



Flash Memory Summit

Diving in: Managing NVMe[™] and NVMe-oF[™] in the Enterprise

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What are Redfish and Swordfish?

DMTF Redfish™ covers server, data center, basic fabric management

- REST API with JSON payloads; choice of CSDL, JSON and YAML schema for development

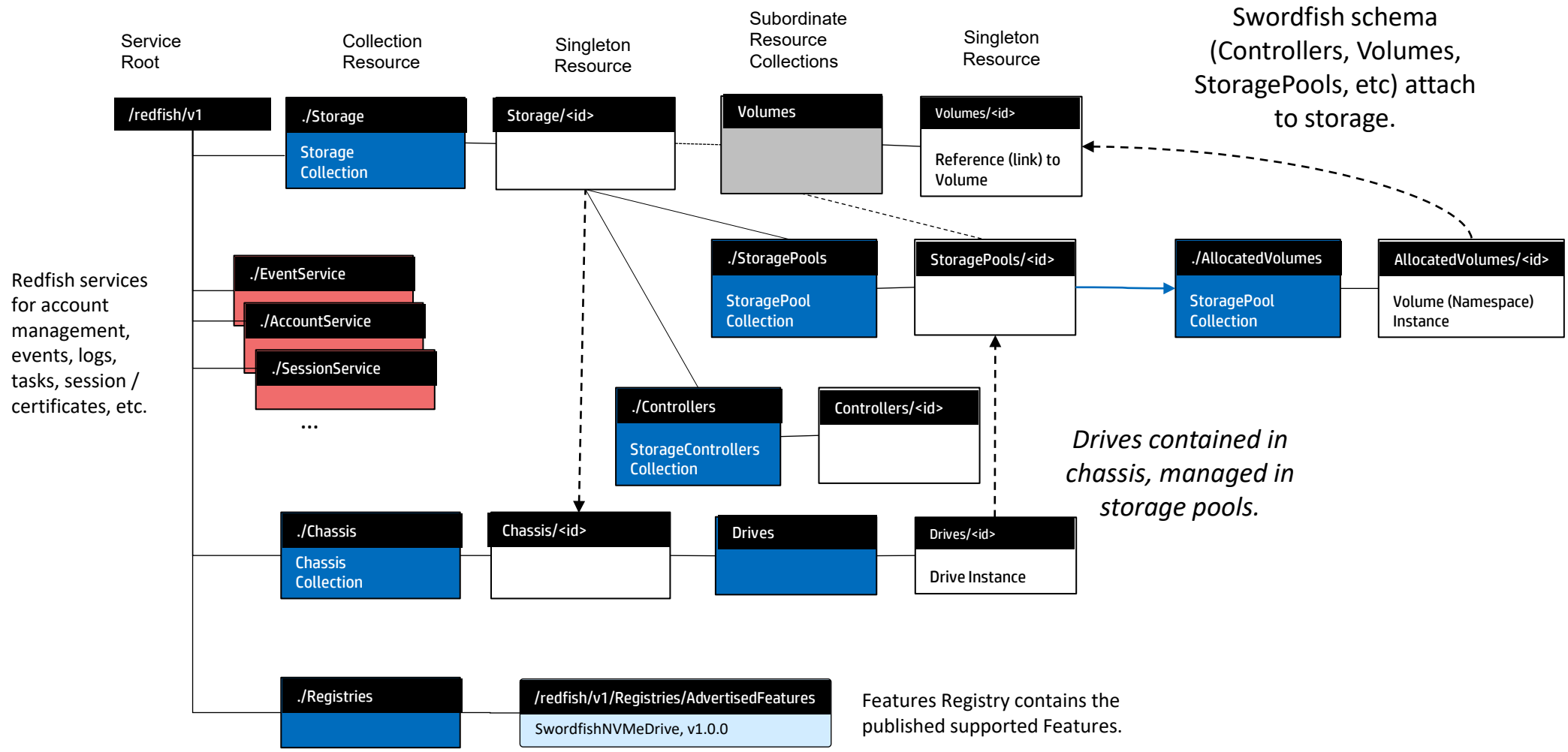
SNIA Swordfish™: Storage Management Specification with REST Based API extends DMTF's Redfish Specification

Swordfish adds storage management to all of these use cases, plus storage fabric management

- Covers block, file, and object storage
- Extend traditional storage domain coverage to include converged environments (servers, storage and fabric together)
- Provides the option for implementation to utilize Class of Service (intent or service level) based provisioning, management, and monitoring
- NVMe / NVMe-oF devices (through an Alliance partnership with NVM Express® and DMTF)
- Storage Fabric Management: An alliance partnership with OFA, DMTF is expanding support in RF/SF for fabrics and storage fabrics management



Building on the Redfish Hierarchical for Swordfish Advanced Storage



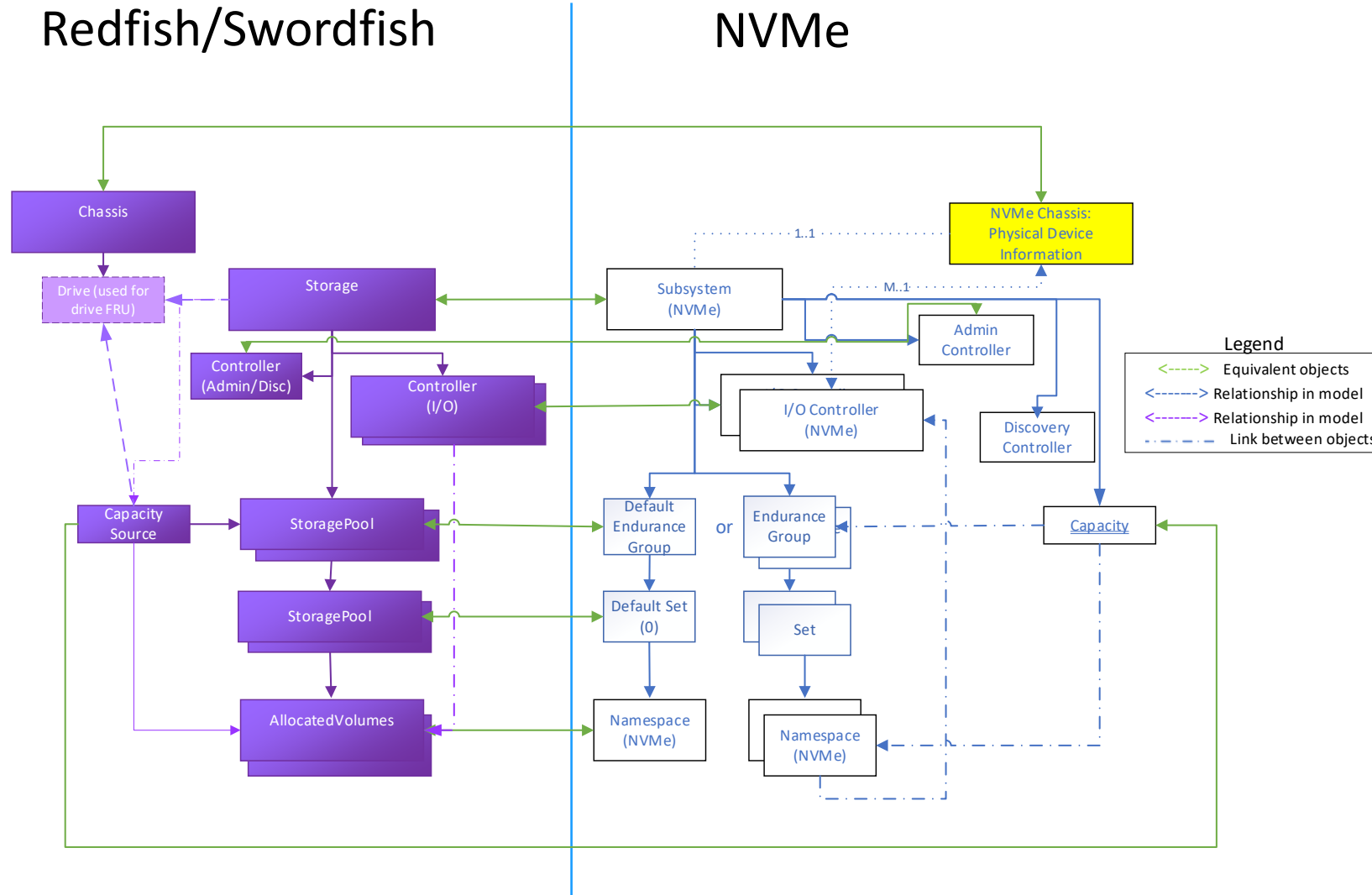
Mapped NVMe objects to existing RF/SF model

- NVM Subsystem
- NVM Controllers (IO, admin, discovery)
- Namespaces
- Endurance groups
- NVM Sets

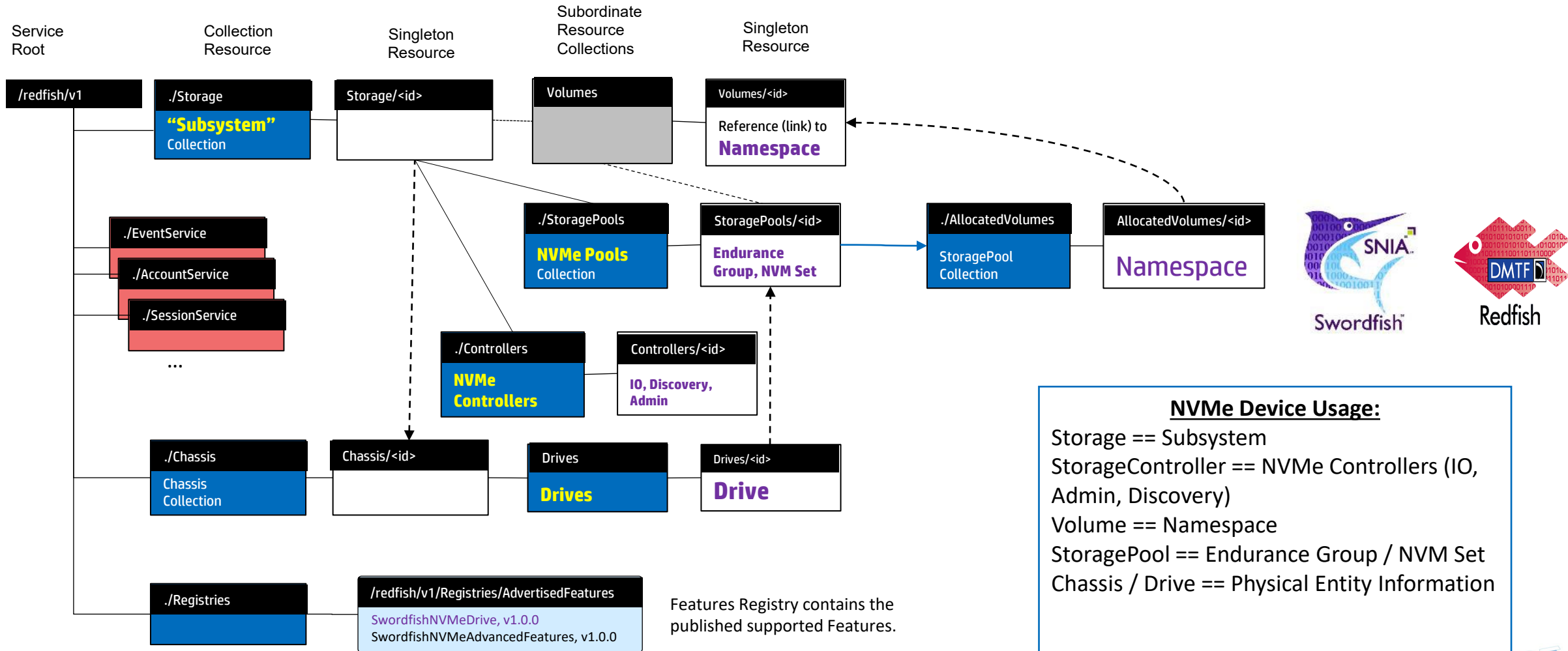
Create new objects where needed

- NVMe Domains

NVMe Subsystem Model



Swordfish and NVMe: Common Usage



Enterprise Storage Management Concerns

- **Scalability**

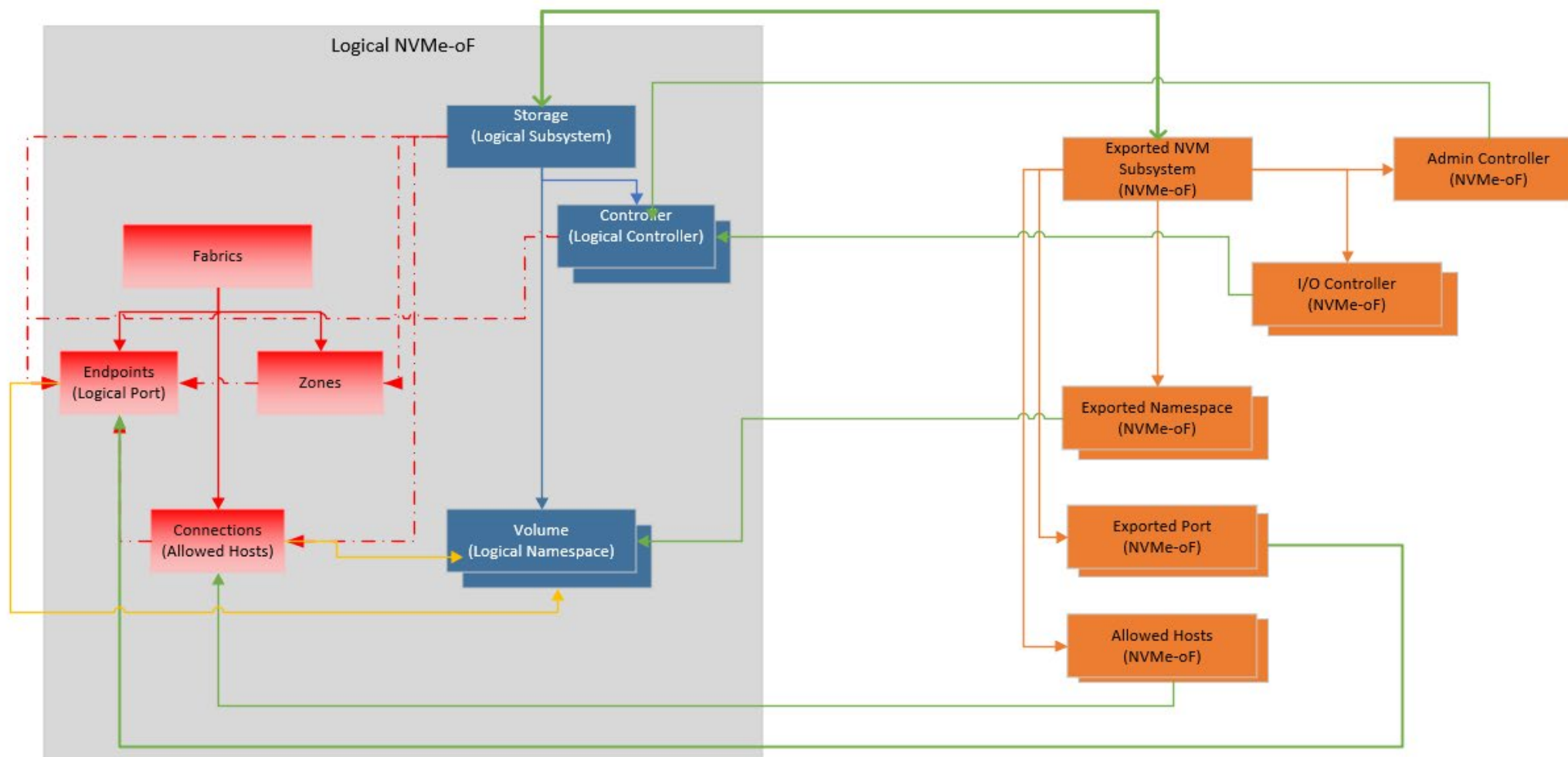
- Scale out orchestration of 10's of thousands of devices possible by using a RESTful API such as DMTF Redfish™ and SNIA Swordfish™
 - Devices can represent their own management information directly
 - Standard service definitions for aggregation, composition

- **Enabling Orchestration**

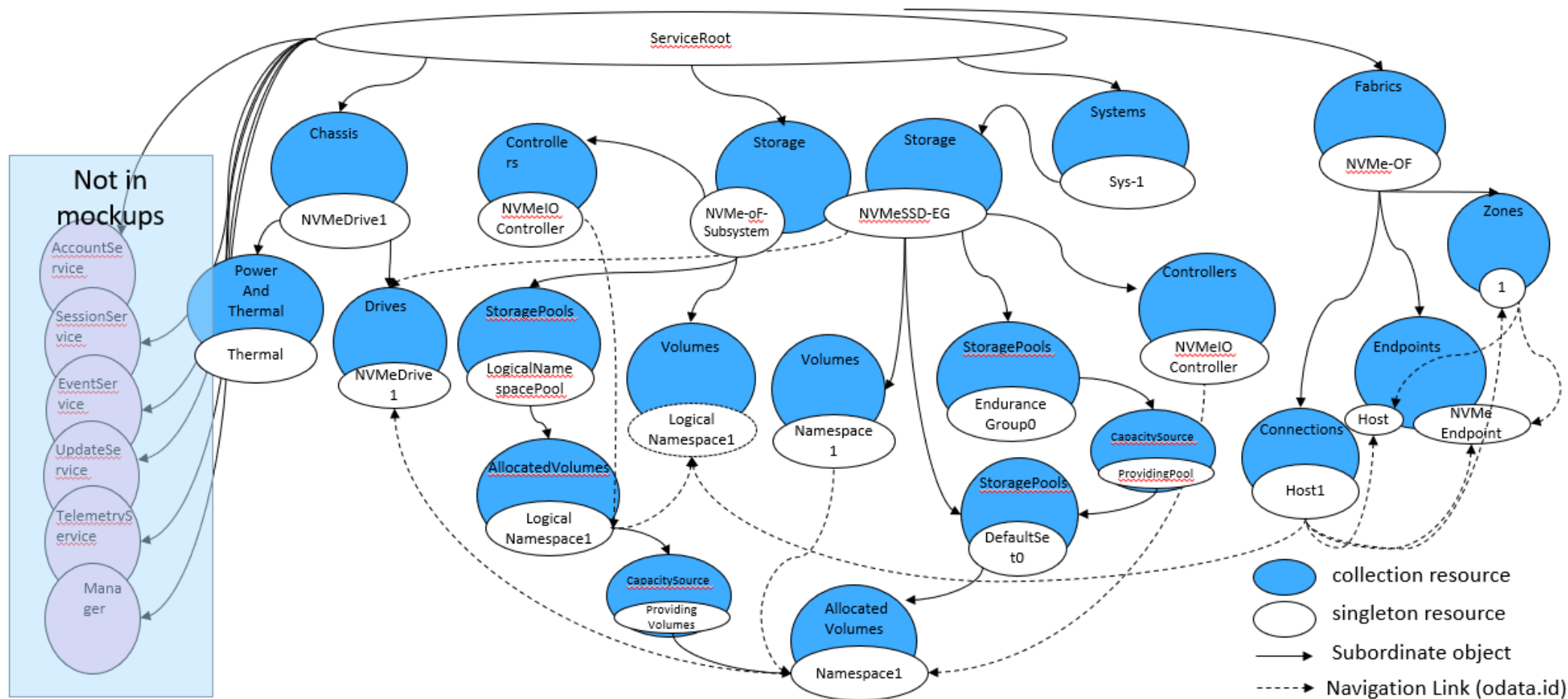
- **Connectivity**

- SNIA is working with DMTF and OFA to apply (and extend) Redfish Fabric Model to multiple fabric types
 - Redfish: basic technology instrumentation
- When basic fabric management in place, adding storage-specific capabilities
 - Storage fabric management
 - Workload optimization
 - Performance instrumentation

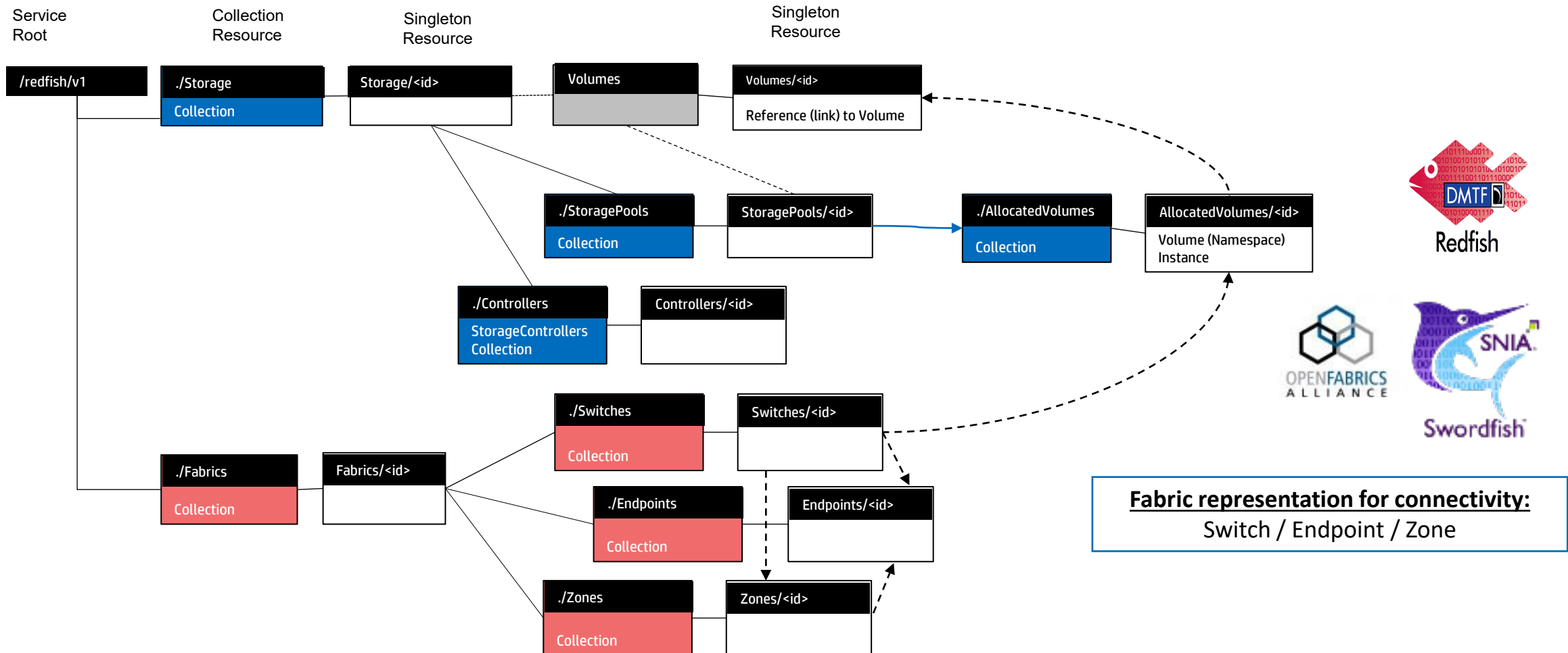
NVMe-oF Exported Logical Subsystem Model



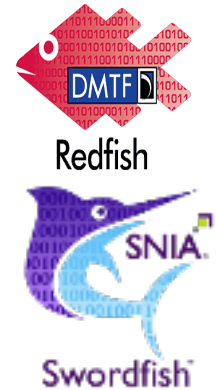
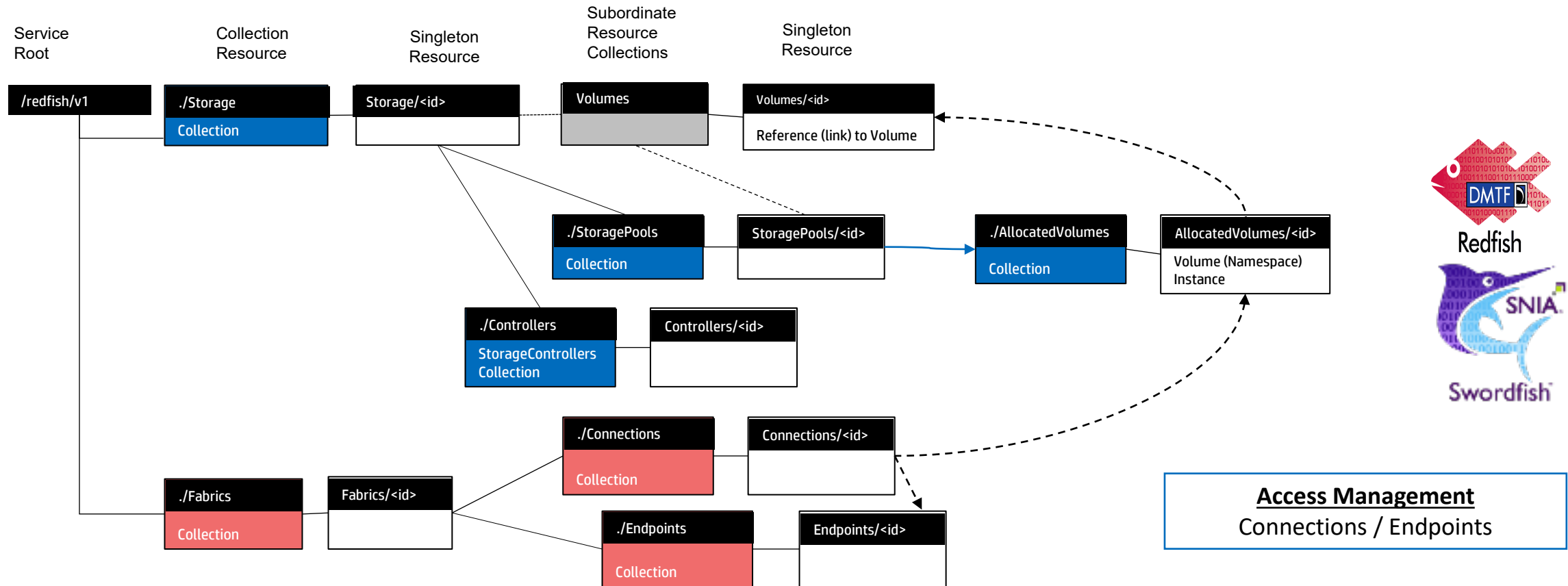
Sample NVMe-oF Instance



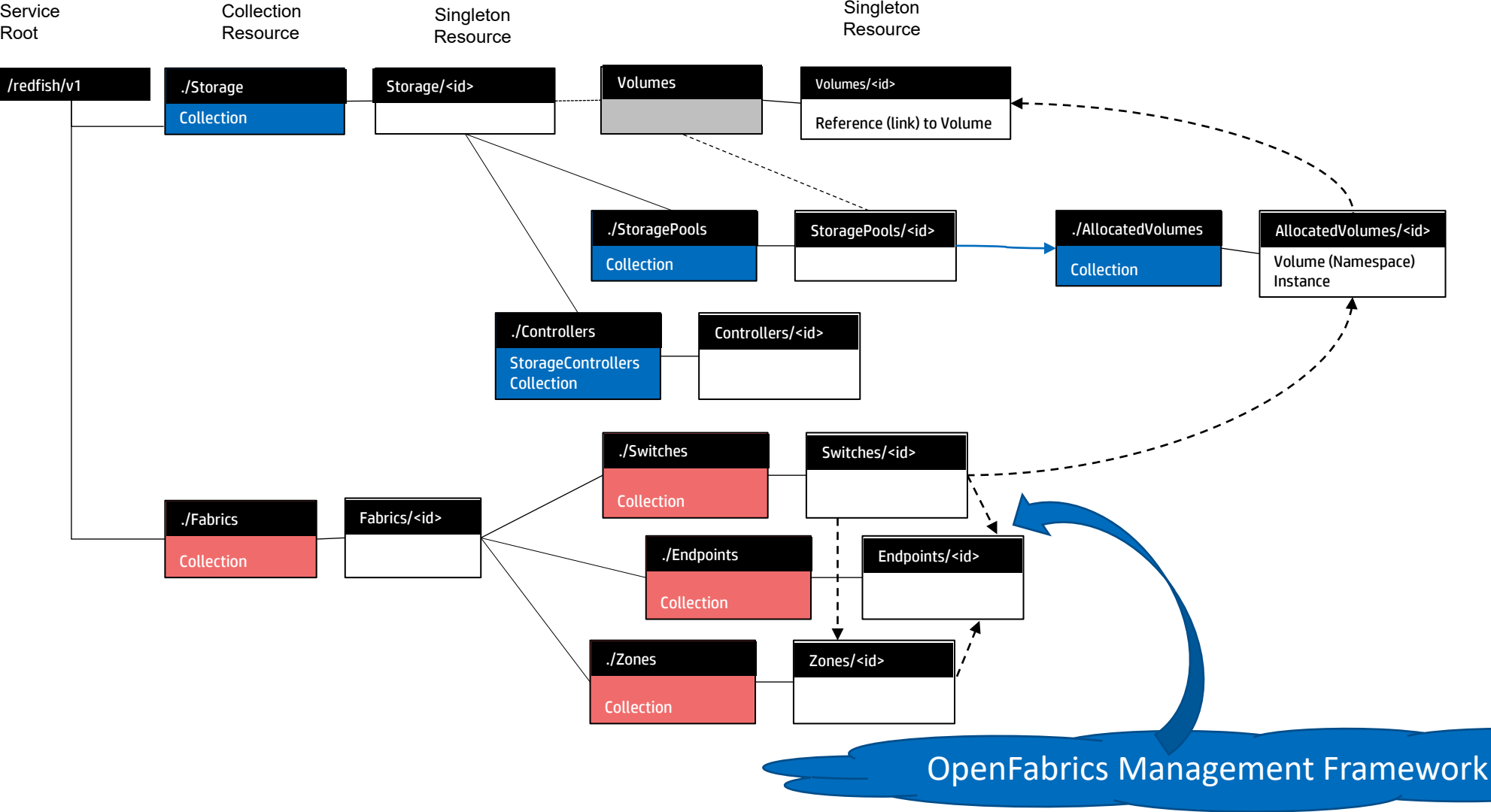
Redfish/Swordfish Hierarchy: Managing Extended Connectivity



Redfish/Swordfish Hierarchy: Adding Multi-System Access Management



Developing the OpenFabrics Framework and Mapping to Redfish and Swordfish



Redfish

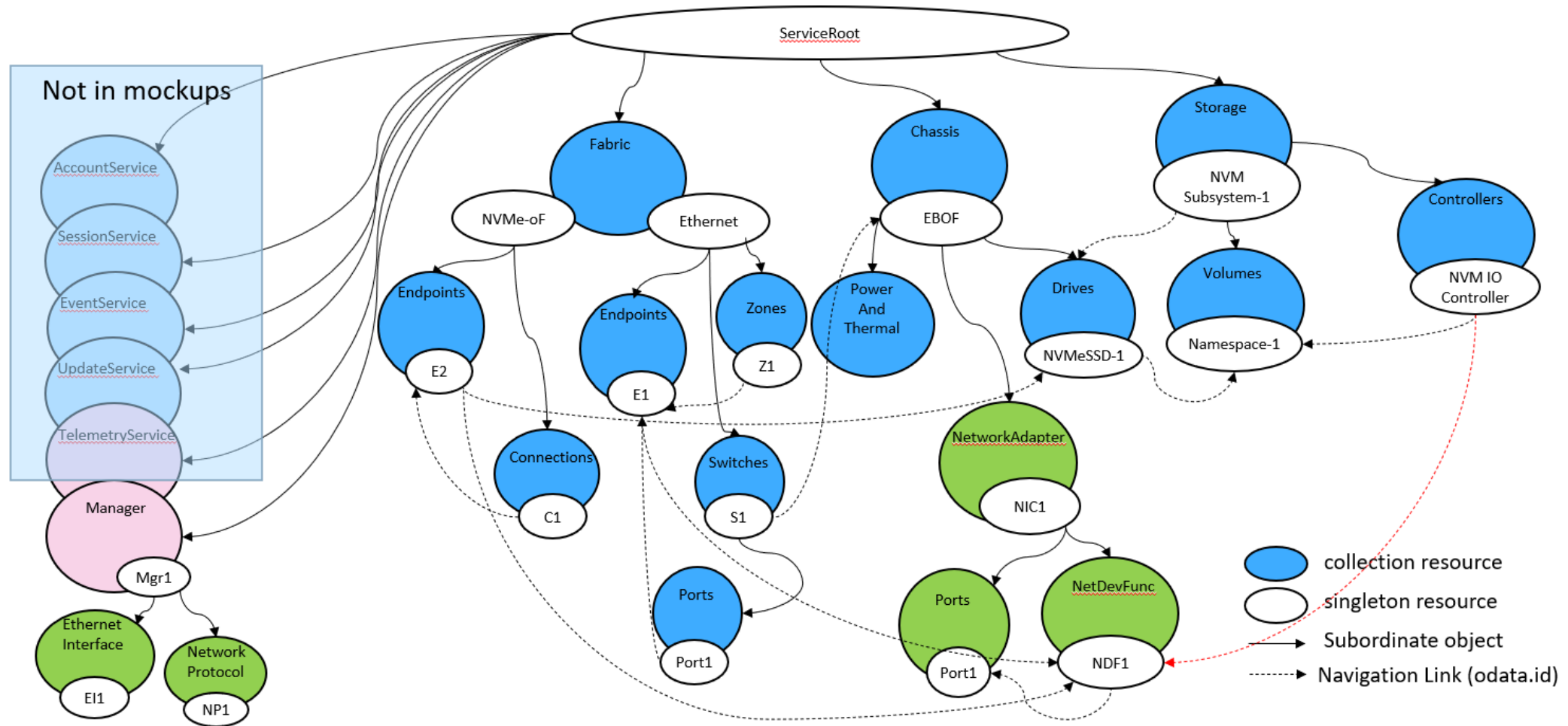


Swordfish



OPENFABRICS
ALLIANCE

Demonstrating Fabric connectivity: EBOF



Where to Find More Info...



Flash Memory Summit

SNIA Swordfish™

- **Swordfish Standards**
 - Schemas, Specs, Mockups, User and Practical Guide`s, ...
<https://www.snia.org/swordfish>
 - **NVMe Mapping Guide**
- **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
- **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>



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/>

