

Virtual Conference June 8, 2021

EDSFF for Storage, Memory and Acceleration

Presented by: Pekon Gupta <Pekon.Gupta@smartm.com>

Agenda

What is EDSFF ?

Mechanical, Electrical and Connector

EDSFF in Storage

- E3.S v/s U.2
- E1.S v/s M.2

EDFSS in Memory

- DDR4 DIMM v/s E1.S and E3.S
- EDSFF in Acceleration
 - Computational Storage, SMART NIC

Summary

EDSFF: Scalable Form Factor

EDSFF: Enterprise and Data-center SSD Form Factor



Open standard, now maintained by SNIA: <u>https://www.snia.org/technology-communities/sff/specifications</u>





EDSFF Mechanicals: The Height



Source https://www.snia.org/technology-communities/sff/specifications

4 | ©2021 Storage Developer Conference EMEA ©. SMART Modular Technology. All Rights Reserved.

Connector spec SFF-TA-1002



EDSFF: Mechanicals: The Length



EDSFF: Mechanicals: The Thickness



Interoperability between EDSFF connectors



7 | ©2021 Storage Developer Conference EMEA ©. SMART Modular Technology. All Rights Reserved.

SFF-TA-1002



EDSFF in Storage

STORAGE DEVELOPER CONFERENCE

8 | ©2021 Storage Developer Conference EMEA ©. Insert Company Name Here. All Rights Reserved.

Migrating from U.2 to E3.S EDSFF 3" XMM RAM Memory N U.2 - 2.5-inch (SFF-8639) **E3.S** Scalability Data: SAS, SATA x4, PCIe x4 Data: up to **x16** high speed differential ٠ • Primary Side (closest to drive edge) Additional sideband for low-power LED control and Wake-up PCI Sideband SAS/SATA/SATA Express Power, SATA Express sideband E6-E1 1st Port P15-P1 (15 Pins) (6 Pins) S7-S1 (7 Pins) Data Power sideband Data Data PCIe Lanes 3-1, Sideband SAS/SATA Express PCIe Lane 0, RefClk E39-17 2nd Port E16-E7 x16/4C x8/2C x4/1C (23 Pins) S14-S8 (7 Pins) (10 Pins) A1/B1 Secondary Side 0 to +55 degree C (operating), Up to 85 degree C. Devices specific profiles based on Air Flow Impedance. Temperature Flexibility for device manufacturers and server OEMs Max Power Up to 25W (15mm) Up to 40W (for 2T thick 16.8mm)

Source(s): <u>http://www.ssdformfactor.org/docs/SSD_Form_Factor_Version1_a.pdf</u>, <u>https://www.snia.org/technology-communities/sff/specifications</u> <u>https://www.anandtech.com/show/16248/edsff-form-factor-updates</u>

STORAGE DEVELOPER CONFERENCE

Migrating from M.2 to E1.S





	M.2	E1.S		
Scalability	 Data: SATA x4, PCIe x4, UIM, USB Sideband UIM, I2C, UART, Wake, Low power 	 Data: PCIe x8 up to 32GT/s Sideband: I2C/SMBus, Wake, low-power, LED control 		
Hot Plugging	Not supported	Supported (ease of serviceability)		
Power	3.3V	12V and 3.3V		
Mechanicals	22 x 80 mm	31.5 x 111.49 mm		
Source(s): <u>http://www.ssdformfactor.org/docs/SSD_Form_Factor_Version1_a.pdf</u> , <u>https://www.snia.org/technology-communities/sff/specifications</u> https://www.anandtech.com/show/16248/edsff-form-factor-updates				

STORAGE DEVELOPER CONFERENCE

EDSFF in Memory

STORAGE DEVELOPER CONFERENCE

11 | ©2021 Storage Developer Conference EMEA ©. Insert Company Name Here. All Rights Reserved.

Challenges with parallel memory interfaces



EDSFF simplifies Board design						
DIMM (Direct attached Memory – Parallel bus)		EDSFF (PCIe attached - Serial bus)				
	DIMM	E1.S (x4)	E1.S (x8)	EDSFF 3" XMM DRAM Memory Module E3.S (x16)		
	DDR4 DIMM	E1.S with x4 (1C)	E1.S with x8 (2C)	E3.S with x16 (4C)		
Pins	288 pins (64 data, 87 sideband, rest power)	56 pins (16 diff-data, 16 sideband, 24 power)	84 pins (32 diff-data, 18 sideband, 34 power)	140 pins (64 diff-data, 24 sideband, 52 power)		
Connector Area (LxW)	142.0mm x 6.5mm	23.8mm x 6.0mm	35.6mm x 6.0mm	57.0mm x 6.0mm		
Power	Input voltage=1.2V VPP 2.5	Input voltage 12V Vaux 3.3 (optional)	Input voltage 12V Vaux 3.3 (optional)	Input voltage 12V Vaux=3.3 (optional)		

13 | ©2021 Storage Developer Conference EMEA ©. SMART Modular Technology. All Rights Reserved.

STORAGE DEVELOPER CONFERENCE

EDSFF is scalable

EDSFF DIMM (PCIe attached - Serial bus) (Direct attached Memory – Parallel bus) **DRAM Memory Module** DIMM Cie EDSP NVDIMM-N, NVDIMM-P (Persistent) E1.S (x4) E3.S (x16) E1.S (x8) E1.S 1C (x4) E1.S 2C (x8) E3.S 4C (x16) **DDR DIMM** DDR4@3200 PCIe-Gen4-x4 PCIe-Gen4-x8 PCIe-Gen4-x16 **Current Generation** 25.6GB/s 15.7GB/s 31.5GB/s 7.8GB/s DDR5@4800 ** PCIe-Gen5-x4 PCIe-Gen5-x8 PCIe-Gen5-x16 **Future Generation** 38.4GB/s 15.7GB/s 31.5GB/s 63.0GB/s

Source(s): <u>https://en.wikipedia.org/wiki/PCI_Express#History_and_revisions</u> and <u>https://en.wikipedia.org/wiki/DDR4_SDRAM#JEDEC_standard_DDR4_module</u>

** Source(s): https://www.anandtech.com/show/16143/insights-into-ddr5-subtimings-and-latencies



EDSFF in Acceleration



15 | ©2021 Storage Developer Conference EMEA ©. Insert Company Name Here. All Rights Reserved.



≈SD@EMEA

16 | ©2021 Storage Developer Conference EMEA ©. SMART Modular Technology. All Rights Reserved. Source: https://2020ocptechweek.fnvirtual.app/a/event/1165 (Pekon Gupta)

EDSFF + Compute + Ethernet = SMART NIC





A compact pluggable form-factor for distributed compute



4C+ (x16) 168 contacts 4C (x16) 140 contacts 2C (x8) 84 contacts 1C (x4) 56 contacts



ure 1: BCM957414N4140C OCP 3.0 SFF Ne



OCP NIC (x16) – small PCIe-x16 Add-in Card **Full-height Half length** Mechanicals (L x W) 115 x 76mm 167.75 x 111.28mm Number of pins 164 168 pins (4C+) Power 75W from Edge Up to 70W

STORAGE DEVELOPER CONF

17 | ©2021 Storage Developer Conference EMEA ©. SMART Modular Technology. All Rights Reserved. Sources: https://docs.broadcom.com/doc/957414N4140C-DS (Broadcom OCP NIC) and <a href="https://www.intel.com/content/www/us/en/products/docs/network-io/ethernet/network-adapters/ethernet/nethernethernet/network-adapters/ethernet/network-adapters/etherne





18 | ©2021 Storage Developer Conference EMEA ©. Insert Company Name Here. All Rights Reserved.

Summary

EDSFF: Enterprise and Data-center SSD Scalable Form Factor



19 | ©2021 Storage Developer Conference EMEA ©. SMART Modular Technology. All Rights Reserved. Source: <u>https://www.snia.org/sites/default/files/SSSI/OCP%20EDSFF%20JM%20Hands.pdf</u>,

https://www.snia.org/forums/cmsi/knowledge/formfactors







Please take a moment to rate this session.

Your feedback is important to us.

