

VIRTUAL EVENT • MAY 24-25, 2022

# Computational Storage: How do NVMe and SNIA CS Work Together

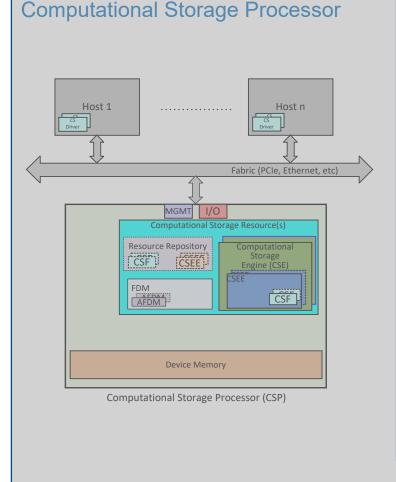
Bill Martin SNIA TC Co-Chair NVMe Computational Programs Co-Chair SSD IO Standards Samsung Semiconductor Inc.

#### Agenda

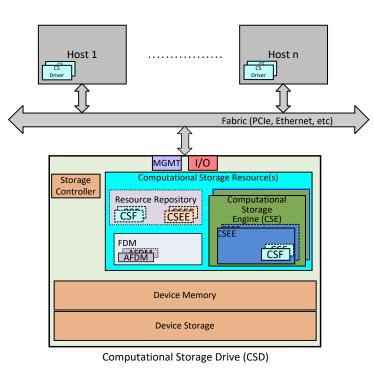
- Overview of SNIA CS Model
- Overview of NVMe CP Model
- NVMe-SNIA mapping
- Summary



#### **SNIA Computational Storage Architecture**



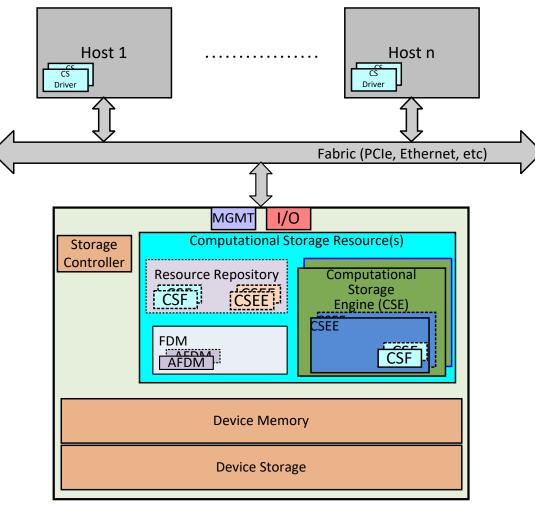
#### **Computational Storage Drive**



#### Computational Storage Array Host 1 Host n CS Fabric (PCIe, Ethernet, etc) MGMT I/O Computational Storage Resource(s) Storage **Resource Repository** Array CSF CSEE Engine (CSE) Control Transparer FDM CSF Storage AFDM Access Proxied **Device Memory** Storage Access Storage Device Storage Device or CSD or CSD Computational Storage Array (CSA) PERSISTENT MEMORY

COMPUTATIONAL STORAG

#### **SNIA Architectural Elements for CS Drive**



Computational Storage Drive (CSD)



#### NVMe Computational Storage Architectural Components

Host		
NVMe Controller		
3   2   1   0   Programs   Compute Namespace 1     3   2   1   0   Programs   Compute Namespace 2   Compute Namespace 2	Subsystem Local Memory	NVM Namespace 100 NVM Namespace 101 NVM Namespaces
Domain 1		
NVM Subsystem		

- Compute Namespaces contain:
  - Compute Engines
  - Programs
- Programs operate on data in Subsystem Local Memory
  - Includes program input, output
- NVM Namespaces
  - Persistent storage of data
  - NVM
  - ZNS
  - KV



This presentation discusses NVMe work in progress, which is subject to change without notice.

#### Correlation of SNIA/NVMe terms

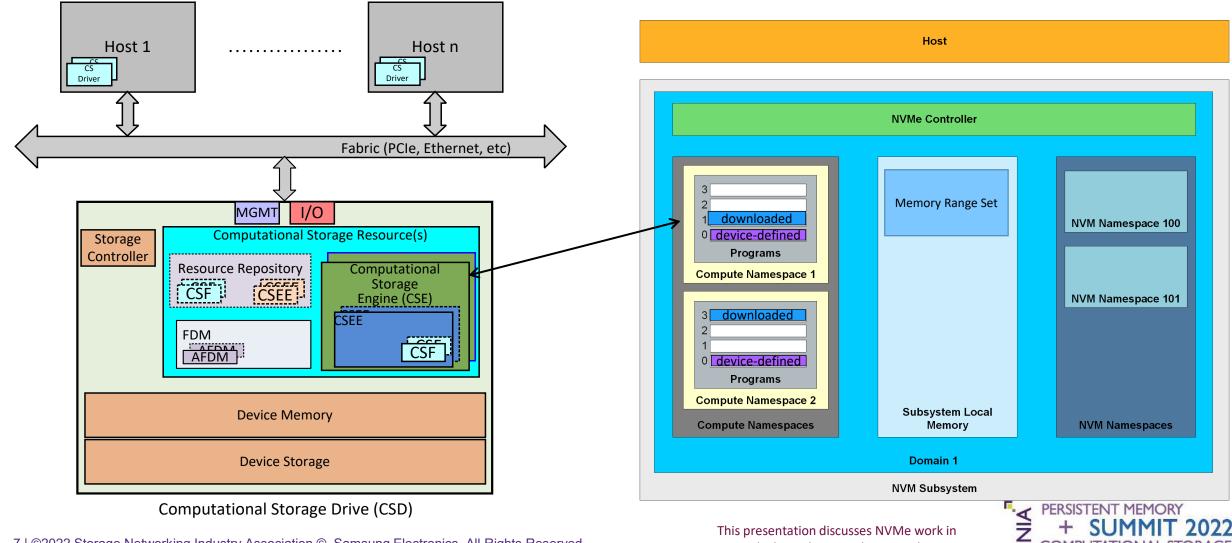
#### **SNIA Terms**

- Computational Storage Engine
- Computational Storage Engine Environment
- Resource Repository
  - Downloaded CSF
  - Pre-loaded CSF
- Function Data Memory (FDM)
- Allocated FDM (AFDM)
- Device Storage

#### **NVMe Terms**

- Compute Engine/Compute Namespace
- Virtual (Not Defined)
- Programs
  - Downloaded programs
  - Device-defined programs
- Subsystem Local Memory (SLM)
- Memory Range Set
- NVM Namespaces

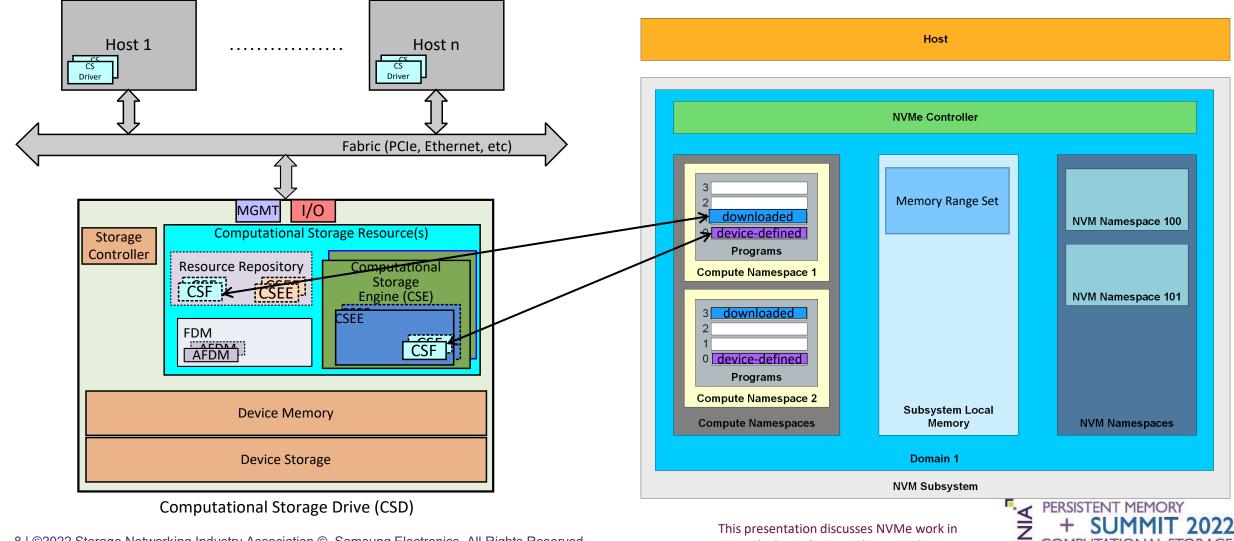




7 | ©2022 Storage Networking Industry Association ©. Samsung Electronics. All Rights Reserved.

progress, which is subject to change without notice

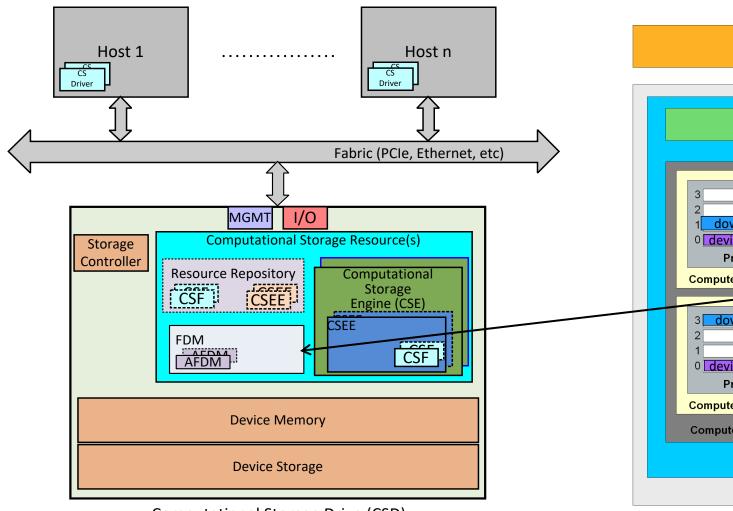
COMPUTATIONAL STORAGE



8 | ©2022 Storage Networking Industry Association ©. Samsung Electronics. All Rights Reserved.

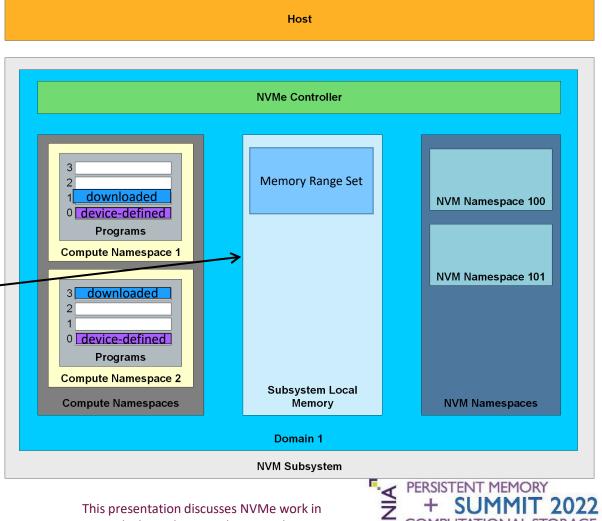
progress, which is subject to change without notice

COMPUTATIONAL STORAGE



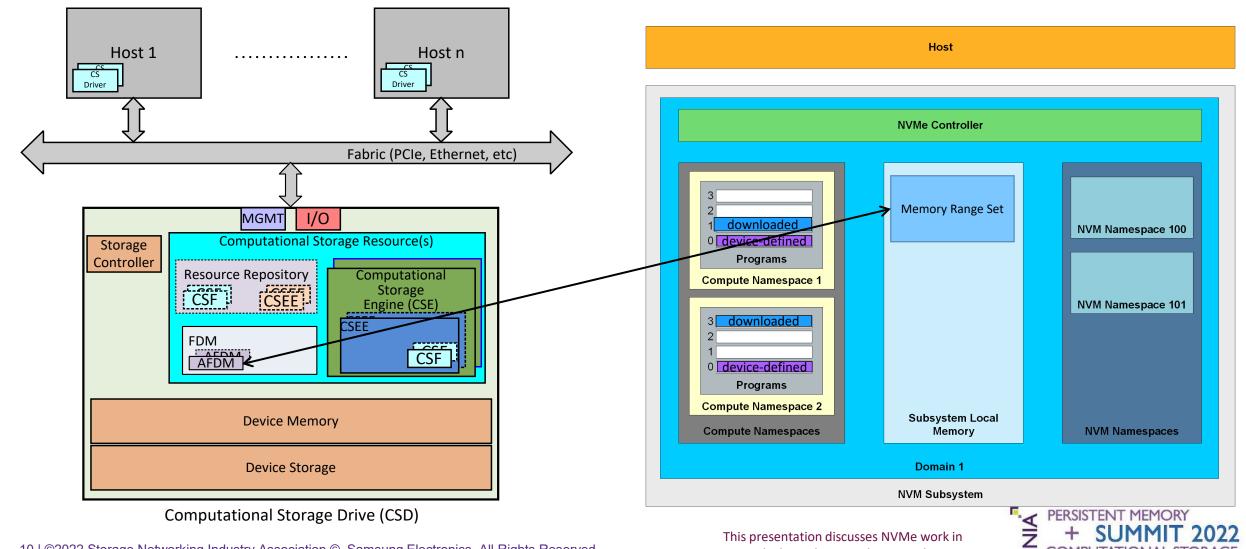
Computational Storage Drive (CSD)

9 ©2022 Storage Networking Industry Association ©. Samsung Electronics. All Rights Reserved.



COMPUTATIONAL STORAGE

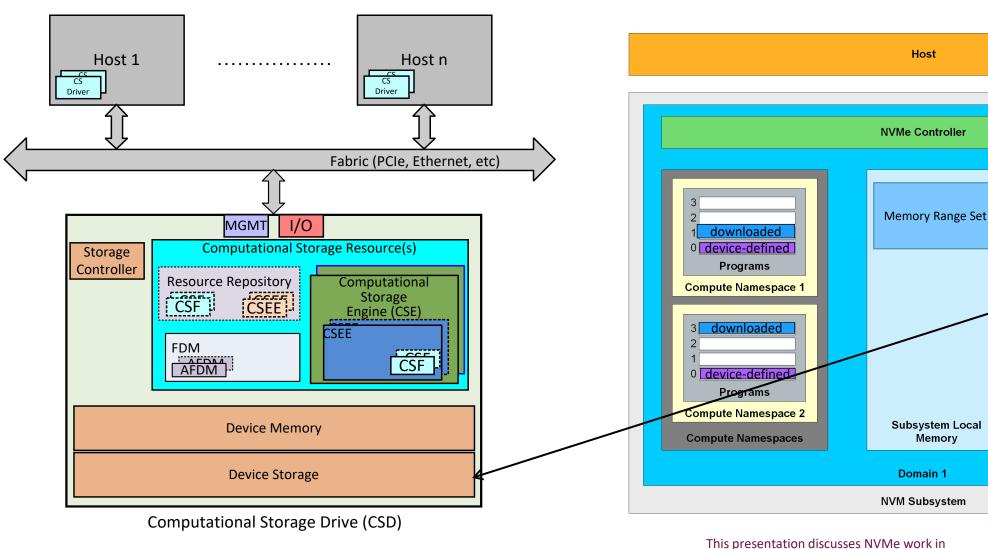
This presentation discusses NVMe work in progress, which is subject to change without notice



10 | ©2022 Storage Networking Industry Association ©. Samsung Electronics. All Rights Reserved.

progress, which is subject to change without notice

COMPUTATIONAL STORAGE



Samsung Electronics. All Rights Reserved. progress, which is subject to change without notice

PERSISTENT MEMORY + SUMMIT 2022 COMPUTATIONAL STORAGE

NVM Namespace 100

NVM Namespace 101

NVM Namespaces





VIRTUAL EVENT • MAY 24-25, 2022

# Summary

### Summary

#### SNIA

- A general architectural model for computational Storage
- Flexibility for a variety of protocols

#### **NVMe**

- A specific I/O Command Set for computational Programs
- Specific for the NVMe protocol
- Related Computational Storage sessions at the Summit include:
  - The Latest Efforts in the SNIA Computatonal Storage Technical Work Group
  - NVMe Computational Storage An Update on the Standard
  - Programming with Computational Storage
- Join SNIA and NVMe in the standardization effort





## Please take a moment to rate this session.

Your feedback is important to us.