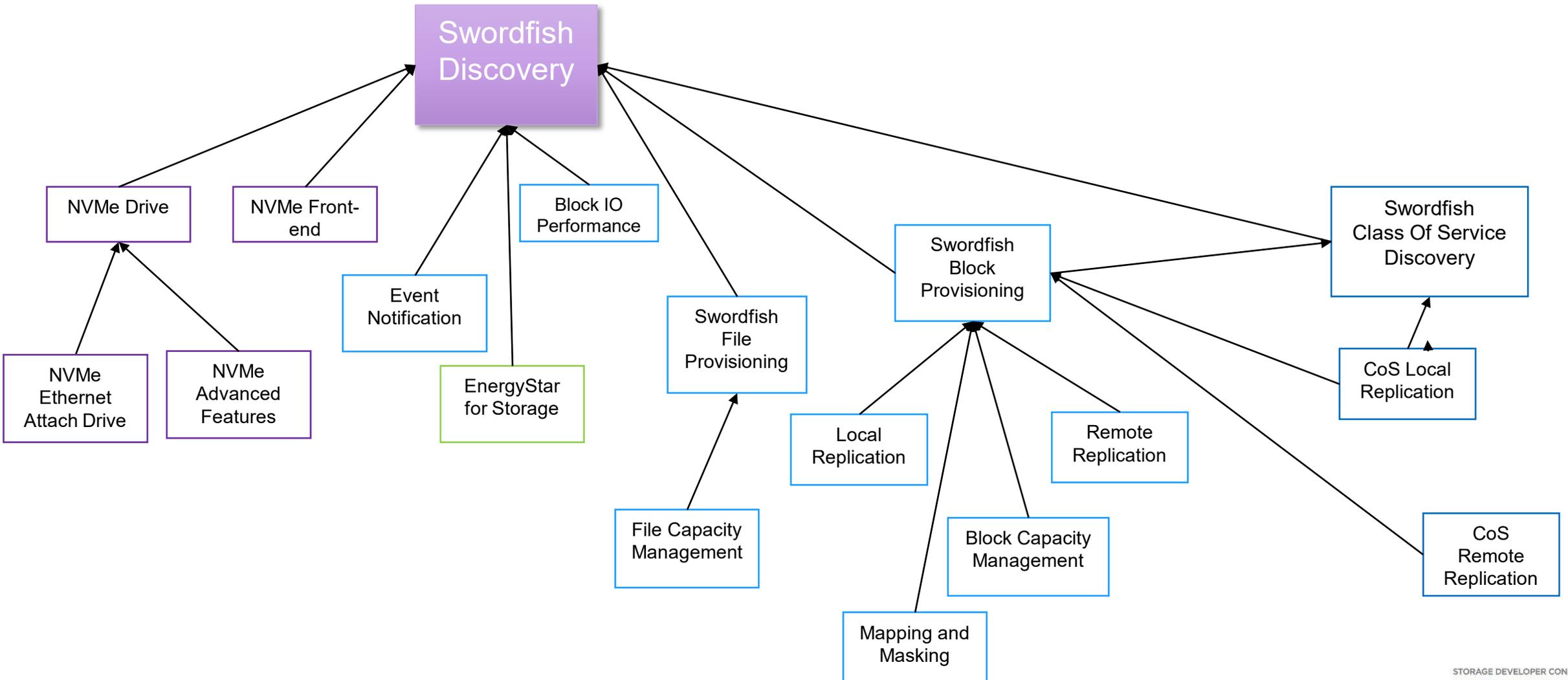
- The CTP Program logos are numbered to correspond to the versions of Swordfish that the SSM TWG chooses to release as SNIA Standards
  - Easy for clients to match your implementations with specifications
  - Identifiable logos to use in marketing materials



# What is Covered by tests?

- **Conformance to Redfish (and Swordfish) specifications**
  - Base required functionality
    - \$metadata, odata enumerations
    - Required properties in schema
  - Check all URIs are valid (per RF/SF schema)
  - Limited functionality validation – e.g., sessions for authentication
- **Conformance to requirements in Swordfish profiles**
  - Each Profile contains only requirements for that feature

# Swordfish Profiles Inheritance Hierarchy



# Framework and Test Overview

# Test Framework

- The test framework leverages the “Redfish-Test-Framework”, an open source framework from the Redfish Forum
  - No need to learn complex setup: Framework is bundled with simple command-line interface specific to Swordfish
- Test early and often
  - CTP supports checking compliance level using mockups
  - Or, use an emulator as a test / development tool: Swordfish API Emulator and DEM both being enhanced to support CTP compliance
- Enhancements (some work in progress, some TBD):
  - SNIA authenticated self-run test result mechanism (e.g., certificate based authentication for CTP members for submitted test results)

```
(.venv) [root@e7f161f18cda swordfish-ctp-tests]# python ./run_snia_test.py -h
usage: run_snia_test.py [-h] [--user USER] [--password PASSWORD]
                       [--secure SECURE] [--authtype AUTHTYPE]
                       [--profiles PROFILES [PROFILES ...]]
                       [--profile_version PROFILE_VERSION]
                       host level

Python Script for the official Swordfish CTP Testing Suite.
  The hostname provided should be a full URI, as example `https://example.com:8000`.

  The hostname may also be provided as a mockup directory as formatted for the Redfish-Mockup-Server or Redfish-Protocol-Validator

  The following test levels are available:  serviceroottest, servicetest, officialtest

  After performing the run, your test directory will be output into your Swordfish-CTP-Tests folder as "test_dir_currentdate".

positional arguments:
  host                Full URL of System being tested (or directory of mockup)
  level              Level of testing

optional arguments:
  -h, --help          show this help message and exit
  --user USER, -u USER  Username for server
  --password PASSWORD, -p PASSWORD  Password of server
  --secure SECURE, -s SECURE  Ensures certificate checking on https servers
  --authtype AUTHTYPE  Specify that we are using redfish session or not
  --profiles PROFILES [PROFILES ...]  Specify profiles to test against service
  --profile_version PROFILE_VERSION  Default version of profiles to test against

(.venv) [root@e7f161f18cda swordfish-ctp-tests]#
```

# Test Results: Summary results available from individual test runs

- Each run shows results of each test run
- Submit results when desired tests are passing
  - Redfish service-level tests required
  - Swordfish Discovery feature required
- From final / validated test results, these results will be transformed into results posted online at [snia.org/ctp](https://snia.org/ctp)
  - Results will be categorized as Base Redfish, and by Swordfish Feature – only “passed” features published



**Conformant**

## SNIA Swordfish(Tm) Conformance Test Program Results

**Start Time:** 2021-09-10 22:48:47  
**Duration:** 38.72 s  
**Summary:** Total: 5, Pass: 2, Fail: 3

Swordfish CTP Test	Status
Redfish Protocol Validator	Fail <a href="#">View</a>
Redfish URI Validator	Fail <a href="#">View</a>
SNIA Drives Capacity Test	Pass <a href="#">View</a>
SNIA Registries Test	Fail <a href="#">View</a>
SwordfishDiscovery	Pass <a href="#">View</a>

# Test Results: Published Results

- Final / validated test results will be posted online at [snia.org/swordfish-ctp](http://snia.org/swordfish-ctp)
  - Results will be categorized as Base Redfish, and by Swordfish Feature
  - Only “passed” features published

## Example Company "A"

### Official SNIA Swordfish™ CTP Test Results

CTP Test version: v1.2.2

**Tested Software:** Example Company "A" Storage Manager v1.2  
**Swordfish version:** v1.2.2



**Conformant**

Swordfish Conformant Tests
Redfish Protocol Tests
Swordfish Discovery
Swordfish Block Provisioning
Swordfish NVMe SSD Drive
Swordfish NVMe SSD Drive Advanced Features
Swordfish NVMe SSD Drive Ethernet Attach

**Applicable Product Family:** Example Company "A" NVMe SSD Ethernet-Attached Drives  
**Products in Family:** Product Name X01 NVMeGen3 Drive, NVMeGen4 Drive

[Company product family page.](#)

# Redfish Service Tests

/redfish/v1/ (response time: 0.003722) ServiceRoot				
/redfish/v1/ (response time: 0.003722)		Context: redfish/v1/\$metadata=#ServiceRoot.ServiceRoot File Origin: localFile:///.../metadata/ServiceRoot_v1.xml Resource Type: #ServiceRoot.v1_9_0.ServiceRoot		GET Success HTTP Code (200)
<a href="#">Show Results</a> <a href="#">Show Payload</a>				pass: 8 passGet: 1 refine: 1 skipOptional: 25
Property Name	Value	Type	Exists	Result
@odata.context	redfish/v1/\$metadata=#ServiceRoot.ServiceRoot	odata	Exists	PASS
@odata.id	redfish/v1/	odata	Exists	PASS
@odata.type	#ServiceRoot.v1_9_0.ServiceRoot	odata	Exists	PASS
Storage	Link: /redfish/v1/Storage	link to: StorageCollection	Yes	PASS
AggregationService	-	link to: AggregationService	No	Optional
PowerEquipment	-	link to: PowerEquipment	No	Optional
Facilities	-	link to: FacilityCollection	No	Optional
Vendor	-	string	No	Optional
CertificateService	-	link to: CertificateService	No	Optional
ResourceBlocks	-	link to: ResourceBlockCollection	No	Optional
JobService	-	link to: JobService	No	Optional
TelemetryService	-	link to: TelemetryService	No	Optional
Product	-	string	No	Optional
ProtocolFeaturesSupported	-	ServiceRoot.v1_3_0.ProtocolFeaturesSupported	No	Optional
CompositionService	-	link to: CompositionService	No	Optional
StorageSystems	-	link to: StorageSystemCollection	No	Optional
StorageServices	-	link to: StorageServiceCollection	No	Optional
Fabrics	-	link to: FabricCollection	No	Optional
UpdateService	-	link to: UpdateService	No	Optional
RedfishVersion	1.12.0	string	Yes	PASS
UUID	92384634-2938-2342-8820-489239905423	GUID	Yes	PASS
Systems	-	link to: ComputerSystemCollection	No	Optional
Chassis	Link: /redfish/v1/Chassis	link to: ChassisCollection	Yes	PASS
Managers	-	link to: ManagerCollection	No	Optional
Tasks	-	link to: TaskService	No	Optional
SessionService	Link: /redfish/v1/SessionService	link to: SessionService	Yes	PASS
AccountService	-	link to: AccountService	No	Optional
EventService	-	link to: EventService	No	Optional
Registries	-	link to: MessageRegistryFileCollection	No	Optional
JsonSchemas	-	link to: JsonSchemaFileCollection	No	Optional
Links	[JSON Object]	ServiceRoot.v1_0_0.Links	Yes	complex
Links.Sessions	Link: /redfish/v1/SessionService/Sessions	link to: SessionCollection	Yes	PASS
Links.Oem	-	Resource.Oem	No	Optional
Id	RootService	string	Yes	PASS
Description	-	string	No	Optional
Name	Root Service	string	Yes	PASS
Oem	-	Resource.Oem	No	Optional
No errors				
No warns				

Service validator checks general conformance to schema

# Troubleshooting from test results

PhysicalPortAssignment	-	link to: NetworkPort	No	Optional
BootMode	Disabled	string (enum)	Yes	PASS
VirtualFunctionsEnabled	True	boolean	Yes	PASS
MaxVirtualFunctions	16	number	Yes	PASS
Links	[JSON Object]	NetworkDeviceFunction.v1_0_0.Links	Yes	complex
Links.EthernetInterfaces	Array (size: 1)	array of: EthernetInterface	Yes	...
Links.EthernetInterfaces[0]	Link: /redfish/v1/Chassis/EBOFEnclosure/NetworkAdapters/8fd725a1/NetworkDeviceFunctions/11100/EthernetInterfaces	EthernetInterface	Yes	FAIL
Links.OffloadSystem	-	link to: ComputerSystem	No	Optional
Links.OffloadProcessors	-	Processor	No	Optional
Links.PhysicalNetworkPortAssignment	-	link to: Port	No	Optional
Links.EthernetInterface	-	link to: EthernetInterface	No	Optional
Links.PhysicalPortAssignment	-	link to: NetworkPort	No	Optional
Links.Endpoints	-	Endpoint	No	Optional
Links.PCIeFunction	-	link to: PCIeFunction	No	Optional
Links.Oem	-	Resource.Oem	No	Optional
Id	11100	string	Yes	PASS
Description	-	string	No	Optional
Name	Network Device Function View	string	Yes	PASS
Oem	-	Resource.Oem	No	Optional

ERROR - Links.EthernetInterfaces[0]: Linked resource reports schema version (or namespace): EthernetInterface.EthernetInterface not found in typechain

WARNING - /redfish/v1/Chassis/EBOFEnclosure/NetworkAdapters/8fd725a1/NetworkDeviceFunctions/11101 @odata.id: Expected @odata.id to match URI link /redfish/v1/Chassis/EBOFEnclosure/NetworkAdapters/8fd725a1/NetworkDeviceFunctions/11100

- Descriptive messages show issues with any failures or warnings
- Additional log files available for more detailed reporting

# Individual Features Tests

Each test run has parameters, system info

Results show PASS/FAIL for each item

##### SNIA Swordfish (tm) Conformance Test Report #####



Tool Version: 2.0.0  
 Fri Sep 10 22:49:25 2021  
 (Run time: 0:00:00)

The Swordfish CTP Test Framework is provided and maintained by the SNIA. For feedback on the Swordfish CTP framework, go to:  
<https://www.snia.org/feedback>  
 This tool is provided and maintained by the DMTF. For feedback, please open issues in the tool's Github repository:  
<https://github.com/DMTF/Redfish-Service-Validator/issues>

Description: My Target System Root Service, version 1.12.0, 92384634-2938-2342-8820-489239905423  
 System: http://192.168.1.42:5000

Profile: ['./profiles/SwordfishDiscovery.json']  
 Schema: None

authtype: None, certificatebundle: None, certificatecheck: False, config: None  
 configuri: http://192.168.1.42:5000, debugging: False, forceauth: False, ip: http://192.168.1.42:5000  
 logdir: logdir, oemcheck: True, online\_profiles: True, payload: None  
 timeout: 10, token: None, username: , usssl: False  
 verbose: 0, warnrecommended: False, writecheck: False

/redfish/v1/ (response time: 0) ServiceRoot					
/redfish/v1/ (response time: 0) Show Results	Context: /redfish/v1 \$metadata=#ServiceRoot.ServiceRoot File Origin: None Resource Type: #ServiceRoot.v1_9_0.ServiceRoot	GET Success	pass: 3 passGet: 1 totaltests: 3		
Property Name	Value	Expected	Actual	Result	
Storage.ReadRequirement	Mandatory	Must Exist	Exists	PASS	
Systems.ReadRequirement	Implemented	Any	DNE	PASS	
StorageSystems.ReadRequirement	Implemented	Any	DNE	PASS	
No errors					
No warns					
/redfish/v1/Storage (response time: 0) StorageCollection					
/redfish/v1/Storage (response time: 0) Show Results	Context: /redfish/v1 \$metadata=#StorageCollection.StorageCollection File Origin: None Resource Type: #StorageCollection.StorageCollection	GET Success	pass: 2 passGet: 1 totaltests: 2		
Property Name	Value	Expected	Actual	Result	
Members.MinCount	1	<=	1	PASS	
Members#0.ReadRequirement	Mandatory	Must Exist	Exists	PASS	
No errors					
No warns					
/redfish/v1/Storage/IPAttachedDrive/Volumes (response time: 0) VolumeCollection					
/redfish/v1/Storage/IPAttachedDrive/Volumes (response time: 0) Show Results	Context: /redfish/v1 \$metadata=#VolumeCollection.VolumeCollection File Origin: None Resource Type: #VolumeCollection.VolumeCollection	GET Success	pass: 2 passGet: 1 totaltests: 2		
Property Name	Value	Expected	Actual	Result	
Members.MinCount	0	<=	1	PASS	
Members#0.ReadRequirement	Mandatory	Must Exist	Exists	PASS	
No errors					
No warns					

# Ready to Participate?

- We are working with companies now to “test the tests”.
- Please contact us at [storagemanagement@snia.org](mailto:storagemanagement@snia.org) if you are interested in joining the SNIA Swordfish CTP Program

# Relationship to SM Lab

- Swordfish SM Lab has a symbiotic relationship with the Swordfish Conformance program
  - Participants can use the SM Lab to test their own products as well as interoperability with the latest and greatest versions of other companies' products.
  - Regular automated results reporting of available infrastructure
- Multiple virtual participation options (e.g., virtual plugfests)
- Discounts for dual participation

# Where to Find More Info..

## SNIA Swordfish™

- **Swordfish Standards**
  - Schemas, Specs, Mockups, User and Practical Guide`s, ...  
<https://www.snia.org/swordfish>
- **Swordfish Specification Forum**
  - Ask and answer questions about Swordfish
  - <http://swordfishforum.com/>
- **Scalable Storage Management (SSM) TWG**
  - Technical Work Group that defines Swordfish
  - Influence the next generation of the Swordfish standard
  - Join SNIA & participate: [https://www.snia.org/member\\_com/join-SNIA](https://www.snia.org/member_com/join-SNIA)
- **Join the SNIA Storage Management Initiative**
  - Unifies the storage industry to develop and standardize interoperable storage management technologies
  - <https://www.snia.org/forums/smi/about/join>

## DMTF Redfish™

- **Redfish Standards**
  - Specifications, whitepapers, guides,...  
<https://www.dmtf.org/standards/redfish>



## Open Fabric Management Framework

- **OFMF Working Group (OFMFWG)**
  - Description & Links <https://www.openfabrics.org/working-groups/>
- **OFMFWG mailing list subscription**
  - <https://lists.openfabrics.org/mailman/listinfo/ofmfwg>
- **Join the Open Fabrics Alliance**
  - <https://www.openfabrics.org/membership-how-to-join/>



## NVM Express

- **Specifications** <https://nvmexpress.org/developers/>
- **Join:** <https://nvmexpress.org/join-nvme/>





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