

CSTI What We Do

The <u>SNIA Cloud Storage Technologies Initiative</u> (CSTI) is committed to the adoption, growth and standardization of storage in cloud infrastructures. This encompasses data services, orchestration and management, as well as the promotion of portability of data in multi-cloud environments.



CSTI 2020 Accomplishments

- Topics Resonating: AI, Kubernetes, IoT
- 10 CSTI webcasts in FY'20
 - Generated over 4,400 combined views
- Top 3 webcasts:
 - 1. The Impact of AI on Storage and IT
 - 2. A Multi-tenant Multi-Cluster Kubernetes Data Apocalypse is Coming
 - 3. The Influence of IoT on Data Strategy
- Top 3 blogs:
 - 1. The Power of Data Aggregation during a Pandemic
 - 2. A Q&A on the Impact of Al
 - 3. Kubernetes Business Resiliency FAQ



CSTI Work Items for 2021

- Beyond cloud storage covering technologies periphery to cloud
- Topics we propose:
 - Data Privacy & Data Protection
 - Cloud Analytics
 - IoT
 - Smart Cities
 - Ethics of artificial intelligence and machine learning
 - Big Data
 - 5G
 - Distributed computing
 - Hyperscaler trends
- Focus on real-world use cases
 - Airlines
 - Genomics
 - Manufacturing



CSTI Work Items for 2021

- SNIA Cross-Group collaboration
 - Security Technical Work Group
 - Cloud Storage Technical Work Group
 - CDMI 2.0 and Update of ISO/IEC 17826 (Cloud Data Management Interface)
 - Data Protection & Privacy Committee
 - SNIA EMEA
 - Goal: Storage Management Initiative: CDMI and Swordfish collaboration
- External group collaboration /Alliances
 - ISO/IEC JTC1/SC38 Cloud Computing and Distributed Applications
 - INCITS Technical Committee CS1 Cyber Security
 - Expert speakers from range of industries
 - Ex: Cyber Insurance



CSTI Membership as of 1-1-21

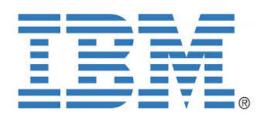
















CSTI Participation

- CSTI has matured
 - Cloud Storage is a given
 - Breadth of technical expertise
 - Depth of knowledge on all technologies related to storage
- Delivering on education
- Our audiences are vendors and end users
- Every SNIA member company can benefit from CSTI activities
 - Educate, participate, share expertise
- Contact Alex McDonald (<u>cstichair@snia.org</u>) for additional information





Compute, Memory, and Storage Initiative (CMSI)

2020 Review and 2021 Plans

Presentation at SNIA Annual Members Symposium

January 26, 2021

January 2020



 Expanded the scope of the Initiative from solid state storage and persistent memory to add computational storage



CMSI 2020 Mission and Accomplishments

CMSI Mission - The SNIA CMSI is dedicated to fostering the growth and success of the market for solid state storage, computational storage, persistent memory, and other advanced storage technologies in both commercial and consumer environments.

CMSI-wide – approved support of the Computational Storage TWG; continued support of SSS TWG, NVM Programming TWG, and IOTTA TWG; finalized the CXL Consortium/SNIA Alliance agreement; created a 10-slide CMSI "Gold Deck"; created new CMSI Fact Sheet; sponsored SDC US 2020 (booth and shirt giveaway); sponsored OCP Summit (booth); sponsored Flash Memory Summit 2020 (booth, virtual reception)

Computational Storage SIG

- Established January 2020
- Produced three educational videos
 - What is Computational Storage? (834 views)



<u>Advantages of Reducing Data Movement</u> – (501 views)

Edge Compute Deployment – (457 views)

- Produced two use case videos (115 views)
- Produced three webcasts
- Live demonstrations at SDC US; presented at SDC EMEA and SDC US
- Sponsored Computational Storage Track at FMS (November 12) – 3 presentations, 1 panel, live demonstrations
- Contributed 22 content items to the SNIA Educational Library

Persistent Memory and NVDIMM SIG

- Produced 2020 Persistent Memory Summit
 - 15 presentations
 - 251 live attendees
 - On demand viewing of presentations in top-10 at end of 2020
- Expanded PM Workshop and Hackathon Program
 - 300+ developers completed
 - Created NVDIMM Programming Challenge and selected first winner
 - Created <u>Introduction to Persistent Memory</u> video (180 views)
 - Sponsored bootcamp at SDC India 2020
- PMEM Workshop/Hackathon at SDC September 21-23
- PM BoF at SDC 2020 and promotion of PM track at SDC 2020
- Sponsored PIRL (Persistent Memory in Real Life) Conference with UCSD (19 sessions)
- Sponsored and exhibited at IMC Summit
- Sponsored Persistent Memory Track at FMS 2020 6 presentations , 1 panel, PM Workshop/Hackathon
- Contributed 44 content items to the SNIA Educational Library

Solid State Drive SIG

- Updated Form Factor page consistently in top five of SNIA.org page views in 2020
- Successful Enterprise and Data Center Form Factor webcast with SSD SIG, Dell, Facebook, HPE, Intel, KIOXIA, Lenovo, and Microsoft (535 unique views to date) https://www.snia.org/educational-library/enterprise-and-data-center-ssd-form-factor-end-25-inch-disk-era-2020
- Published NVMe SSD Classification online page
- Sponsored EDSFF panel at FMS 2020
 - Enterprise and Data Center Form Factor
 - SSD performance
- Contributed 8 content items to the SNIA Educational Library



CMSI 2021 Work Items (slide 1 of 2)

Initiative- wide

- Outreach and participation in four industry events (PIRL, IMC Summit, Flash Memory Summit, OCP Summit)
- Support of SNIA SDC events (India, EMEA, US)
- Persistent Memory/Computational Storage Summit (virtual, expansion to two days April 21-22, 2021)
- 10 blogs on the sniacmsiblog.org site to include webcast Q&As and education on technology topics from Initiative member thought leaders

Computational Storage SIG

- Support of the Computational Storage Technical Work Group work items
- Continued research and documentation of computational storage use cases
- Three webcasts/four educational videos

Persistent Memory and NVDIMM SIG

- Update of the NVDIMM Cookbook
- Identify and advance three new persistent memory applications/research areas (e.g. Java containers)
- Continued SNIA NVM Programming Model evangelization through the PM Bootcamp/Hackathon program
- Three webcasts/four educational videos

Solid State Drive SIG

- Publication of the NVMe Classification white paper and outreach on the NVMe Classification webpage material
- Update of Storage Total Cost of Ownership materials on snia.org and outreach
- Continued support, enhancement of, and outreach on the SSD Form Factor webpage material
- Three webcasts/four educational videos



CMSI 2021 Work Items (slide 2 of 2)

TWGs supported

- Computational Storage TWG (Specification promotion/outreach, user input)
- NVM Programming TWG (wind-down deliverables)
- S3 TWG (Specification promotion/outreach)

External Group Collaboration/Alliance Activities

- CXL Consortium Marketing/outreach work on alliance
- JEDEC –NVDIMM-P specification support; automotive SSD standard support
- NVM Express support of/outreach on joint marketing and technical alliance activities



CMSI Membership – January 2021

36 Companies + 10 Individual Members = 46 total Members
Blue – joined December 2020/ * Voting members

Companies	Companies	Companies
AMD*	Innogrit	Rambus
ARM*	Intel*	Rockport Networks*
Broadcom	KIOXIA*	Samsung*
Calypso Systems	MemVerge	ScaleFlux
Cisco* – joined 12/2020	Micron*	Silicon Motion
Dell – joined 12/2020	NetApp*	SK hynix
Eideticom	Netint Technologies	SMART Modular
Fadu	NGD Systems*	Spin Memory
Futurewei* - joined 12/2020	NVIDIA*	SunRise Memory
Gigabyte Technology	Nyriad (joined 12/2020)	Western Digital*
HPE*	Oracle	UNH-IOL
IBM*	Phison	Xilinx*
		Yangtze Memory Technologies

CMSI Membership Classes

- Strategic Voting \$5,000/year
- Non-Voting \$3,000/year
- Startup, Non-Voting \$1,000/year
- Individual, Non-Voting \$300/year
- Educational Institution, Non-Voting
 complimentary

Individual Members
Tom Coughlin (Coughlin Associates)
Dave Eggleston (Intuitive Cognition Consulting)
Tom Friend (Illuminosi)
Mark Geenan (Trend Focus)
Jim Handy (Objective Analysis Semiconductor Market Research)
Dennis Martin (Principled Technologies)
Alex McDonald (Individual Member)
Scott Miller (DreamWorks)
Tom West (HyperIO)



CMSI Officers as of January 2021

- CMSI Co-Chairs
 - Alex McDonald (Individual Member); Jennifer Dietz (Intel)
- CMSI Treasurer
 - Tom Friend (Illuminosi/Individual Member)
- CMSI Education Committee Chair
 - Tom Coughlin (Coughlin Associates/Individual Member)
- CMSI Marketing Committee Co-Chairs
 - Tim Lustig (NVIDIA); Willie Nelson (Intel)
- CMSI Computational Storage SIG Chair
 - Eli Tiomkin (NGD Systems)
- CMSI Persistent Memory SIG Co-Chairs
 - Arthur Sainio (SMART Modular); Raghu Kulkarni (Intel)
- CMSI Solid State Storage Drive SIG Co-Chairs
 - Cameron Brett (KIOXIA); Jonmichael Hands (Intel)

Note that a new CMSI Governing

Board will be in place by March 201



CMSI Participation

- Expected industry impact of CMSI work
 - Significant education deliverables contributing to expanded knowledge of computational storage technology and applications
 - Implementation knowledge of the NVM Programming Model benefits and application to persistent memory applications
 - The place to go for information on SSD form factors, NVMe classification, and Total Cost of Ownership (TCO) information
- Industry segment relevance of CMSI work
 - Support of the industry drive to combine processing with memory and storage
 - Support the creation of new compute architectures and software to analyze and exploit the explosion of data creation over the next decade.
- Why you should join and participate in the CMSI
 - Engage and educate on compute, memory, and storage technologies
 - Accelerate standards
 - Propel technology adoption
- Who to contact for additional information
 - Reach out to our leadership Jenni Dietz and Alex McDonald cmsichair@snia.org
 - Website www.snia.org/cmsi
 - CMSI fact sheet https://www.snia.org/sites/default/files/SSSI/CMSIFactSheet20.pdf





Green Storage Initiative (GSI

2020 Review and 2021 Plans

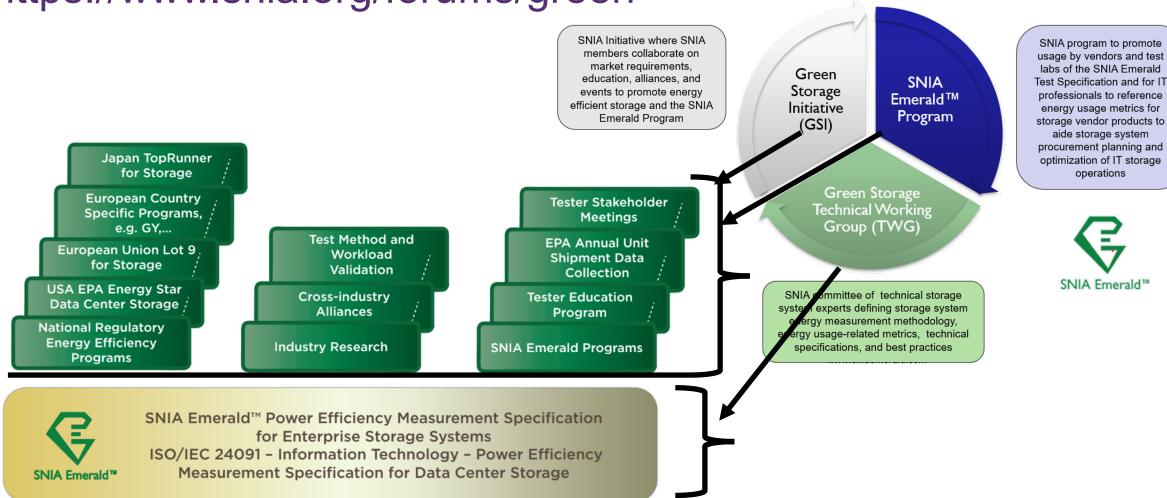
Presented by Wayne M. Adams GSI Chair

waynemadams@gmail.com

www.sniaemerald.com

https://www.snia.org/technology-focus/power-efficiency

Green Storage Initiative (GSI) Mission https://www.snia.org/forums/green





GSI Work Items (slide 1 of 2)

2020 Accomplishments

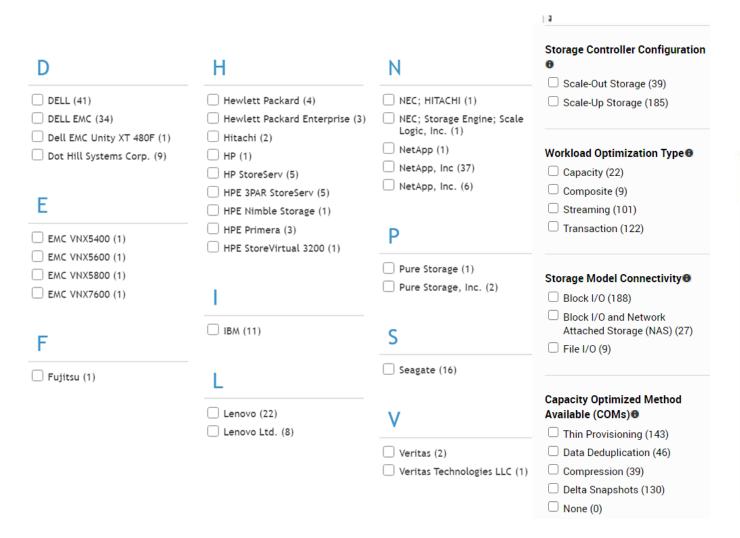
- Emerald 4.0 Industry Training and Tester Kit
- Renew TGG/SNIA Alliance Agreement
- Industry Stakeholder Meeting
- EPA DCS Block IO thresholds
- VdBench assurances
- Data Analysis
- EPA Unit Shipment Report

2021 Plans

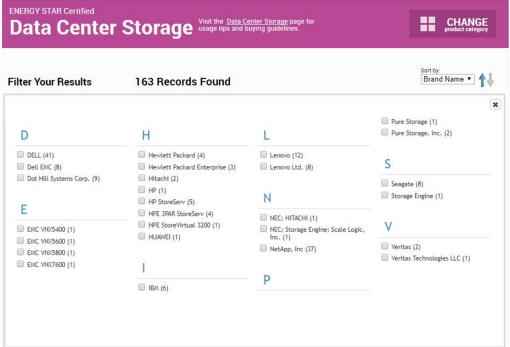
- EPA Energy Star DCS 2.0/Emerald 4.0 Data Analysis
- TGG Alliance / EU regulations
- TGG/SNIA updated storage whitepaper
- Test method for solid state AFA
- Emerald 4.x stakeholder meeting, requirements, 18 mo. roadmap
- Japan Top Runner
- EPA Unit Shipment Report
- Next version tbd ISO submission



EPA Energy Star Testing



1 2021 232 test reports (DCS v1.0/v1.1) 9 2017 163 test reports DCS v2.0 thresholds required March 2021





GSI Work Items (slide 2 of 2)

GSI Alliances and Cross Industry Work

GSI/GreenTWG Cross-SNIA Group Collaboration

Technology and Testing

 SPEC (SFS), Oracle (Vdbench (SPC community)), SPEC (power meters), S-FLOW, 80 Plus Ecova/EPRI (power supply testing)

Policy

- The Green Grid (+Digital Europe) (EU, EU country level pgms)
- SNIA-J (Japan)

Industry Regulatory

- EPA Energy Star
- TopRunner (via SNIA-J)
- EU Lot 9 (via TGG → Digital Europe), Blue Angel, others

International Standards

SC39 / ITS 39

SMI/SSM TWG

- Storage Management profiles for power, capacity, I/O
- Profiles requests to support DCIM

S3 TWG/CMSI

- Solid state storage taxonomy
- S3 Test Methods/data collection



GSI Membership as of 1/1/2021



Membership Dues 2021

Voting dues = \$12K Non-voting dues = \$6K

GSI Leadership:

- Chair, Wayne M. Adams, Independent Consultant
- SNIA Emerald Program Manager, Dave Thiel, Contractor
- SNIA Emerald Data Analysis, Patrick Stanko, Contractor



GSI 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 GSI
 - Membership fees underwrite critical contractor services for program mgt, data analysis, test validation, and industry training; industry awareness of your company's leadership
 - Start new work to address ODM/device level requirements
 - Refresh and renew focus on best practices (whitepapers, planning tools)
 - Avoid being surprised when a new regulation goes live and affects your product portfolio/revenues
- Who to contact for additional information
 - GSI Chair, Wayne M. Adams, <u>gsichair@snia.org</u>
 - GSI SNIA Emerald Program Manager, David Thiel, emerald@snia.org





SMI 2020 Accomplishments



- Charter: https://members.snia.org/wg/sminit/document/32778
- Mission:
 - The SNIA Storage Management Initiative (SMI) is dedicated to fostering the creation of implementable, deployable and verifiable end user storage management solutions based on industry and SNIA standards that can be adopted industry wide.
- In 2020:
 - Delivered educational content promoting SMI-S and Swordfish ecosyste
 - SMI-S: Pywbem
 - Swordfish: Addition of NVMe / NVMe-oF to Redfish and Swordfish
 - Marketing / awareness campaigns for SMI-S CTP, upcoming (rolling out Swordfish CTP Program





SMI: 2021 Priorities



- Accelerating Swordfish development and adoption, through interoperability, conformance, education and marketing activities
- Developing a seamless transition from other storage management standards to Swordfish
- Sword

- Educating everyone on the purpose and value of storage management
- Partnering with other organizations to expand storage management standards
 - Active alliances with DMTF, NVM Express, SODA, OFA, and more.











Storage Management Initiative: Structure and Members



PURESTORAGE



















Programs

(pay to play)

Operations

(Governing Board)







Marketing

Conformance Development

Education



SMI Governing Board

	Richelle Ahlvers Storage Management Architect, Intel SNIA Board Advisor, SMI Chair and SMI Conformance Committee Chair
	Chris Lionetti Senior Technical Marketing Engineer, Hewlett Packard Enterprise SNIA Vice Chair, Executive Committee and SMI GB Member
C. C.	Barkz Technical Director, Pure Storage SMI GB Member
	Barry Kittner Technology Initiatives Manager, Intel SMI GB Member-at-Large, SMI Marketing Committee Chair

Join SMI, SM Lab, CTP

SMI Annual Membership Fee	Member Fee	\$5,000 US
	"Start-up" Member Fee	\$1,000 US
SM Lab Annual Participation Fee (SMI membership required to participate)	Lab Provider/Service Developer Participant (Revenue greater than \$600M+)	\$25,000 US
	Lab Provider/Service Developer Participant (Revenue greater \$150M to \$600M)	\$20,000 US
	Lab Provider/Service Developer Participant (Revenue greater \$20M to \$150M)	\$15,000 US
	Lab Provider/Service Developer Participant (Revenue greater \$0M to \$20M)	\$11,000 US
	Infrastructure Developer Participant	\$15,000 US
	Storage Client Fee	\$10,000 US
	Storage "Start-up" Fee	
Conformance Testing Program Subscription Fee (SMI CTP)	SMI-S CTP Subscriber	\$15,000 US
	SMI-S CTP Maintenance Subscriber	\$7,500 US
	SMI-S CTP Subscriber (non-SNIA member)	\$25,000 US
	Swordfish CTP Subscriber (Note 1)	\$5,000
	Swordfish CTP Subscriber (non-SNIA member) (Note 1)	\$10,000 US



SMI Participation

- Targeted Industry Impact:
 - Promoting, and accelerating adoption of industry standard storage management standards
 - Educating on importance of storage management and storage management standards
- Target Industry segments: All storage infrastructure (physical and virtual)
- Join the SMI and programs to accelerate adoption of storage standards and drive interoperability
- For additional info, contact <u>storagemanagement@snia.org</u>





Data Protection & Privacy Committee

2020 Review and 2021 Plans

Presented by Thomas Rivera, Co-Chair (dppcchair@snia.org)

DPPC

Charter

The DPPC exists to further the awareness and adoption of Data Protection technology, and to provide vendor neutral education, best practices and technology guidance on all matters related to the protection and privacy of data. The DPPC is the place where Data Protection and Privacy experts from the data storage industry gather to improve standards, assess changes in legislation, and provide insights into the future challenges of protecting all forms of data.

Recent completed work - summary

- Industry advisories on secure data deletion and CA IoT law
- Webcasts, blogs, and presentations at SDC
- Direct feedback into ISO international standards updates and NIST publications
- Outline scope for storage concepts document



DPPC Work Items

- Strategic
 - Goal: Monitor and advise on global data privacy legislation changes
- Educational
 - Goal: Produce comprehensive reference materials, including storage concepts guide
- Collaborative
 - Goal: Input and influence international standards and formalize alliances with key associations
 - Goal: Utilize the storage expertise within SNIA to enhance the quality of content
- SNIA Cross-Group collaboration with Security TWG
- Continue work on formalizing alliance agreement with IAPP



DPPC Governing Committee as of January 2021

- PK Gupta, Dell Technologies (Co-Chair)
- Thomas Rivera, VMware (Co-Chair)
- Sangeetha Seshadri, IBM
- Mounir Elmously, Ernst & Young
- Michael Jaslowski, Northern Trust
- Michael Dexter, Gainframe
- Ron Pagani, OpenTech Partners
- Steven O'Neill, Attorney
- David Hill, Mesabi Group
- 100+ subscribers to the DPPC mailing list



DPPC Participation

- What is the expected industry impact of this work
 - To use our vendor neutral technology expertise to influence international standards, make sense of legislation, and provide access to best practice and education on Data Protection and Privacy issues.
- What is the industry segment relevance
 - ISO27040 Storage Security Standard revision (in progress) contains 'shall' statements for the first time. This means it will be used as a conformance standard to hold storage vendors to account.
 - 44% of CEO respondents rank Data Privacy among the top 3 policies most impactful to their business (PWC)
- Why you should join and participate in the DPPC
 - The DPPC aims to drive the storage narrative in highly prevalent issues of:
 - Data Privacy legislation
 - Cyber Security as it relates to storage
 - Ransomware and data protection strategies
- Who to contact for additional information
 - DPPC Co-Chairs PK Gupta and Thomas Rivera dppcchair@snia.org
 - SNIA DPPC Facilitator paul.talbut@snia.org
- DPPC Birds of a Feather session 'Why data privacy matters' @ SNIA Symposium
 - Wednesday 26th 2pm PT Use the above email to register your interest in attending





NSF What We Do

The <u>SNIA Networking Storage Forum</u> (NSF) drives the broad adoption and awareness of storage networking solutions. Our expert community covers block (FC, iSCSI, NVMe-oF), file (SMB, NFS), and object network storage, as well as diverse related topics such as virtualized and hyperconverged solutions, storage security, and more.

We accomplish our mission by delivering webcasts, publishing white papers and articles in trade journals, actively blogging, and leveraging social media to promote networked storage and related technologies.

NSF 2020 Accomplishments

- NSF vendor-neutral, educational webcast success
- Produced 16 NSF webcasts in FY'20
 - Generated over 16,000 views
- Top 3 webcasts for FY'20:
 - 1. QUIC: Will it Replace TCP/IP
 - 2. Object Storage: What, How and Why
 - 3. Ethernet-attached SDDs: Brilliant Idea or Storage Silliness?
- Focus on Storage Networking Security
 - 7-webcast series covering Key Management, Privacy Regulations, Encryption, and more
- Authored over 30 blogs:
 - Expert webcast Q&A blogs among the most popular



NSF Work Items for 2021

Exploring all technologies related to Networked Storage

- NVMe over Fabrics Performance webcast series
 - Host factors
 - Switch impact
 - Congestion
- Storage for applications
 - AI, Databases, other applications
- Technologies Ripe for Refresh
- Storage Networking Packet Walk webcast series
- Continuation of Storage Networking Security webcast series
- Cloud to edge impact on Computational Storage



NSF Work Items for 2021

- SNIA Cross-Group collaboration
 - Security Technical Work Group
 - Storage Management Initiative
 - Cloud Storage Technologies Initiative
 - Compute, Memory, and Storage Initiative
- External group collaboration /Alliances
 - IETF
 - OpenFabrics Alliance
 - NVM Express® (NVMe over Fabrics)



NSF Members as of 1-1-21















SAMSUNG



Western Digital.



NSF Participation

- Expected Industry Impact
 - Educating vendors and customers
 - Promoting the SNIA brand as a place to get quality education on technology
- Industry segment relevance
 - Relevant to vendors of systems, HDDs, SSDs, and networking
 - Relevant to all verticals/industries
- Why you should join and participate in this Forum
 - Learn, monitor, contribute, and build your company brand and personal brand
- Contact us to get involved!
 - John Kim NSF Chair (<u>nsfchair@snia.org</u>)
 - Alex McDonald NSF Vice Chair





Regional Groups

2020 Review and 2021 Plans

Presented by Paul Talbut, Regional Affiliate Program Director

Regional Groups 2020 Accomplishments

- SNIA has global representation through various local groups, some of whom are well structured (local BoD) and some who are individual regional champions
- Regions: EMEA, India, Japan, Brazil, Malaysia
- Highlights and challenges of 2020
 - Pandemic has affected all regions in different ways, but all remain focused
 - Adapting to the new virtual methodology
 - First SDC virtual event outside the US SDC India Dec 4-5
 - Large percentage of the SNIA audience resides outside the US, so our marketing activity has a global reach



Regional Groups Work Items 2021

- Planning under way for virtual international events and local meetings
- SDC EMEA will extend beyond the Israeli community
- SDC India
- Virtual meetups want to encourage these to occur more often



Regional Groups Participation

- What is the expected industry impact of this work
 - International representation for SNIA expands the global coverage for standards and educational content
- What is the industry segment relevance.
 - SNIA is recognized as a global association and we can deliver consistency of messaging and content
 - All regions desperately need more resources and access to content
- Why you should join and participate
 - Volunteer participation outside the US is the biggest single challenge
 - Please encourage your colleagues to consider joining or participating in SNIA's global regions
- Who to contact for additional information
 - Regional Affiliate Program Director paul.talbut@snia.org

