sodacon
— Global 2021 — July 13-14

Managing Fabrics as part of your Redfish and Swordfish Ecosystem

Phil Cayton

Vice Chair – OpenFabrics Alliance

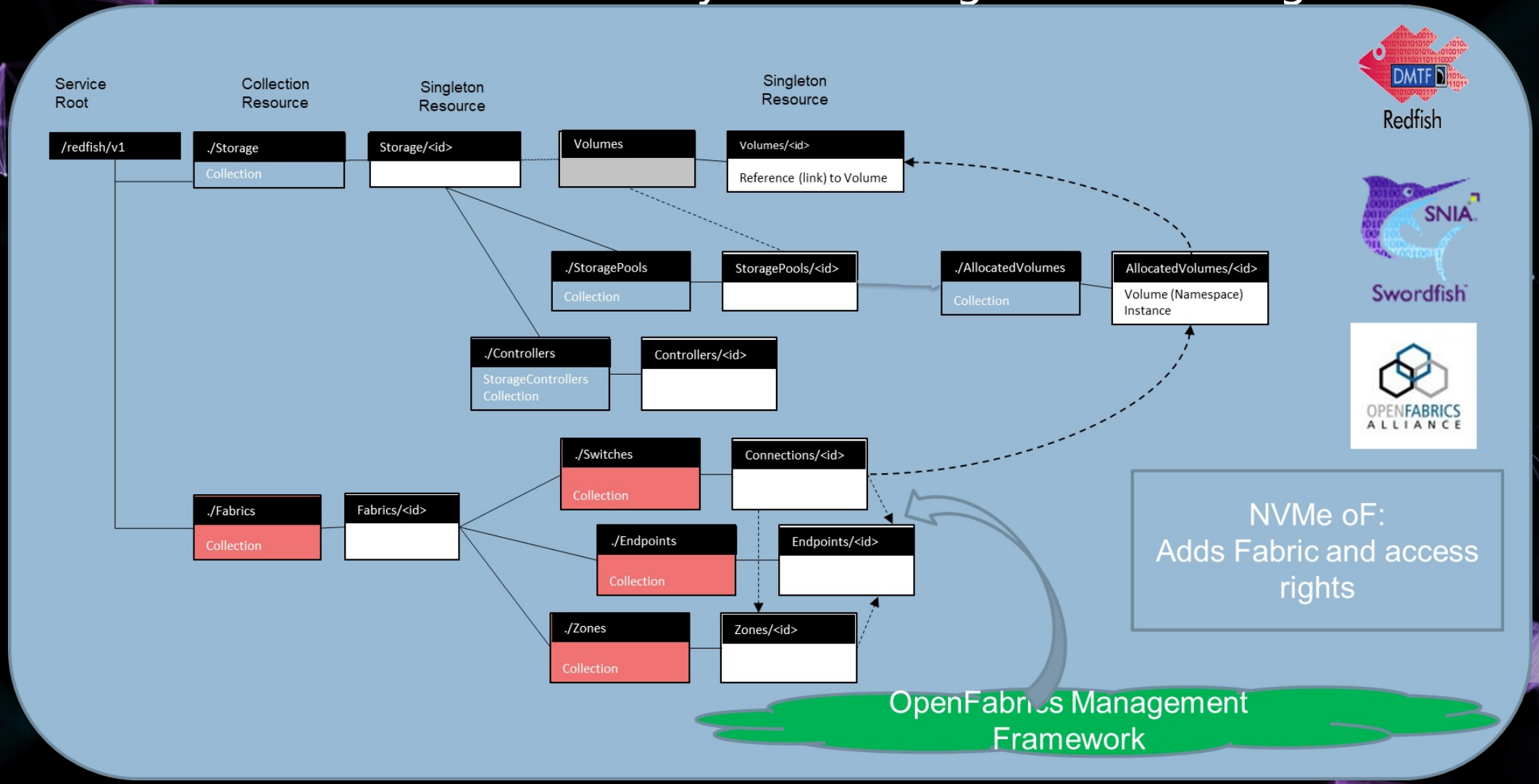
Senior Staff Engineer, Intel

soda foundation

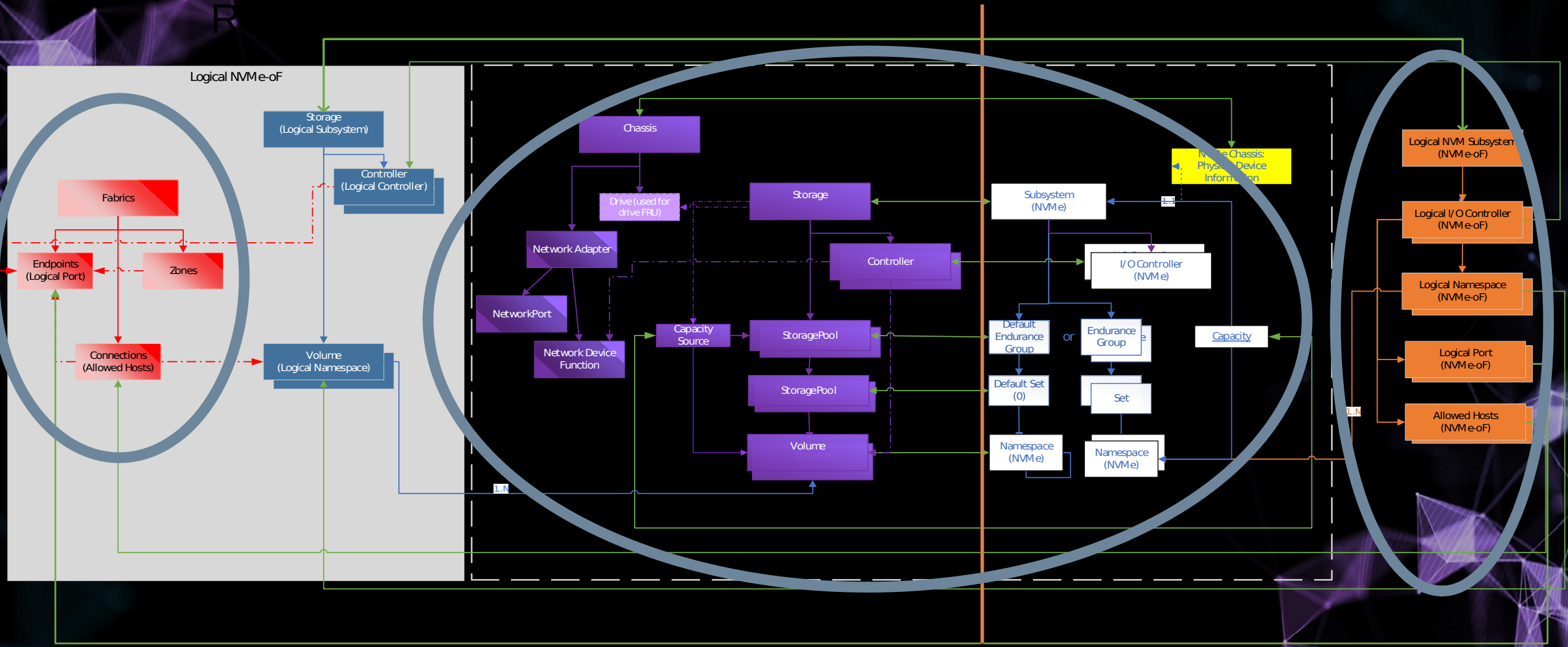
sodacon
— Global 2021 — July 13-14

Q/A session after this talk
Look for the session: “Your Questions Answered on Storage Management”

Redfish/Swordfish Hierarchy: Extending Fabric Management



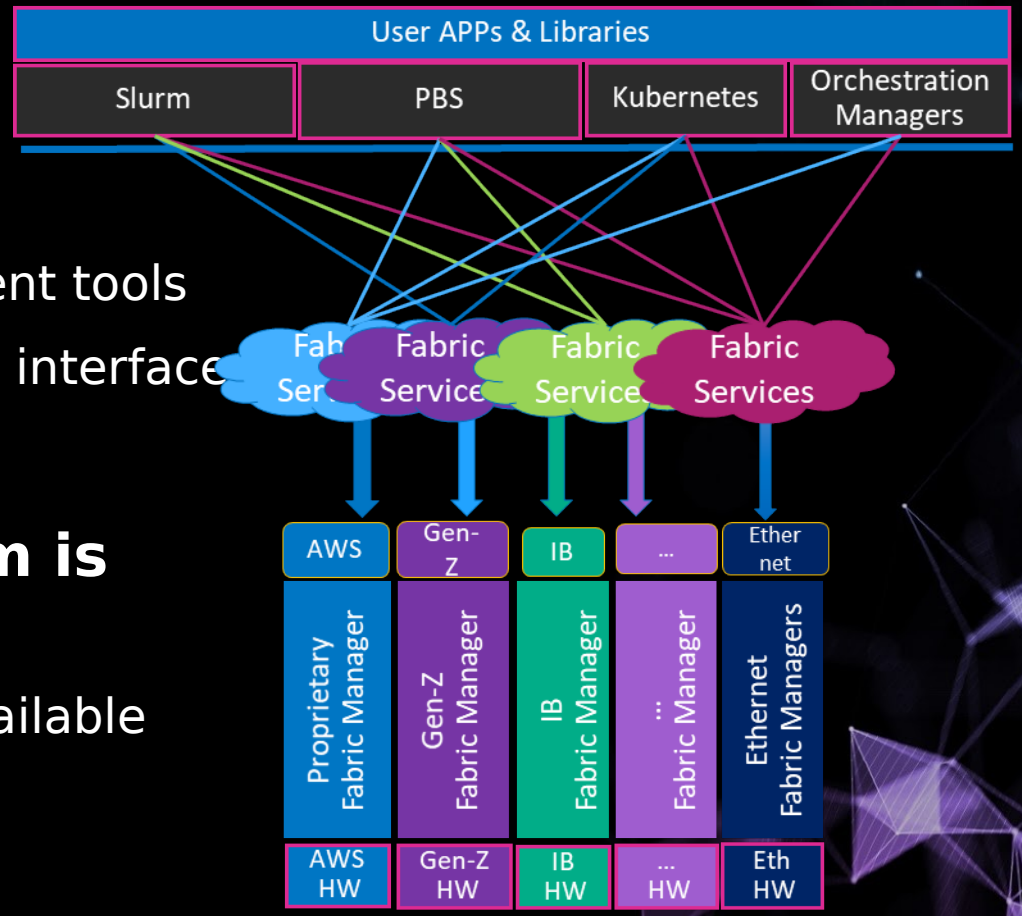
Redfish/Swordfish Hierarchy: Extending Fabric Management



The Ecosystem for Fabrics in Datacenters is Changing

The Fabric Landscape is Changing

- Rapidly increasing types of fabric interconnects
- Each fabric has its strengths, features, and management tools
- Each fabric has its own configuration mechanisms and interface



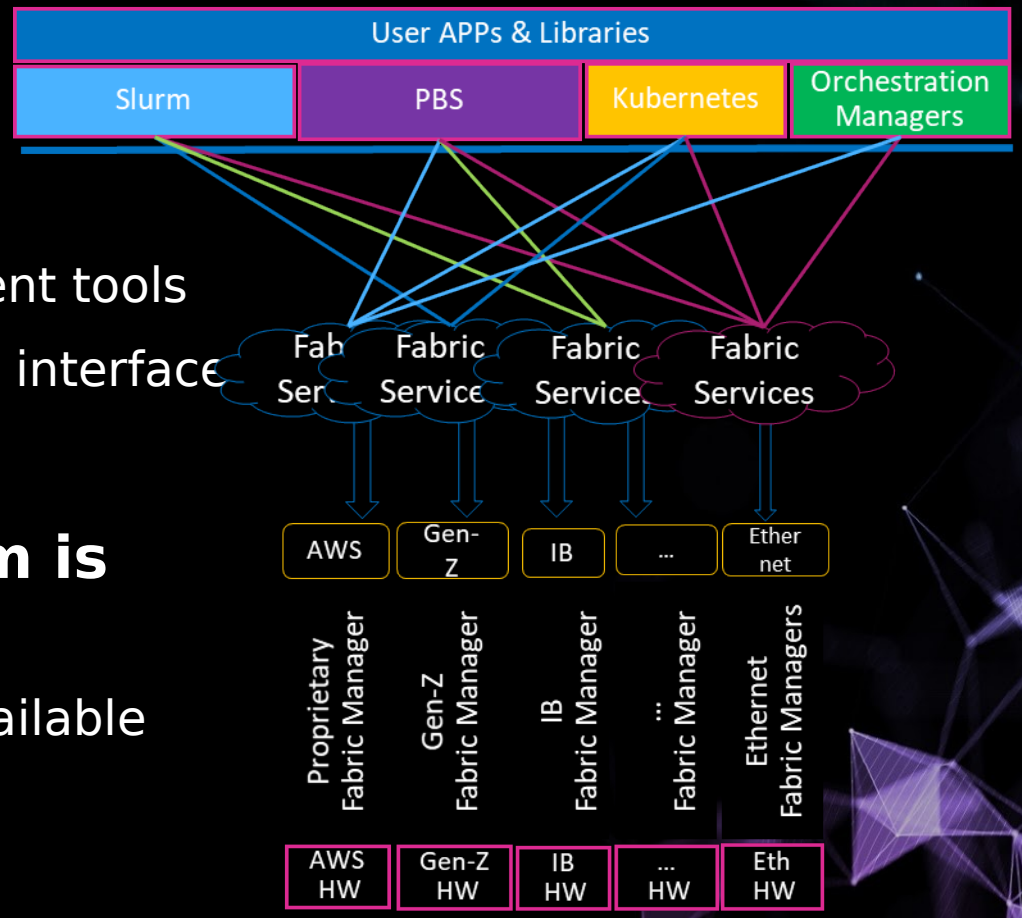
The Workload and Resource Ecosystem is changing

- New compute and storage resources are becoming available
- HPC Clusters and Cloud Computing environments:
  - running increasingly diverse and dynamic workloads
  - incorporating both distributed computing capabilities and heterogeneous hardware

The Ecosystem for Fabrics in Datacenters is Changing

The Fabric Landscape is Changing

- Rapidly increasing types of fabric interconnects
- Each fabric has its strengths, features, and management tools
- Each fabric has its own configuration mechanisms and interface



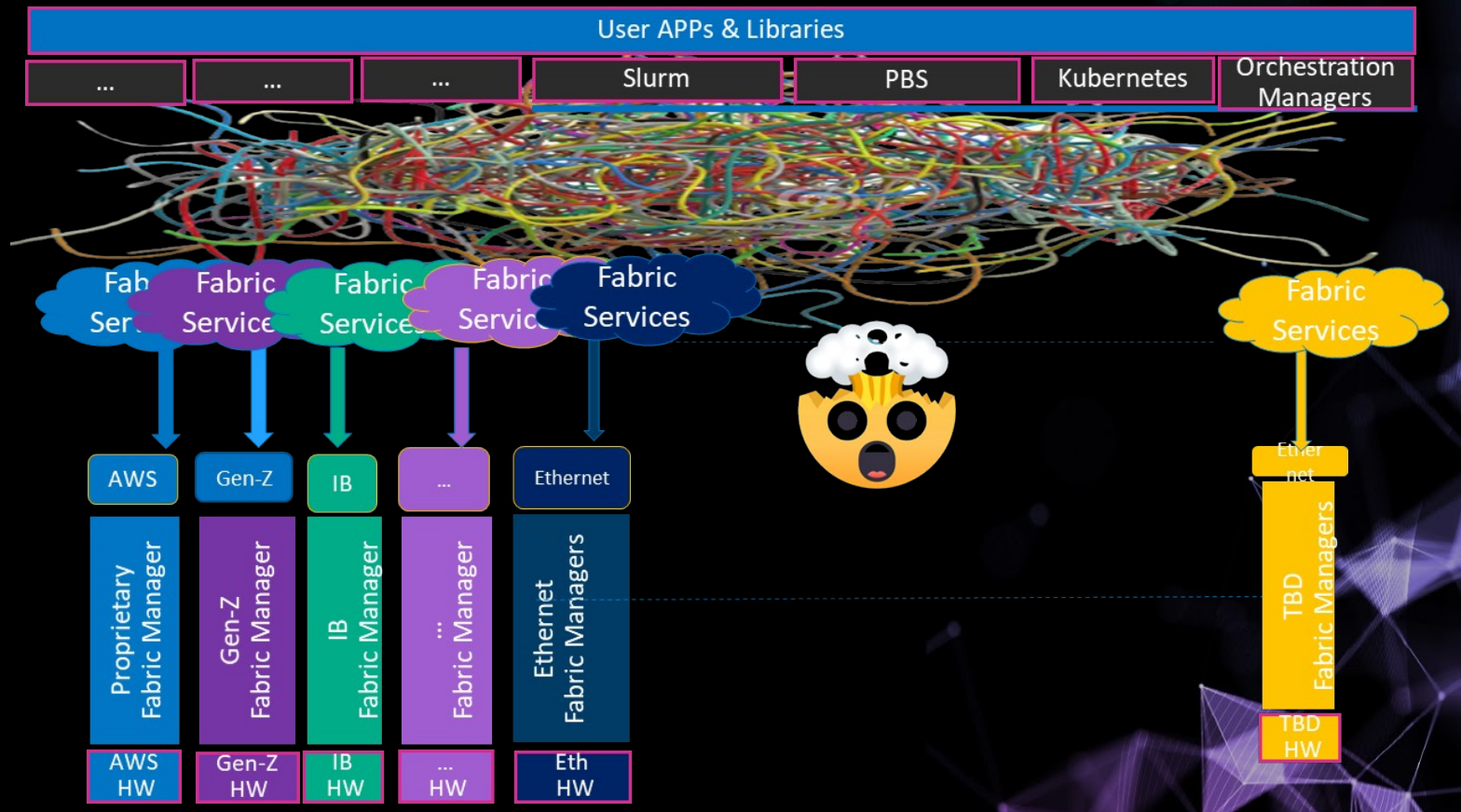
The Workload and Resource Ecosystem is changing

- New compute and storage resources are becoming available
- HPC Clusters and Cloud Computing environments:
  - running increasingly diverse and dynamic workloads
  - incorporating both distributed computing capabilities and heterogeneous hardware

This Creates Problems in Manageability

Administrative Management Challenges

- No common fabric manager interface or fabric model available to link applications with remote resources
- Workload management and optimization is different for each type of fabric
- Administrators are being asked to manage
  an increasing heterogenous fabrics infrastructure, each with its own management standard and model



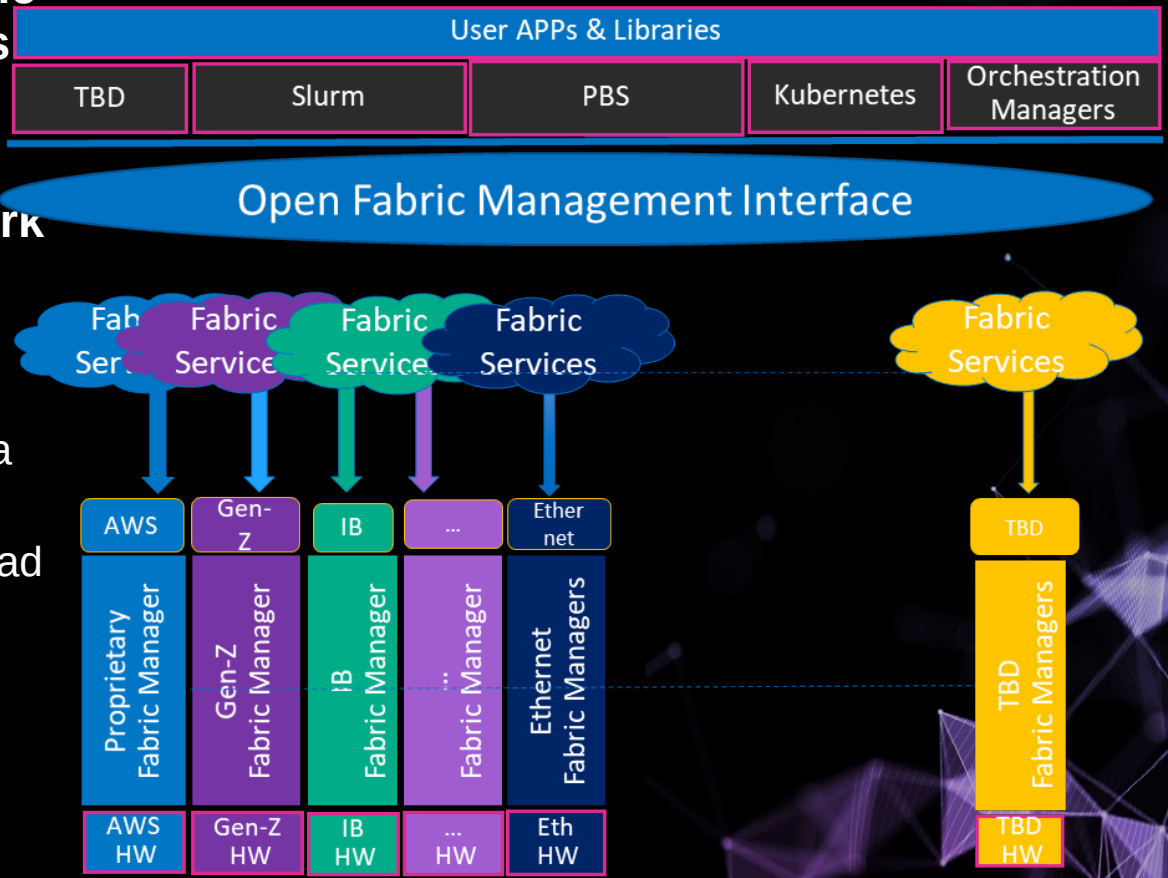
We Can Fix These Management Problems

- **Need interoperability through common interfaces to enable managers to efficiently connect workloads with resources a dynamic ecosystem**

- **Need to Integrate an Open Fabrics Management Framework (OFMF) with standards-based Ecosystem management**

- **Without an Open Fabric Management Framework:**
  - Every tool and middleware library provider needs a unique call to a specific fabric management stack for each available fabric
  - Connecting workloads to resources has high management overhead

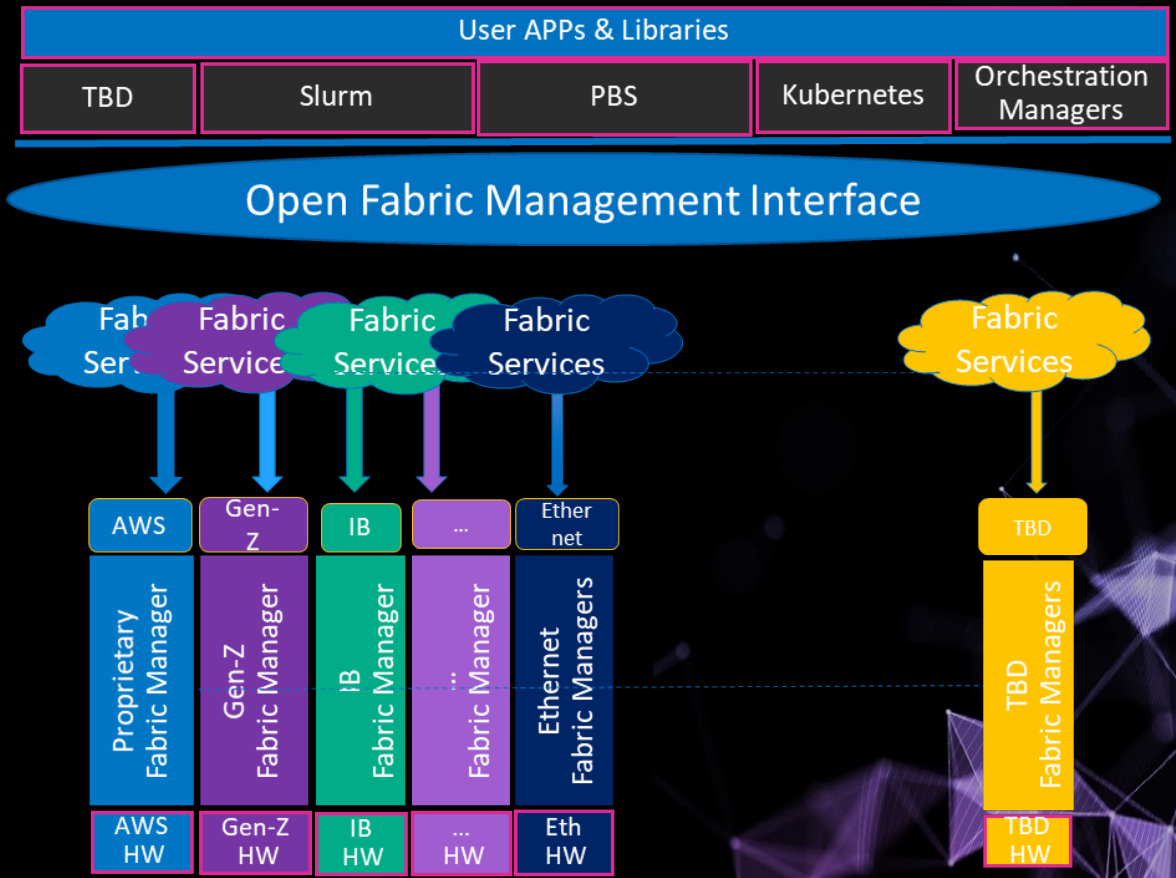
- **With an Open Fabric Management Framework:**
  - Everyone calls common fabric services to manipulate the Redfish fabric model
  - Shares common taxonomy and management APIs
  - Open Fabrics Management Framework triggers fabric specific providers to make the actual changes in the fabric



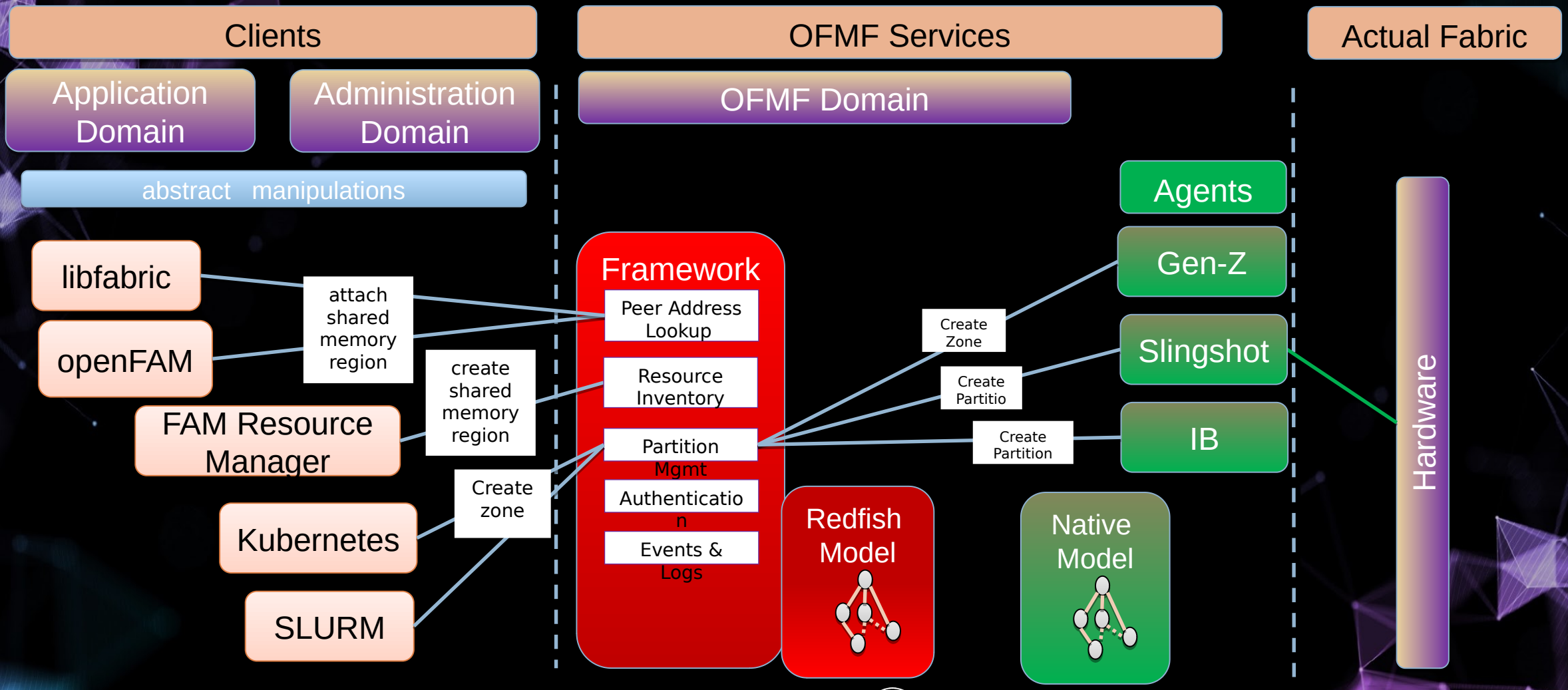
General Fabric Management

Common set of APIs

- Control Services
  - Discovery
  - Inventory
- Communication Services
  - Connection Management
  - Address vectors
- Partition Services
  - Zones
  - Connections
- Messaging Services
  - Queues and Contexts
  - Events and Errors
  - Atomics and other synchronizations
- Security



Open Fabric Management Framework Architecture



Project Process and Steps

- Requirements Analysis – Collect use-cases
- Iterative Design – Development through use-cases
- Program Design – Deep dive into system design
- Program Implementation
  - Develop POC during iterative development
  - Full implementation following

Use Case Description	Fabric Resource Hot Subtract
Actors	OFMF Fabric Manager, Administrator, Fabric Subnet Manager
Description	Subtract components when is detected by a Subnet Manager
Normal Flow	• A periodic Subnet Manager sweep recursively performs a scan of it's currently running fabric • The Subnet Manager finds a missing endpoint • The Subnet Manager deletes the endpoint • The Subnet Manager communicates to the Agent that a deletion has been made to the fabric • The Agent notifies OFMF that a fabric change has occurred • The OFMF does a Get to request the Agent to identify the change • The OFMF updates the Redfish tree with the deletion through a post of new information or delete • OFMF reports to clients that a modification to the fabric has occurred.
Alternate Flow 1	• A periodic Subnet Manager sweep recursively performs a scan of it's currently running fabric • No deletion is identified

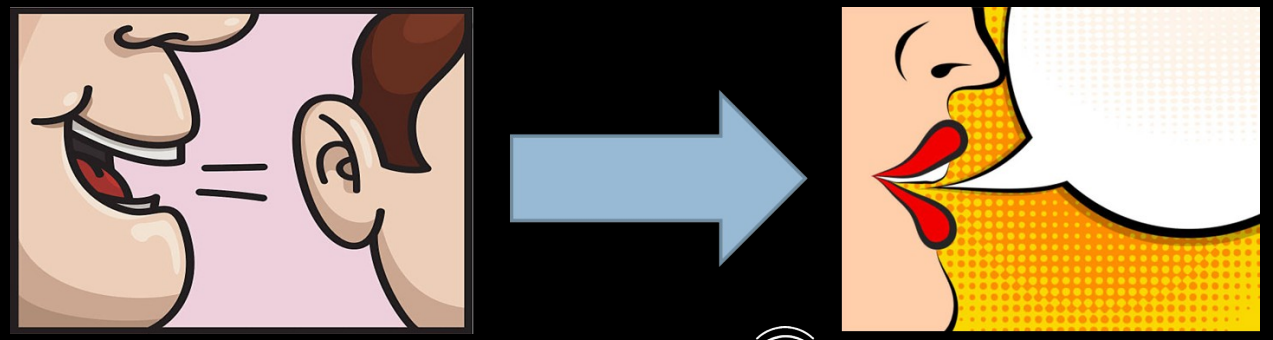
Example

Examples of Use-Cases

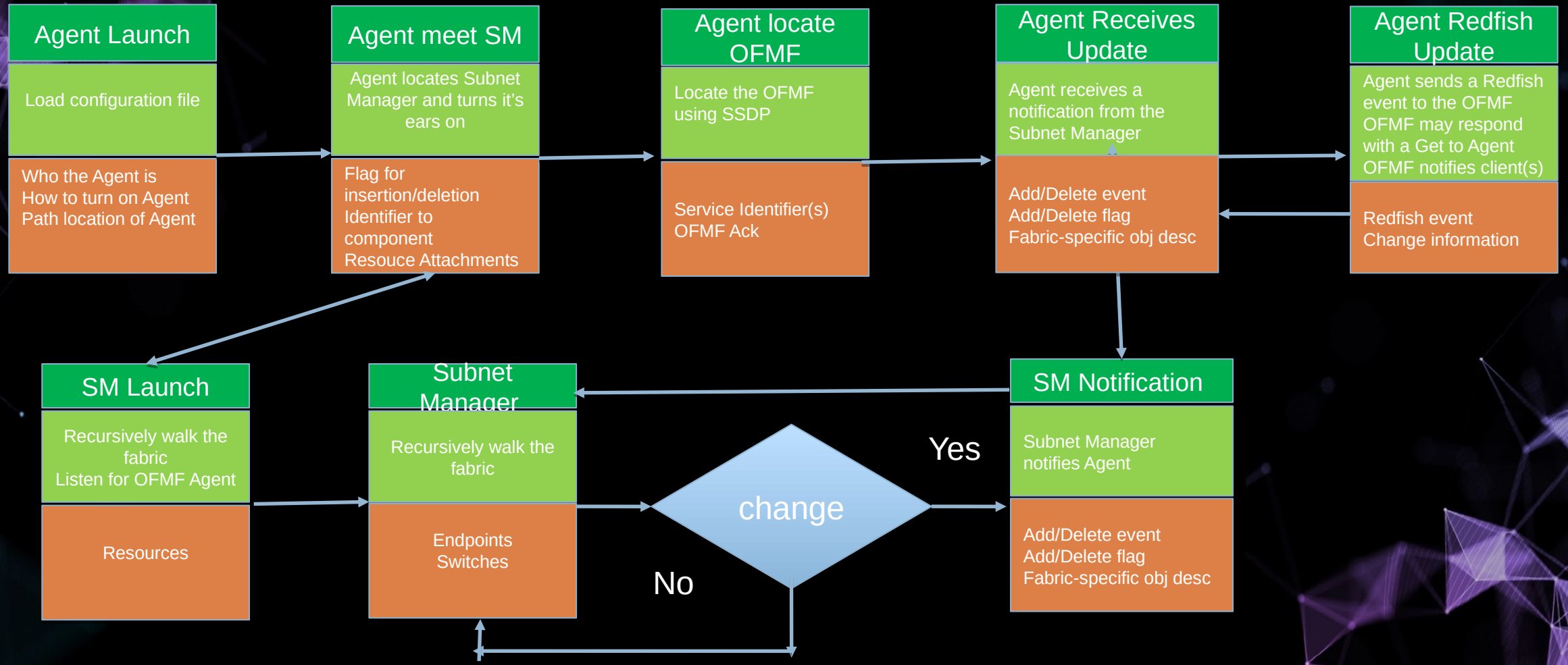
- Initial OFMF Startup
  - Discovery
- Initial Agent startup
  - Listen to Subnet Manager for changes
  - Announce to OFMF
- Security / Authentication
  - Client <-> OFMF
  - OFMF <-> Agent
- OFMF / Agent interaction
  - Add components
  - Subtract components
  -

Fabric-Specific Agent

- One Agent per vendor-specific fabric implementation
- Provides a connection from OFMF to underlying vendor-specific fabric management
- Represents the underlying Fabric object to the OFMF
  - Listens to the Subnet Manager for real-time updates
  - Translates fabric-specific taxonomy to Redfish fabric schema
  - Translates logical connection information to physical routes
  - Communicates the updates to the OFMF
    - Underlying fabric hardware element information (adapters, switches, …)
    - Connection information, links, ports, and paths

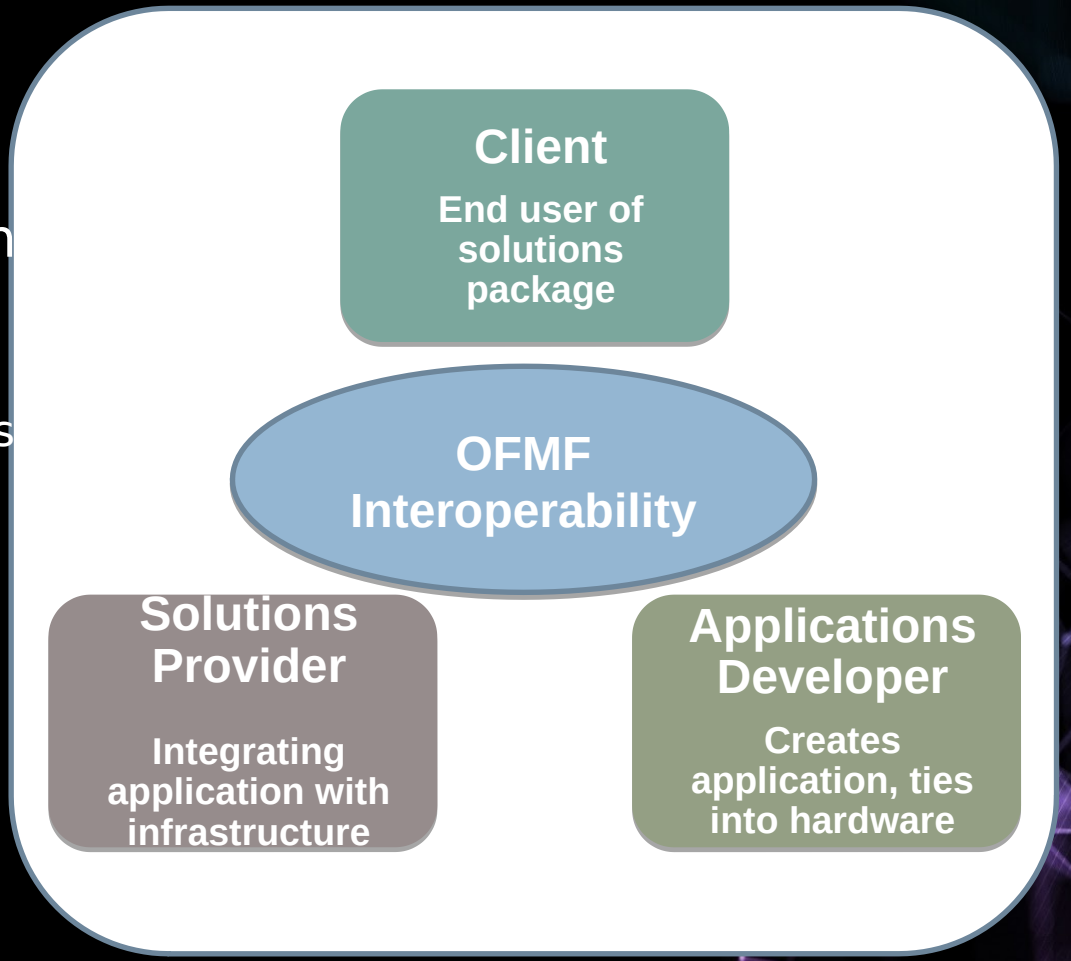


Subnet Manager, Agent, OFMF Interaction



Planned Work Items

- Gather more client-driven use-cases
  - Use OFA identified Use Case Descriptions and Flow Diagrams to confirm property / object completeness
- Map together RF/SF management interface with OFA Open Fabric Manager functionality
  - Redfish and Swordfish provide the OFA Fabric Manager with NVMe-oF instantiation for current fabric conditions
  - Step through use-cases to validate RF/SF extensions
- Ensure wide fabric management coverage e.g.,
  - Gen Z
  - Slingshot
  - InfiniBand
  - OmniPath
  - RoCE
  - iWarp
  - Ethernet
  - FC
  - Future unknown fabrics



Work left to do for an Enhanced Ecosystem Management Model

- DMTF
  - Add details of all various fabric types to Redfish fabric model
  - Adding support for new object types (e.g., Fabric Adapters)
  - Enhancements to fabric model for advanced concepts (e.g., hierarchical switching)
- SNIA
  - Needs DMTF base-model completed to build on
  - Workload management, load-balancing, QOS for Storage use-cases
- OFA
  - Complete OFMF Architecture + High Level Design
  - Develop POC with Gen-Z
  - Expand fabric-agnostic implementation supporting multiple active fabrics and workloads

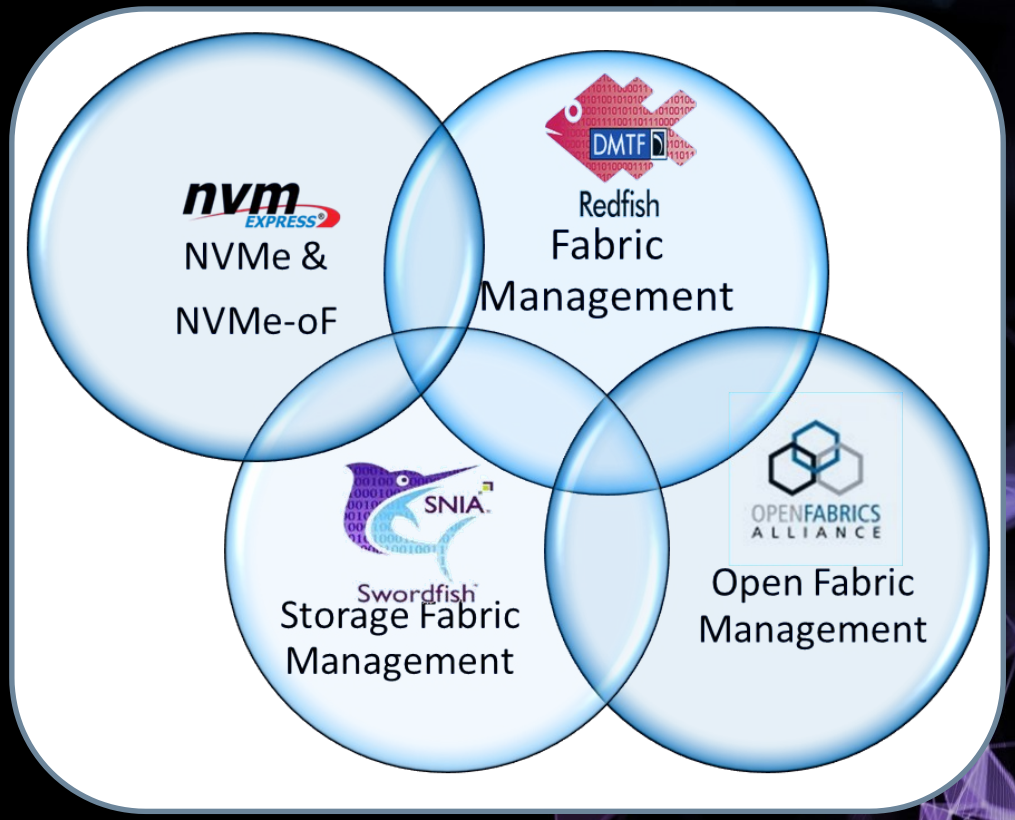
Alliances: Working Together

Through Alliance Agreements

Bring the technical teams from the organizations together to align existing work

- DMTF: provides a framework for ecosystem management
- SNIA: storage & storage fabric management and domain expertise
- OFA: accelerate the development and adoption of advanced fabrics for the benefit of advanced fabrics ecosystems
- NVMe Consortium enables fast local and remote storage

Create new content in each area as needed



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
- 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

OpenFabrics Alliance: OFMF

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 OpenFabrics Alliance
https://www.openfabrics.org/membership-how-to-join/

sodacon
— Global 2021 — July 13-14

#sodacon2021