BLOCKCHAIN TWG

2021 Review and 2022 Plans

Presented by Parmeshwr Prasad & Olga Buchonina

Blockchain TWG 2021 Accomplishments

- Published 0.5 TWG draft specification
- TWG invited guest speakers from Chia Blockchain, Sky Labs, Signum Blockchain. All guests are providing solutions for Data Storage Centric Blockchains
- Run SNIA BOF's focused on Blockchain during developers conference
- Working on whitepapers that promote SNIA TWG Blockchain

Blockchain TWG Work Items for 2022

- Continue work on white papers focused on Data Storage Blockchain
- Continue work on SNIA Blockchain specification for interoperability in view of web 3.0 development
- Collaborate closer with SODA foundation
- Establish active GitHub repository

SNIA

Blockchain TWG Membership as of 01/25/2022

SNIA

Blockchain TWG Participation

- What is the expected industry impact of this work
  - Blockchain industry has data storage initiatives, fast growing segment- SNIA IP will provide solution for interoperability (think Chainlink or Polkadot)
- What is the industry segment relevance.
  - Software vendors, application developers, open source community developers, system vendors, ICP providers, banking and finance sector (in the long run)
- Why you should join and participate in this TWG
  - Architecture will provide back end and frond end interfaces for next generation in financial sector, industrial sector and to some extent cybersecurity
- Who to contact for additional information
  - olga@myactionspot.com or parmeshwr.prasad@dell.com

Cloud Storage TWG

2021 Review and 2022 Plans

Presented by David Slik and Mark Carlson

Cloud Storage TWG 2021 Accomplishments

- The Cloud Storage TWG is created for the purpose of developing SNIA Architecture related to system implementations of Cloud Storage technology:
  - Identifies, develops, and coordinates systems standards for Cloud Storage
  - Produces specifications and drives consistency of interface standards and messages
  - Documents system-level requirements and shares these with other standards organizations
- Recent Work
  - CDMI 2.0 submitted to ISO and under ballot
  - CDMI Extensions: Extended Child Listing Extension and Partial Upload Extension
  - Added work item for multi-cloud Technical Work
  - Continuing BrightTalk sessions/educational outreach
    - Multi-cloud BrightTalk in early January 2022

Cloud Storage TWG Work Items

- Support CDMI 2.0 PAS submission process
- Review and document vendor-submitted CDMI extensions
  - Three CDMI extension submissions for discussion
    - Container/Data Object Representation Extension
    - S3 Exports Extension
    - CBOR (Concise Binary Object Representation) Extension
- OpenAPI specification
- Multi-cloud Whitepaper

SNIA

Cloud Storage TWG Membership as of January 2022

- TWG Membership monitoring TWG: 28 companies
- TWG Membership actively participating in TWG:

Cloud Storage TWG Participation

- What is the expected industry impact of this work
  - Enabling interoperable cloud storage
  - Enabling standardized cloud storage data interchange
  - Enabling standardized cloud storage management
- What is the industry segment relevance.
  - Cloud storage systems
- Why you should join and participate in this TWG
  - Cloud storage system developers, cloud application developers, SREs, cloud data management stakeholders
- Who to contact for additional information
  - David Slik, co-chair, cloudtwgchair@snia.org
  - Mark Carlson, co-chair, cloudtwgchair@snia.org

Computational Storage TWG

2021 Review and 2022 Plans

Scott Shadley, Jason Molgaard – Co-Chairs

computationaltwgchair@snia.org

Computational Storage TWG 2021 Accomplishments

- Architectural updates r0.8
- Introduction and Release of API r0.5
- Further Dictionary Definition updates

- Drove Content for **CS SIG** in CMSI
  - 1st Annual PM/CS Summit support from member companies

- 2021 SDC participation continued growth from member companies

- Continued work with NVMe TP efforts around “Computational Programs”
- Architecture Security Focus – Joint work with SNIA Security TWG

- TWG Charter - Computational Storage TWG Charter V1c-Approved.pdf

Computational Storage TWG Work Items for 2022

- Drive Rev 1.0 Release – Architecture and Programming Model
  - Finalize Security work for Rev 1.0
- Drive Rev 1.0 Release – User API Document
  - Refine based upon member company code development and add security
- Support CS SIG Work
  - Webinar Series of Content, Blogs, Articles
  - 2nd Annual PM/CS Summit (May 2022), SDCs
  - SodaCon, OCP, SC22, and other Events
- SNIA Group collaboration
  - Cross pollination and potential collaboration with SDXI TWG
  - Continued collaboration with Security TWG on Security for CS
- External Interactions
  - NVM Express interaction around TP work

52 Participating Companies - 261 Member Representatives

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Computational Storage TWG Participation

- What is the expected industry impact of this work?
  - Drive further adoption and deployment of CSxes due to creation of a standard framework/Architecture for end customers to more easily integrate.
- What is the industry segment relevance?
  - As the Storage Architecture is changing, CSxes will become a standard part of the evolution of storage in the compute throttled environments created today.
- Why should you join and participate in this TWG?
  - Allows you/your company to more easily adopt this emerging technology and allows your inputs on designs, constraints, and future work.
- Who to contact for additional information
  - Jason Molgaard & Scott Shadley - computationaltwgchair@snia.org

GREEN STORAGE TWG

2021 Review and 2022 Plans

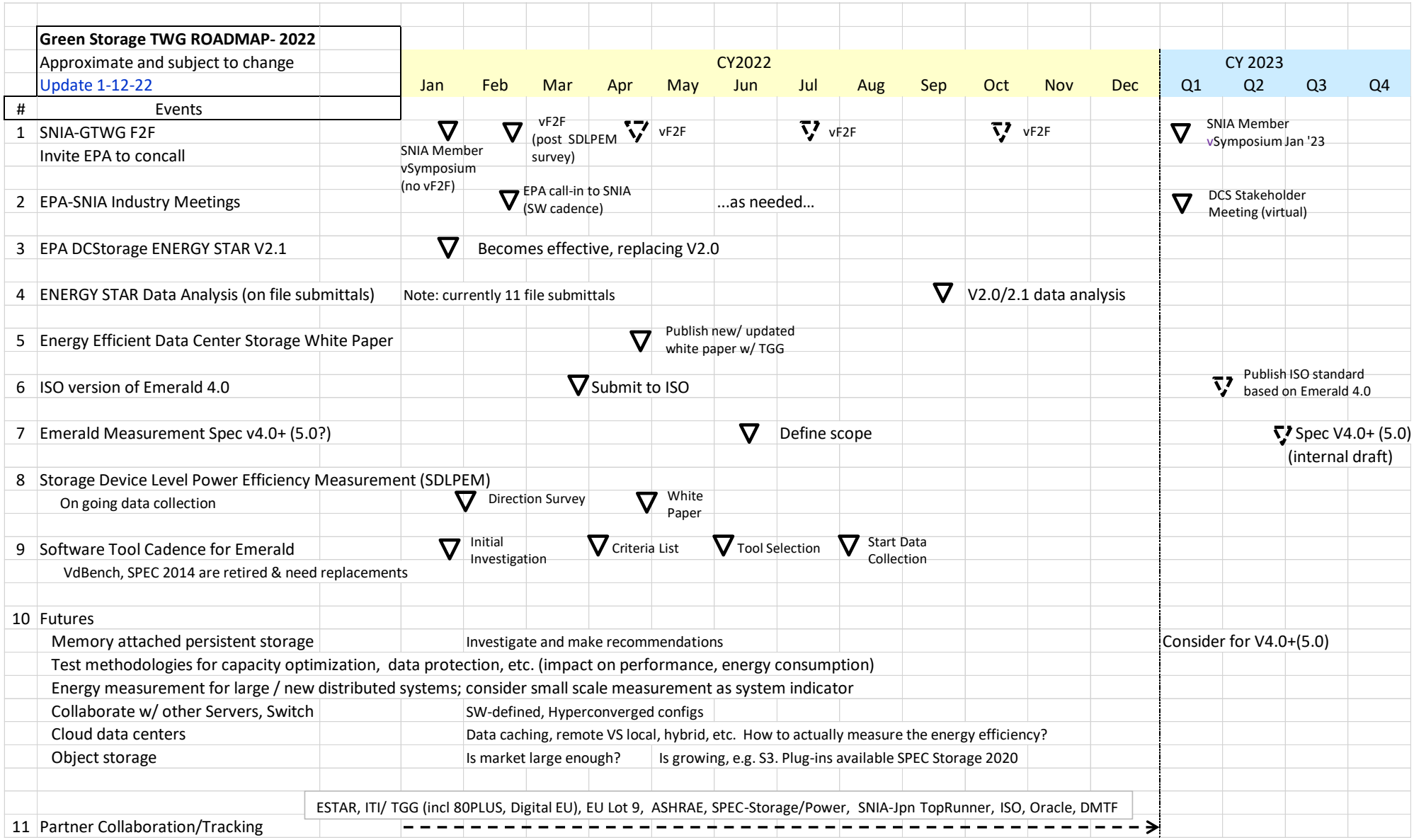
Presented by:
Don Goddard Donald.Goddard@netapp.com
Herb Tanzer herbtanz@gmail.com

Green Storage TWG 2021 Accomplishments

Green Storage TWG Charter link

Recent completed work – summary:

- Idle data evaluation and analysis with SNIA-Japan
- Supported 2020 EPA DCS Unit Shipment Report Submissions; 2021 in progress
- Green terms into SNIA Dictionary is ongoing
- Collaboration with TGG on EU Lot9 Regulatory updates
- Ongoing Industry Support for V4.0 Emerald Measurement Specification test tools & kits
- EPA ESTAR V2.0 became effective March'21 –references Emerald 4.0: includes Filers in addition to Block
- Engaged w/ the EPA to develop ESTAR V2.1 – added Verification Testing (releasing Jan'22)
- Actively updating White Paper #77 (w/ TGG) "Energy Efficient Data Center Storage"
- Added a new work item "Storage Device Level Power Efficiency Measurement (SDLPEM)" – initiated investigation and device level testing
- Engaged with SNIA-Japan developing nextgen Japan Top Runner regulatory program requirements (disagreement on using idle instead of active drive efficiency measurement metrics)



Green Storage TWG Membership as of 18-Jan-22

- ActionSpot
- Calypso
- Dell, Inc.
- Fujitsu America
- Futurwei
- HPE
- Hitachi
- Huawei
- IBM
- Kioxia Corp.
- Marvel
- NEC Corp.
- NetApp Inc.
- Oracle Corp.
- Quantum Corp. USA
- Samsung Electronics
- Seagate Technology
- SK Hynix
- Toshiba America

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Green Storage TWG Participation

- What is the expected industry impact of this work
  - One architecturally unbiased test methodology to serve regulatory bodies worldwide
  - Proactively provide a single test methodology worldwide
  - Industry knowledge of storage system power consumption and best practices/configurations to optimize power usage w/o compromising system functionality
- What is the industry segment relevance
  - Storage System Manufacturers; Storage Device Manufacturers; DCIM SW Vendors
- Why you should join and participate in Green Storage TWG
  - Participate in developing Standards used worldwide for datacenter data storage power efficiency
  - Influence regulations worldwide related to datacenter data storage power efficiency
  - Refresh and renew focus on best practices (whitepapers, planning tools)
  - Maintain / create competitive advantage in product sustainabilty
  - Avoid being surprised when a new regulation goes live and affects your product portfolio/revenues
- Who to contact for additional information
  - GTWG Co-chairs: Don Goddard, Donald.Goddard@netapp.com Herb Tanzer, herbtanz@gmail.com

SNIA

IOTTA TWG

2021 Review and 2022 Plans

Presented by Tom West (IOTTA TWG Co-Chair)

iottatwgchair@snia.org

IOTTA TWG 2021 Accomplishments

- Input/Output Traces, Tools, and Analysis (IOTTA) Technical Work Group
- Primary focus:
  - Create/maintain worldwide repository for storage-related I/O trace files, associated tools, and other related information
  - Trace types: Block I/O, System Call, Key-Value Stores, Static Snapshots, and others
  - Repository website: iotta.snia.org
  - Additional information: iotta.snia.org/faqs/aboutIOTTATWG/
- Recent Work:
  - BibTeX entries for traces
  - Updates to the I/O Trace Common Semantics document
  - IOTTA Repository website improvements

IOTTA TWG Work Items

- Continued support of the repository
  - Posting of new traces
  - Solicitation of additional traces
- SNIA IOTTA GitHub Project
  - SNIA IOTTA Open-Source software tools
  - SNIA Open Source Liaison (multi-vendor collaborative group)
  - Open to both SNIA and non-SNIA members
- SNIA Compute, Memory, and Storage Initiative (CMSI) collaboration
  - Stay abreast of CMSI related activities (e.g., Performance Test Specifications)

IOTTA TWG Membership as of January 2022

- TWG roster includes 59 members
- Company affiliations include:
  - Broadcom, Cisco, Dell, FADU, Hitachi, HPE, Huawei, Inspur, Intel, JetIO, Kioxia, Lenovo, Marvell, Micron, NetApp, Oracle, Phison, Samsung, Seagate, SK Hynix, Western Digital
- Education Institutions:
  - Harvey Mudd College (HMC)
  - Stony Brook University
- Additional support from Ulsan National Institute of Science and Technology (UNIST) and NetApp

IOTTA TWG Participation

- Industry Impact of the IOTTA Repository:
  - Provides a *common facility* through which a *broad community* can avail themselves of a variety of storage-related I/O traces (especially *contemporary* I/O traces)
  - "One-Stop Shop" with currently over 575 citations in research publications
- All repository content available for free download and unrestricted use:
  - Storage research and development communities in both academia and industry
  - General public
- Why you should join and participate in the IOTTA TWG
  - Help improve the IOTTA Repository, including vote on future directions
  - Monitor upcoming changes to the repository (e.g., the addition of new traces)
- Contact chairs for additional information:
  - Co-Chairs: Geoff Kuenning (HMC), Tom West (hyperI/O LLC)
  - Contact at: iottatwgchair@snia.org

Linear Tape File System (LTFS) TWG

2021 Review and 2022 Plans

Presented by Takeshi Ishimoto (ishimoto@jp.ibm.com)

LTFS TWG 2021 Accomplishments

- Tape storage technology continues to evolve, and the latest model can store up to 20 TB in single palm-size tape cartridge (depends on model).
- The LTFS Format Specification defines the self-describing data structure on tape for the long-term retention of data at low-cost with the benefit of data portability between the different systems and different sites using tapes.

- Recent completed
  - Published SNIA Format Specification Version 2.5.1
  - SNIA standard adopted as the internal national standard ISO/IEC 20919:2021 through the collaboration between SNIA and ISO

SNIA

LTFS TWG Work Items

- **LTFS Compliance Test Specification**
  - Defines the test cases to be executed by the LTFS adaptor to validate the compliance of an implementation, the file system software and the produced media, with LTFS Format Specification. The goal is to improve the interchangeability of LTFS formatted tapes between different implementations.
- **LTFS Tape Image Format Specification**
  - Defines the data structure of a file image for a magnetic tape written by the LTFS implementation, analogous to *.iso file format for optical disc storage.

LTFS TWG Membership as of 2022/01/25

- Dell Inc.
- Hewlett Packard Enterprise (co-chair)
- Huawei Technologies Co. Ltd.
- IBM (co-chair)
- Inspur Electronic Information Industry Co., Ltd..
- JetIO Technology Ltd.
- Kioxia Corporation
- NetApp
- Quantum Corporation USA
- SK Hynix
- VMware, Inc
- Western Digital
- And, approved individuals and SNIA business partner and contractors

SNIA

LTFS TWG Participation

- What is the expected industry impact of this work
  - The massive increase of data and the requirement of long-term retention of archived data need to utilize the low-cost storage media in the standardized portable format to free from the data lock in.
- What is the industry segment relevance.
  - Storage system integrators and cloud service vendors, who offer the long-term data archive repository and data exchange service for files, such as documents, movies, medial data, scientific research data, etc
- Why you should join and participate in this TWG
  - Contribute to the new standards for creating the common data retention method on tape and on the electric image format.
- Who to contact for additional information
  - Takeshi Ishimoto, IBM (ishimoto@jp.ibm.com)

Object Drive TWG

2022 Update

Presented by

Mark Carlson

Bill Martin

Object Drive TWG 2021 Accomplishments

- Native NVMe-oF™ Drive Specification v1.1 June 17, 2021
- Key Value Storage API v1.1 September 28, 2020

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Object Drive TWG Work Items

- Native NVMe-oF™ Drive Specification
  - Point to latest swordfish
  - Add Discovery and Security TPs from NVMe
  - Other related work
- Coordinating with the SSM TWG work on Swordfish for NVMe
  - **Release Date:** 5 December 2021
  - **Version:** 1.2.3

Object Drive TWG Membership

- Calypso Systems, Inc.
- Dell Inc.
- Fujitsu America Inc.
- Hewlett Packard Enterprise
- Huawei Technologies Co. Ltd
- IBM
- Innogrit
- Intel Corporation
- Kioxia Corporation
- Marvell
- Kioxia Corporation
- NetApp
- NETINT Technologies Inc.
- NGD Systems, Inc.
- NVIDIA
- Oracle Corporation
- Samsung Electronics Co., LTD
- Toshiba America Electronic Components, Inc.
- VMware, Inc
- Western Digital

Object Drive TWG Participation

- What is the expected industry impact of this work
  - The Object Drive TWG has defined the API for Key Value implementations that has allowed open source libraries for NVMe® Key Value drives
  - The Object Drive TWG has defined the connector pinout and management interface for drives implementing NVMe-oF to allow interoperable implementations
- What is the industry segment relevance.
  - The standards that are being driven by the Object Drive TWG are important to any developers of Native NVMe-oF or NVMe KV drives and the host software that manages or communicates with these drives
- Why you should join and participate in this TWG
  - Please consider joining this TWG to continue defining infrastructure for connecting NVMe-oF drives and any possible KV API updates
- Who to contact for additional information
  - Mark Carlson: mark@carlson.net
  - Bill Martin: bill.martin@samsung.com

Scalable Storage Management (SSM) TWG

2021 Review and 2022 Plans

Richelle Ahlvers, Intel, SSM TWG Chair

SSM TWG 2021 Accomplishments

- Charter: https://members.snia.org/wg/ssmtwg/document/21899
  - Summary: Extend DMTF's Redfish spec for Storage
- Version 1.2.2 and 1.2.3 – Extended initial NVMe functionality and documentation (released in 2020); released profiles for NVMe drives, and advanced devices with NVMe front ends (such as arrays). Expanded corresponding supplemental documentation to support.
  - Available on snia.org/swordfish:
    - Specification, schema and registries, profiles, User's Guide, Error Handling Guide, NVMe Model Overview and Mapping Guide (expanded), Swordfish Property Guide (New)
  - Updated mockups on swordfishmockups.com
- Working on multi-alliance project with DMTF, OFA, and GenZ to enable storage fabric management
- Open source software additions:
  - Updated Swordfish emulator to function as NVMe drive "out of the box", as well as support joint work with Open Fabrics Alliance, DMTF, and GenZ work, prototyping managing fabrics and storage fabrics

- For reference - versions:
  - Version 1.2.x: Adds NVMe support - 2020
  - Version 1.1.x: Support for full block storage implementations - 2019
  - Version 1.0.x: Support for service-based implementations

SSM TWG Work Items: 2022

- Continued work on NVMe Profiles
  - Additional configuration support: EBOF, JBOF
  - NVMe-oF support: NVMe TP6011 general purpose NVMe-oF virtual support
  - General connectivity / fabric – use by NVMe-oF or SAN
  - Access rights – use by NVMe or mapping / masking
- Collaboration with NVM Express and DMTF for new functionality
  - Additional NVMe / NVMe-oF capabilities, supporting new NVMe features as they are added
- Continue collaboration with OFA (and DMTF) to expand support added for NVMe-oF to additional types of fabrics
  - Continue collaboration with OFA, adding CXL fabric management
- Enhancements to support implementation feedback
- Enhancements to existing profiles based on feedback from CTP

SSM TWG Membership (Jan'22)

SEAGATE
vmware
HUAWEI
SK hynix
PURESTORAGE
BROADCOM
KIOXIA
XILINX
IBM
CISCO
intel
Hewlett Packard Enterprise
Lenovo
TOSHIBA
HITACHI
SAMSUNG
KALRAY THE POWER OF MORE
DELL
Microsemi a MICROCHIP company
StarWind
NEC
FUJITSU
NGD systems
Microsoft
Western Digital
NetApp

Joined since last symposium

SiliconMotion
Red Hat
FUTUREWEI Technologies
JETIO
MARVELL

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SSM TWG Participation

- Industry impact:
  - Develop, maintain, and enhance Swordfish Storage Management Specification and supporting ecosystem – for standards-based storage management of: (Redfish) server-attach storage, external (standalone) storage, storage management of NVMe / NVMe-oF systems, cloud / hyperscalar, hyperconverged, enterprise datacenters
- Who Participates:
  - Storage vendors, storage client application developers (storage management, server management, OS vendors, etc)
- Join the SSM TWG to:
  - Contribute new or modify existing content to improve interoperability, add support for new functionality, and accelerate your company's implementation
  - Monitor new content and discussions as your company decides when to start implementation
- For additional information, contact:
  - Richelle Ahlvers, Chair: ssmtwg-chair@snia.org

Security TWG

2021 Review and 2022 Plans

Presented by Eric Hibbard (securitytwgchair@snia.org)

Security TWG 2021 Accomplishments

- Program of Work
  - General Storage Security
  - SNIA Architectures & Specifications
  - Securing Storage Ecosystems
  - Information Retention, Preservation & Discovery
  - Inventory: https://www.snia.org/securitytwg
- SNIA TLS Specification for Storage Systems, Version 2.x
- Security materials for Computational Storage Architecture
- Substantial contributions for:
  - ISO/IEC 27040 (2nd Ed.), Storage security
  - IEEE draft Std 2883, Standard for Sanitizing Storage
- Update of the “data security” and “legal” terms in the SNIA Dictionary

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Security TWG Work Items

- Major Work Items this TWG will work on in 2022
  - Update of ISO/IEC 20648 (TLS Spec)
  - Contributions for ISO/IEC 27040 (Storage security) and IEEE Std 2883 (Sanitization for Storage)
  - Review and Update of Security Whitepapers
  - Storage Concepts
  - Relevant NIST draft publications
- SNIA Group collaboration: All (security & privacy are cross-cutting)
- External group collaboration: INCITS (CS1/T11/T10), IEEE CPSC, TCG

Security TWG Membership as of 2022-01-11

- ActionSpot
- ARM Limited*
- Bloombase
- Chia Network, Inc.
- Cisco Systems
- Dell Inc.*
- Hewlett Packard Enterprise*
- Hitachi
- Huawei Technologies Co. Ltd.
- IBM*
- Inspur Electronics Information Industry Co. Ltd.
- Intel Corporation*
- JetIO Technology Ltd.
- Kioxia Corporation*
- Marvell
- Microchip Technology Inc.
- Micron Technology Inc.
- NetApp*
- NGD Systems, Inc.*
- Pure Storage
- Samsung Electronics Co. Ltd.*
- ScaleFlux
- Seagate Technology*
- Silicon Motion Inc.
- SK Hynix
- VMware*
- Western Digital*
- Individual Members*

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Security TWG Participation

- What is the expected industry impact of this work
  - Education, Best Practices, Formal Standards
- What is the industry segment relevance.
  - Consumers/users of Storage Technology; Vendors/Developers/Implementors
- Why you should join and participate in this TWG
  - Monitor, Contribute, Coordinate, Educate
  - Weekly Calls – Tuesdays 13:00 – 14:00 Pacific
  - Active participants average 1-2 hours per week
- Who to contact for additional information
  - Chair, Security TWG (securitytwgchair@snia.org)

SFF TA TWG

2021 Review and 2022 Plans

Presented by Alex Haser (Molex) &
Michael Koffman (Western Digital)

SNIA's SFF TA TWG

- 75+ member companies
- 170+ publicly available active specifications, information documents, and reference guides (available here) covering a wide range of topics:
  - Cables & connectors
  - Form factor sizes and housing dimensions
  - Management interfaces
  - Transceiver interfaces
  - Electrical interfaces
- Enables technology vendors to procure compatible, multi-sourced products and solutions
- Consider becoming a member today!

SFF TA TWG

Co-Chairs:
- Alex Haser (Molex)
- Paul Coddington (Amphenol)

Connector Subgroup

Co-Chairs:
- Alex Haser (Molex)
- Paul Coddington (Amphenol)

Transceiver Subgroup

Chair:
- Tom Palkert (Samtec)

SFF TA TWG Membership

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SFF TA TWG: 2021 Accomplishments

- Keyword project
  - Searches on the public specification site were previously limited to title words and document ID
  - But SFF document titles aren't always intuitive & not everyone "knows the numbers" (e.g., SFF-8614 doesn't say "MiniSAS HD" anywhere in the title)
  - Public specification site now includes a keyword search to make documents easier to find
- Other completed projects
  - SFF-TA-1016: Internal Unshielded High Speed Connector System
  - SFF-8024: SFF Module Management Reference Code Tables
  - SFF-8472: Management Interface for SFP+
  - SFF-TA-1026: Storage System High Speed Cable Interconnect

SFF TA TWG Work Items slide 1 of 3

- SFF-TA-1002 Documents
  - Connector variants: SFF-TA-1002
    Vertical, right angle, & straddle mount for 1C, 2C, 4C, & 4C+
  - Cable descriptions: SFF-TA-1020
  - SI test board specifications: SFF-TA-1017, SFF-TA-1018, & SFF-TA-1019
  - Reference pinout information: REF-TA-1012
- EDSFF Documents
  - Form Factors: E1.S (SFF-TA-1006), E1.L (SFF-TA-1007), E3 (SFF-TA-1008*)
  - Pin and Signal Specification: SFF-TA-1009*
  - Thermal Characterization: SFF-TA-1023

*Project initiated to update spec

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SFF TA TWG Work Items slide 2 of 3

- New Projects
  - SFF-8071*: SFP+ 1X 0.8mm Card Edge Connector
  - SFF-TA-1027: QSFP2 Connector, Cage, & Module Specification
  - SFF-TA-1029: Cabled QSFP Cage & Connector
  - SFF-TA-1031: SFP2 Connector, Cage, & Module Specification

*Project initiated to update spec

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SFF TA TWG Work Items slide 3 of 3

- WIP Projects:
  - SFF-8024*: SFF Module Management Reference Code Tables
  - SFF-8636*: Management Interface for 4-lane Modules and Cables
  - SFF-TA-1005*: Universal Backplane Management (UBM)
  - SFF-TA-1024*: SFF-TA-1016 Test Specification
  - MiniSAS HD: Adding SMT footprint variations to enable higher data rates
    - SFF-8613* & SFF-8614*
  - SFP56 & SFP112: Definitions for 56G & 112G modules using SFP
    - SFF-8402* & SFF-8419
  - QSFP56 & QSFP112: Definitions for 56G & 112G modules using QSFP
    - SFF-8665* & SFF-8679*

*Project initiated to update spec

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Become a Member of SFF Today!

- Why become a member of SFF?
  - Direct participation in the development of SFF specifications, information documents, and reference guides
  - Ability to open new projects
  - Access to all presentations, drafts, and supplemental material relevant to all SFF projects
  - One of the lowest membership fees around ($1500/ year)
- Resources
  - Public site: www.snia.org/sff
  - Specifications: www.snia.org/sff/specifications
  - IP disclosure site: https://www.snia.org/sffdisclosures
  - Member site: https://members.snia.org/site/login
  - How to join: www.snia.org/sff/join
  - Questions about membership? Send an email to membership@snia.org
  - Additional questions? Send an email to sff_ta_twgchair@snia.org

Smart Data Accelerator Interface(SDXI) TWG

2021 Review and 2022 Plans

Presented by Shyam Iyer

sdxitwgchair@snia.org

SDXI TWG 2021 Accomplishments

- SDXI TWG Charter
  - https://www.snia.org/sdxi
- Recent Work
  - TWG Formed in 2020
  - April 2021, SNIA PM+CS Summit
    - https://youtu.be/ZD3cl28SBKE
  - May 2021, SNIA SDXI Class code registered with PCI SIG.
  - June 2021, Charter Updated to include BSD-3 Clause license for software development.
  - June 2021, Meeting frequency increased.
  - July 2021, SDXI GitHub repository created.
  - September 2021, Smart Data Accelerator Interface (“SDXI”) Specification v0.9.0 rev 1 released for public review.
    - https://www.snia.org/tech_activities/publicreview#sdxi
  - September 2021, SNIA SDC Roundtable Breakout session
    - https://storagedeveloper.org/events/sdc-2021/abstracts#emerging-lyer
  - September 2021, SNIA SDC BoF on SDXI
    - SDXI (Smart Data Accelerator Interface) discussion with SDXI TWG members, https://storagedeveloper.org/special-events/bof
  - 27 Member companies, 78 Individual members (includes independent members).

SNIA

SDXI TWG 2022 Work Items

- SNIA SDXI Draft Specification v1.0 to be released in Q1 2022
- The TWG will encourage adopting companies to work towards compliant software implementations and driver models.
  - Groundwork underway for a SNIA SDXI Reference Code
- The TWG will work to educate and encourage adoption by OS, Hypervisors, OEMs, Applications and Data Acceleration vendors.
  - Presentations, Whitepapers, podcasts, videos
- Plan post v1.0 activities. Current charter includes:
  - New data mover operations for smart acceleration
  - Data mover operations involving persistent memory targets
  - Cache coherency models for data movers
  - Security Features involving data movers
  - Management architecture for data movers(includes connection manager)
- Additional topics being considered post v1.0
  - RAS
  - QoS
  - Latency improvements
  - CXL related discussions
  - Heterogenous environments
- SDXI TWG collaborating with CS TWG to form joint workstreams
- Liaison with CXL for post v1.0 features

SDXI TWG Membership as of 01/25/2022

- Advanced Micro Devices(AMD)
- ARM
- Broadcom Inc.
- Dell Inc.
- Fujitsu America Inc.
- Futurewei Technologies, Inc
- Hewlett Packard Enterprise
- Huawei Technologies Co. Ltd
- IBM(includes Red Hat, Inc)
- Inspur Electronic Information Industry Co Ltd.
- JetIO Technology Ltd.
- Marvell
- MemVerge
- Micron Technology Inc.
- Microsemi a Microchip Company
- Microsoft Corporation
- NetApp
- NGD Systems, Inc
- Pliops
- Samsung Electronics Co., LTD
- Scaleflux
- SK Hynix
- SMART Modular
- VMware
- Western Digital
- Xilinx, Inc
- XSight Labs Ltd.
- Independent members

SDXI TWG Participation

- What is the expected industry impact of this work ?
  - Standardize data movement across multiple address spaces securely with SDXI Function implementations
  - Standardize in-memory data transforms with accelerators
  - Context:
    - Software memcpy is the current data movement standard
      - Takes away from application performance and incurs software overhead to provide context isolation.
      - Offload DMA engines and their interface are vendor-specific and not standardized for use by user-level software.
    - The SDXI TWG -
      - Develops and standardizes an extensible, forward-compatible memory to memory data mover interface that is independent of actual data mover implementations and underlying I/O interconnect technology.
- What is the industry segment relevance ?
  - System vendors(OEMS, cloud), OS vendors(Including Hypervisor software), ISV software vendors, HW acceleration vendors
- Why you should join and participate in this TWG ?
  - Monitor, contribute and vote
- Who to contact for additional information ?
  - sdxitwgchair@snia.org

Solid State Storage TWG

2021 Review and 2022 Plans

Presented by Eden Kim, Chair - edenkim@calypsotesters.com

S3 TWG 2021 Accomplishments

- Technical White Paper on Persistent Memory PTS

  Introduction to SNIA Persistent Memory Performance Test Specification

- SNIA Initiative White Paper on NVMe-oF (with Network Storage Forum (NSF) and CMSI)

  Optimizing NVMe-oF Performance with different Transports: Host Factors

- In-Development of Storage Device Level Power Efficiency Measurement Spec with Green Storage TWG

S3 TWG Work Items

- Persistent Memory Performance Test Specification (PTS)
- Storage Device Level Power Efficiency Spec in collaboration with Green Storage TWG
- NVMe-oF White Paper and Use Case test and measurement in collaboration with the SNIA Network Storage Forum (NSF) and SNIA CMSI
- Development of Real World Workload IO Capture, Analysis & Test (with IOTTA TWG)

SNIA

S3 TWG Membership as of January 2022

26 Companies

- AMD
- Calypso
- Dell
- Fadu
- HPE
- InnoGrit
- Intel
- Inspur
- JetIO
- Kioxia
- Lenovo
- Marvell
- Micron
- NEC
- NetApp
- NetInt
- NGD
- Oracle
- Samsung
- Seagate
- Silicon Motion
- SK Hynix
- SuperMicro
- ScaleFlux
- Western Digital
- Xylinix

8 Individuals

Individuals:

- Wayne Adams
- Tom Coughlin
- Jim Handy
- Geoff Kuenning
- Ajay Kumar
- Chuck Paridon
- David Thiel
- Tom West

S3 TWG Participation

- What is the expected industry impact of this work
  - PM PTS will provide industry with standardized performance test of block & byte addressable PM
  - Storage Device Level Power Efficiency Measurement (SDLPEM) will provide standardized test harness & tests for storage device power testing
- What is the industry segment relevance.
  - PM PTS provides software developers, storage architects and application developers with tools to integrate, validate and qualify PM storage for traditional block IO access (legacy SSD/NVMe) and direct access in-memory byte access load/store for PM devices (NVDIMM-N/P and PM Modules)
  - SDLPEM will provide storage designers, architects, supply chain and regulatory stakeholders with a standardized methodology to directly measure power efficiency of storage devices using synthetic and real world workloads
- Why you should join and participate in this TWG
  - Participate in the development of new storage architecture performance and power test
- Who to contact for additional information
  - Eden Kim, Chair (edenkim@calypsotesters.com)

Zoned Storage TWG

2021 Review and 2022 Plans

Presented by Dave Landsman & Bill Martin

Zoned Storage TWG Formation

- Charter
  - Facilitate a common industry understanding of Zoned Storage use cases and host/device architecture and programming model, providing a framework for zoned storage SW and HW design, and enabling the development of a robust Zoned Storage solutions ecosystem.
- The ZS TWG was formed in December 2021
- First meeting was January 24

Zoned Storage TWG Work Items

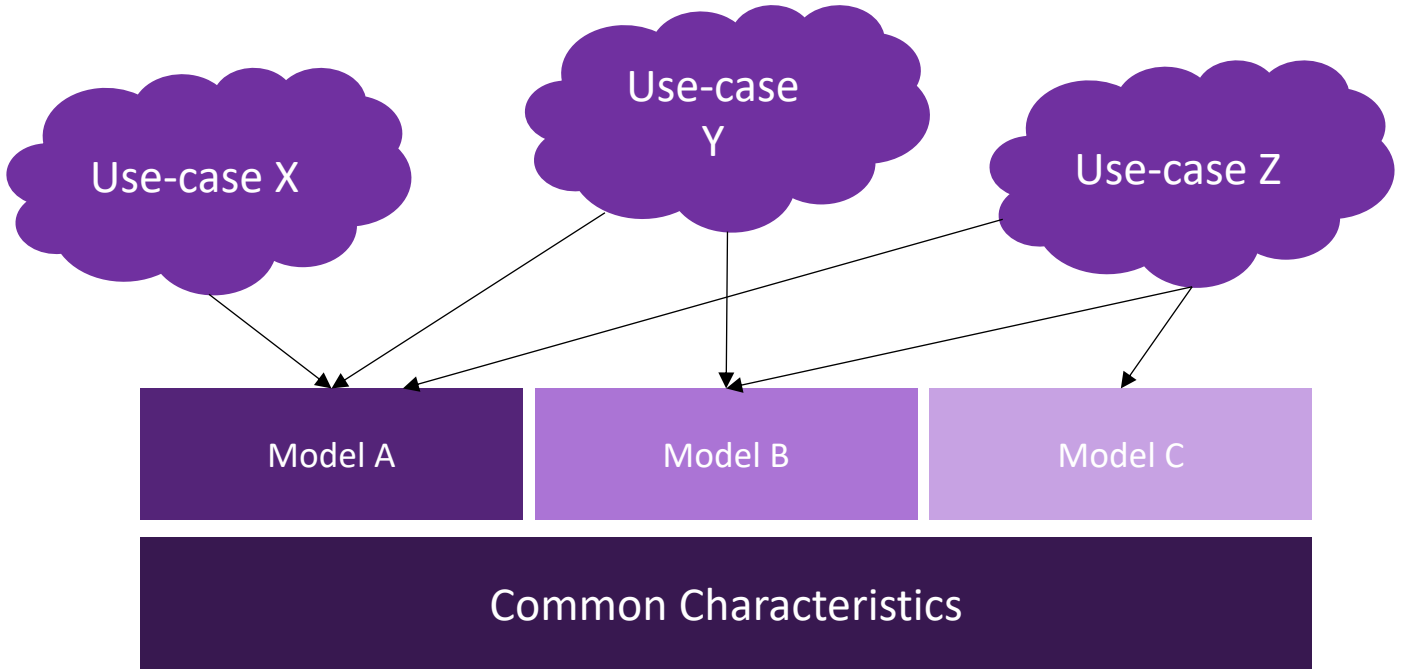
- The Zoned Storage TWG will focus on two main areas of work:
  - Zoned Storage use case white papers
  - Zoned Storage Architecture and Programming Model specification

- The Zoned Storage TWG will be collaborating with:
  - NVM express™ (ZNS implications)
  - INCITS T10 (ZBC implications)
  - INCITS T13 (ZAC implications)

Zoned Storage Model

Architecture

- A Zoned Storage Model consists of a set of base requirements that applies to all SNIA Zoned Storage Models, followed by an additional set of requirements for a given Zoned Storage Model.
  - Allows the host storage stack to always assume certain properties of a ZNS SSD.



Zoned Storage TWG Membership as of 1-21-2022

SNIA

Zoned Storage TWG Participation

- What is the expected industry impact of this work
  - The definition of use cases and an architecture will allow the industry to make better utilization of zoned storage devices
  - By making the utilization of zoned storage devices, we will increase the utilization of zoned storage devices and performance benefit of zoned storage devices
- Why you should join and participate in this TWG
  - Join and participate in this TWG to help define what use cases you want solved and help vendors understand requirements
- Who to contact for additional information
    - Dave Landsman and Bill Martin

