



IBM **Spectrum Scale**

Lenovo Distributed Storage Solution (DSS) for IBM Spectrum Scale

Spectrum Scale Strategy Days 2017 – Expertentage
IBM Ehningen, 09-Mar-2017



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+ Lenovo Data Center Group Portfolio Spans the Entire Data Center

World Class, end-to-end Data Center portfolio, delivered as Discrete or as Integrated offerings

Server



Lenovo

- Rack & Tower
- Mission Critical: X6
- Dense: NeXtScale & ThinkServer
- Blades: Flex System

Storage



Lenovo

- SAN: S Series, V Series
- SDS: DX8000C, DX8000N
- AFA: Coming soon
- Scale-out: GSS
- Direct Attach & Archive

Hyper-converged



Lenovo NUTANIX

- ROBO: HX1000
- SMB: HX2000
- Compute Heavy: HX3000
- Storage Heavy: HX5000
- High-Performance: HX7000

Networking



Lenovo JUNIPER NETWORKS

- Embedded
- Top of Rack
- Campus and Core
- Storage Switches
- Networking OS

Engineered Solutions

Cloud



Big Data



Client Virtualization



Database & Analytics



HPC / AI

CAE & EDA



Academia



Weather&Climate



Cluster & Storage



Machine Learning



Hyperscale

Rack Scale Arch.



Compute & Warm Storage



Application Optimized



Lenovo

ThinkAgile

1. Solution-centric approach to IT
2. Rack-level solution
3. Ease of config, deploy, manage
4. Seamless mgmt. framework
5. Optimized ROI by workload
6. Reduced OPEX w/ consolidated, familiar mgmt. tools



Lenovo

Discrete offerings

1. Broad datacenter offerings; servers, storage, networking
2. Highest configuration flexibility
3. Open and optional networking
4. Simplified and open mgmt



End to end services that span from basic to consultative engagements

+ Lenovo Proven Tier 1 HPC Partner

First



WARM WATER
COOLED SUPER COMPUTER



lrz Leibniz-Rechenzentrum
der Bayerischen Akademie der Wissenschaften

Co-Innovation with LRZ

2nd Largest



SUPERCOMPUTER IN EMEA

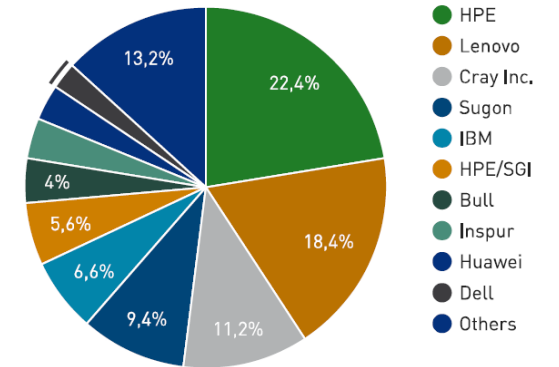


Number 12 on TOP500
World's #3 KNL/**OPA** System

Fastest

GROWING
TOP 500 HPC VENDOR

Vendors System Share



#2 WW – 99 listings
#1 China
Multiple PFLOP+ SKL wins

+ Lenovo GSS with NL-SAS



GSS22 (12U)



GSS24 (20U)



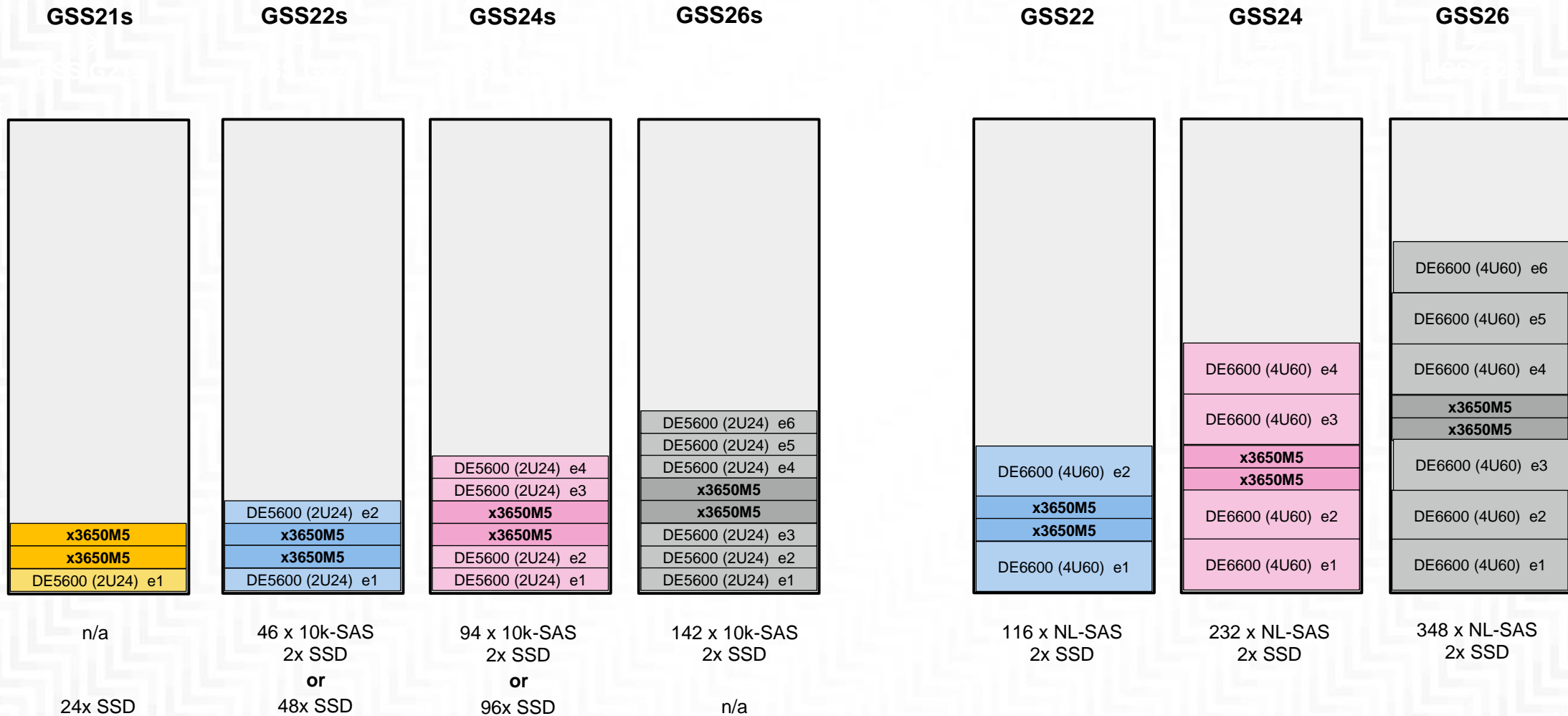
GSS26 (28U)

GSS v3.1 was released in Dec 2016

- Based on Spectrum Scale v**4.2.1**
 - **Declustered Software RAID**
 - **2- or 3-parity**; e2e data integrity
- Up to **10TB** disks
- Two x3650-m5 servers
 - SAS connections to JBODs
 - Interconnect: 10/40GbE, FDR/EDR, **OPA**
- Two, four or six JBODs (4U60)
 - Up to **2.6 PB usable (8TB, 8+2p)**
 - Choice of 4,6,8,**10** TB NL-SAS disks
- Scale out the # of building blocks
 - to desired capacity and performance
 - Can also „scale-up“: up to 6 enclosures

+ Lenovo GSS v3.1 building blocks

Existing GSS models (with NetApp DE5600 and DE6600 JBODs)



+ GSS pre-2016 Release History (Spectrum Scale 3.5 and 4.1 based)

1Q/2013
GSS v1.0

Server:

2 * x3650-M4
- E5-2670-v1
- SAS6 (gen2)
- 10G,FDR

Storage:

GSS24/26:
- 2,3 TB

Software:

- xCat 2.8.2
- rhel-6.3
- gpfs-3.5.0-5 +
- mofed-1.5-3

4Q/2013
GSS v1.5

Server:

2 * x3650-M4
- E5-2670-v1
- SAS6 (gen2)
- 10G,FDR

Storage:

GSS24/26:
- 2,3, **4 TB**

Software:

- xCat 2.8.**3**
- rhel-6.**4**
- gpfs-3.5.0-**13** +
- mofed-**2.0**-3

2Q/2014
GSS v2.0

Server:

2 * x3650-M4-**HD**
- E5-2670-**v2**
- SAS6
- 10G,**40G**,FDR

Storage:

GSS24/26:
- 2,3,4 TB
GSS22s/24s/26s:
- **1.2 TB SAS**
GSS21s/22s/24s:
- **200,800 GB SSD**

Software:

- xCat 2.8.**4**
- rhel-6.**5**
- gpfs-**4.1.0**-1 +
- mofed-**2.1**-1

4Q/2014
GSS v2.5

Server:

2 * x3650-M4-**HD**
- E5-2670-**v2**
- SAS6
- 10G,40G,FDR

Storage:

GSS24/26:
- 3,4, **6 TB**
GSS22s/24s/26s:
- 1.2 TB SAS
GSS21s/22s/24s:
- 200,800 GB SSD

Software:

- xCat 2.8.**5**
- rhel-**7.0**
- gpfs-4.1.0-**5** +
- mofed-2.**3**-1

3Q/2015
GSS v2.5.8

Server:

2 * x3650-**M5**
- E5-2670-**v3**
- SAS**12**
- 10G,40G,FDR,
EDR interoperability

Storage:

GSS24/26:
- 3,4,6 TB
GSS22s/24s/26s:
- 1.2 TB SAS
GSS21s/22s/24s:
- 200,800 GB SSD

Software:

- xCat 2.**9.2**
- rhel-**7.1**
- gpfs-4.1.0-**8**
- mofed-2.**4**-1

4Q/2015
GSS v2.5.9

Server:

2 * x3650-M5
- E5-2670-v3
- SAS12
- 10G,40G,FDR,
EDR interoperability

Storage:

GSS24/26:
- 3,4,6, **8 TB**
GSS22s/24s/26s:
- 1.2 TB SAS
GSS21s/22s/24s:
- 200,800 GB SSD

Software:

- xCat 2.9.2
- rhel-7.1
- gpfs-4.1.**1-2** +
- mofed-**3.1-1**

+ GSS 2016 Release History (Spectrum Scale 4.2 based)

1Q/2016

GSS v2.5.10

Server:

- 2 * x3650-M5
- E5-2670-v3
- SAS12
- 10G,40G,FDR,
EDR interoperability

Storage:

GSS24/26:

- 3,4,6,8 TB

GSS22s/24s/26s

- 1.2 TB SAS

GSS21s/22s/24s:

- 200,800 GB SSD

Software:

- xCat 2.9.2
- rhel-7.1
- gpfs-4.2.0-2 +
- mofed-3.1-1

2Q/2016

GSS v2.6

Server:

- 2 * x3650-M5
- E5-2670-v3
- SAS12
- 10G,40G, FDR,
EDR interoperability
- **Intel OmniPath**

Storage:

GSS24/26:

- 3,4,6,8 TB

GSS22s/24s/26s:

- 1.2 TB SAS

GSS21s/22s/24s:

- 200,800 GB SSD

Software:

- xCat 2.10
- rhel-7.2
- gpfs-4.2.0-3 +
- mofed-3.2-2; **OPA-10.1**

3Q/2016

GSS v3.0

Server:

- 2 * x3650-**M5+**
- E5-26**90-v4**
- SAS12
- 10G,40G, FDR,
native **EDR** support
- Intel OmniPath

Storage:

GSS24/26:

- 3,4,6,8 TB

GSS22s/24s/26s:

- 1.2 TB SAS

GSS21s/22s/24s:

- 200,800 GB SSD

Software:

- xCat 2.10
- rhel-7.2
- gpfs-4.2.1-0 +
- mofed-3.3-2; **OPA-10.1**

4Q/2016

GSS v3.1

Server:

- 2 * x3650-m5+
- E5-2690-v4
- SAS12
- 10G,40G, FDR/EDR,
Intel OmniPath 100

Storage:

GSS**22**/GSS24/GSS26:

- 4,6,8, **10 TB**

GSS21s/22s/24s/26s:

- 1.2 TB SAS; 200,800 GB SSD

JBOD Expansion

- e.g. GSS24s→GSS26s

Software:

- xCat 2.12
- rhel-7.2
- **gpfs-4.2.1+ or** gpfs-4.1.1
- mofed-3.3-2; **OPA-10.2**

Future IBM **GPFS updates (v4.1.1, v4.2.x)** will be made available within the **GSS 3.1(+)** stream...

Same for **RHEL**, incl. security fixes.

No other new functionality will be added to GSS, and GSS will be withdrawn from **marketing** by end of 2017

→ See **DSS-G**

(GSS support will continue for 5+ years, BAU.)

+ GSS Expandability (introduced with GSS v3.1)

- Online addition of more JBODs to an existing GSS building block (max. 6 JBOD total)
 - Must be same JBOD type and drive type as in the existing building block
 - Building block **must** be formatted with „single DA per RG“ ... may not be the case for old GSS24's
 - See document „*GSS-3.1a.Expansion_Procedure.pdf*“ in doc directory for details

- Two new commands **gsslenclosure** and **gssaddenclosure**

- Example: Add 2 JBODs to a GSS22 to expand it into a GSS24:

- Physically add the 2 new enclosures (see „GSS Expansion Procedure“ guide)
- **gsslenclosure #** shows **encl[12]** in RGs **gss01,gss02**, and **encl[34]** as **'FREE'**

```
gsslenclosure:HEADER:encl_model:encl_serial_nr:encl_number:esm_vendor:esm_model:esm_fw:pdisks_in_encl:pdisk_size_gb:rg_list:
gsslenclosure:0:DE6600:SV40705731:1:IBM,IBM:DCS3700,DCS3700:039D,039D:60:4000:gss01,gss02:
gsslenclosure:0:DE6600:SV41010057:2:IBM,IBM:DCS3700,DCS3700:039D,039D:58:4000:gss01,gss02:
gsslenclosure:0:DE6600:SV41010052:3:IBM,IBM:DCS3700,DCS3700:039D,039D:58:4000:FREE:
gsslenclosure:0:DE6600:SV40606671:4:IBM,IBM:DCS3700,DCS3700:039D,039D:58:4000:FREE:
```

- **gssaddenclosure gss01 gss02 SV41010052**
- **gssaddenclosure gss01 gss02 SV40606671**

- Note: After gssaddenclosure returns, the rebalancing of pdisk capacity will happen asynchronously in the background (low prio). This may run many hours to several days (depending on utilized pdisk capacity and I/O workloads)

- **gsslenclosure #** now shows **encl[1234]** in RGs **gss01,gss02**
- Create more vdisks & NSDs, and add them to file system(s) as usual; after expanding the two RGs...

+ Lenovo Distributed Storage Solutions / Architectures

Taking our off-the-shelf server and storage portfolio

marrying it with leading HPC Storage Software



Distributed Storage Solution
for
IBM Spectrum Scale RAID

Defined **Solution** especially for large capacity, high performance workloads in HPC environments

Distributed Storage Solution
for
SUSE Enterprise Storage

Defined **Solution** especially for interaction with Lenovo scale-out HANA solutions.

Distributed Storage Architecture
for
SUSE Enterprise Storage / Red Hat Ceph Storage

Tested **architecture** as entry point and mid range CEPH offering in HPC environments.

Distributed Storage Architecture
for
Intel Lustre EE

Tested **architecture** as entry point and mid range Lustre offering in HPC environments.

+ Lenovo Storage – 12Gb SAS JBODs



Lenovo Storage D1212 and D1224 Drive Enclosures Product Guide

The Lenovo Storage D1212 and D1224 Disk Expansion Enclosures offer 12 Gbps SAS direct-attached storage expansion capabilities that are designed to provide simplicity, speed, scalability, security, and high availability for small to large businesses. The D1212 and D1224 deliver enterprise-class storage technology in a cost-effective solution with flexible drive configurations and RAID or JBOD (non-RAID) host connectivity.

The D1212 and D1224 expansion units are designed for a wide range of workloads, including big data and analytics, video surveillance, media streaming, private clouds, file and print serving, e-mail and collaboration, and databases. They also well-suited for software defined storage (SDS) and Windows Server solutions with Storage Spaces.

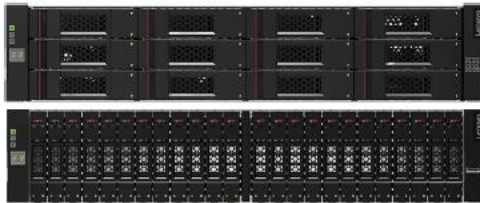


Figure 1. Lenovo Storage D1212 and D1224 Disk Expansion Enclosures

Did you know?

The D1212 and D1224 expansion enclosures offer flexible drive configurations with the choice of 2.5-inch and 3.5-inch drive form factors, 10K or 15K rpm SAS and 7.2K rpm NL SAS hard disk drives (HDDs) and self-encrypting drives (SEDs), and SAS solid-state drives (SSDs).

With support for daisy chaining, the D1212 can be scaled up to 960 TB for capacity-optimized configurations, and the D1224 can be scaled up to 192 drives for performance-optimized configurations.

The D1212 and D1224 expansion units support 12 Gbps SAS connectivity, which doubles the data transfer rate compared to 6 Gb SAS solutions to maximize performance of storage I/O-intensive applications.

<https://lenovopress.com/lp0512-lenovo-storage-d1212-d1224-drive-enclosures>

[Click here to check for updates](#)

Lenovo Storage D1212 and D1224 Drive Enclosures

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Lenovo Storage D3284 External High Density Drive Expansion Enclosure Product Guide

The Lenovo Storage D3284 High Density Expansion Enclosure offers 12 Gbps SAS direct-attached storage expansion capabilities that are designed to provide density, speed, scalability, security, and high availability for medium to large businesses. The D3284 delivers enterprise-class storage technology in a cost-effective dense solution with flexible drive configurations of up to 84 drives in 5U rack space and JBOD (non-RAID) host connectivity.

The D3284 expansion unit is designed for a wide range of workloads, including big data and analytics, video surveillance, private and hybrid clouds, file and print serving, and backup and archiving. The D3284 is also well-suited for software defined storage (SDS) and Windows Storage Spaces.

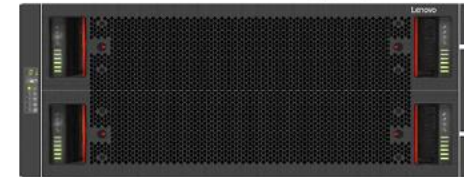


Figure 1. Lenovo Storage D3284 HD Expansion Enclosure

Did you know?

The D3284 expansion enclosures support 12 Gbps SAS connectivity, which doubles the data transfer rate compared to 6 Gb SAS solutions to maximize performance of storage I/O-intensive applications.

With support for daisy chaining, the D3284 expansion enclosures can be scaled up to 3.36 PB for capacity-optimized configurations.

The D3284 expansion enclosures allow daisy chaining with D1212 and D1224 expansion enclosures: Up to two D3284 and two D1212 or one D1224 drive enclosures is supported in a single chain.

<https://lenovopress.com/lp0513-lenovo-storage-d3284-external-high-density-drive-expansion-enclosure>

[Click here to check for updates](#)

Lenovo Storage D3284 External High Density Drive Expansion Enclosure

1

+ Lenovo *DSS for Spectrum Scale RAID* Version 1.0 (target: Apr-2017)

- **Rebranding:** Lenovo *Distributed Storage Solution (DSS)*

- GSS follow-up solution is *DSS for Spectrum Scale RAID (DSS-G)*

- Existing GSS models become DSS „G“ Models (Lustre and Ceph are „L“ and „C“ models)
- Spectrum Scale **licensing change** from server/client to per-drive/per-TB (no client licenses)

- Hardware news:

- New **Lenovo D3284** JBODs (5U84); MTM 6413-FT1

- with 4,6,8,10 TB NL-SAS (and 400GB SSD for logTipBackup)

- New **Lenovo D1224** JBODs (2U24); MTM 4587-HC2

- goal is to support **all** HDDs and SSD **drives from Lenovo D1224 Storage portfolio**
- (no support for the Lenovo D1212 JBOD (2U12), MTM 4587-HC1, within DSS-G)

- Software and firmware news:

- **Spectrum Scale 4.2.2** initially, with PTF update to **4.2.3** when available

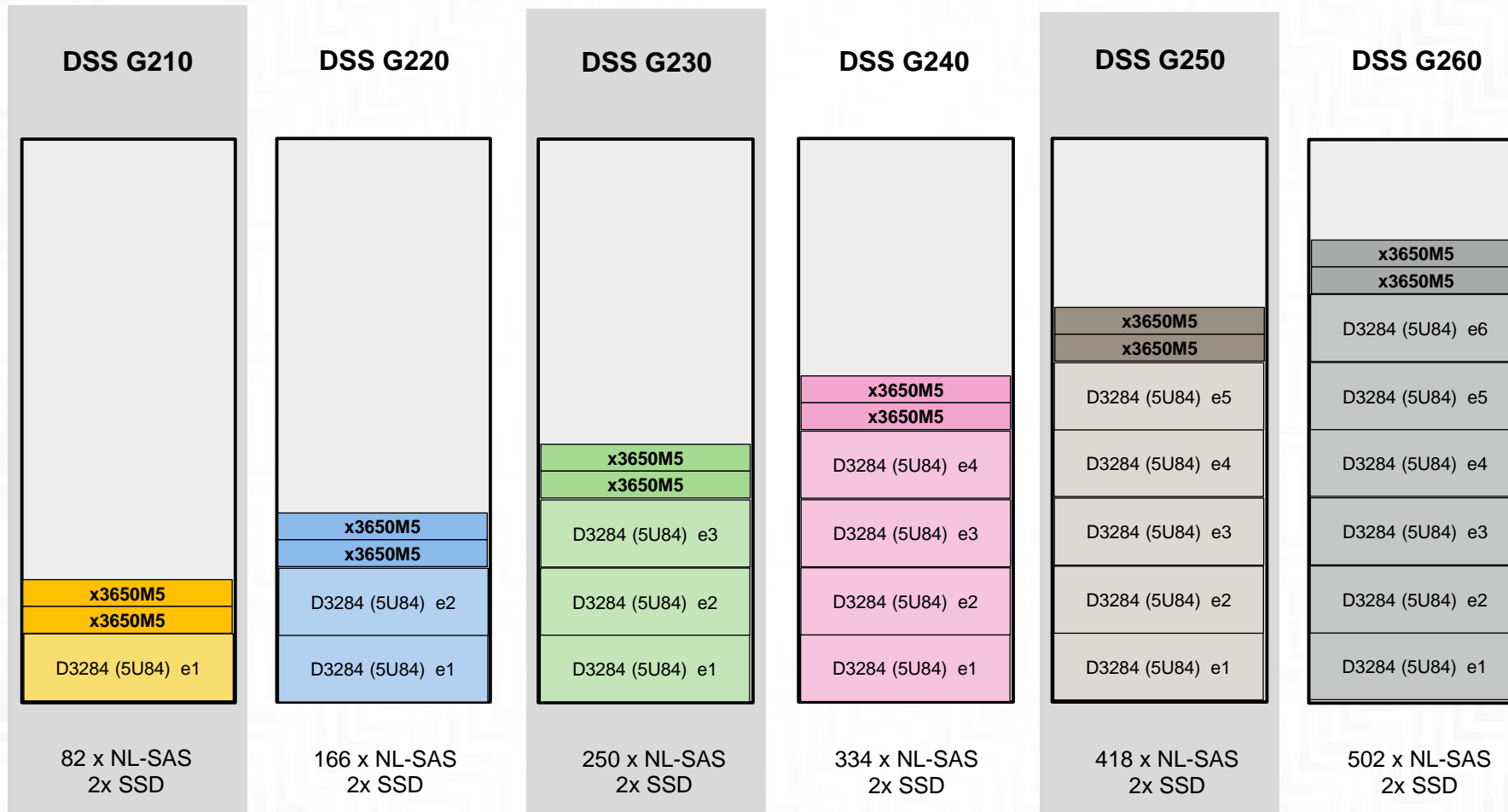
- Refresh of server and adapter FW, MOFED, OPA to **Scalable Infrastructure „17B“** levels

+ Lenovo *DSS for Spectrum Scale RAID* Futures (mostly 2017 targets)

- NDA contents ... email hpcstorage@lenovo.com if you need NDA roadmap infos.

+ DSS for Spectrum Scale RAID building blocks

New DSS-G models with Lenovo D3284 JBODs (models without JBOD intermix)



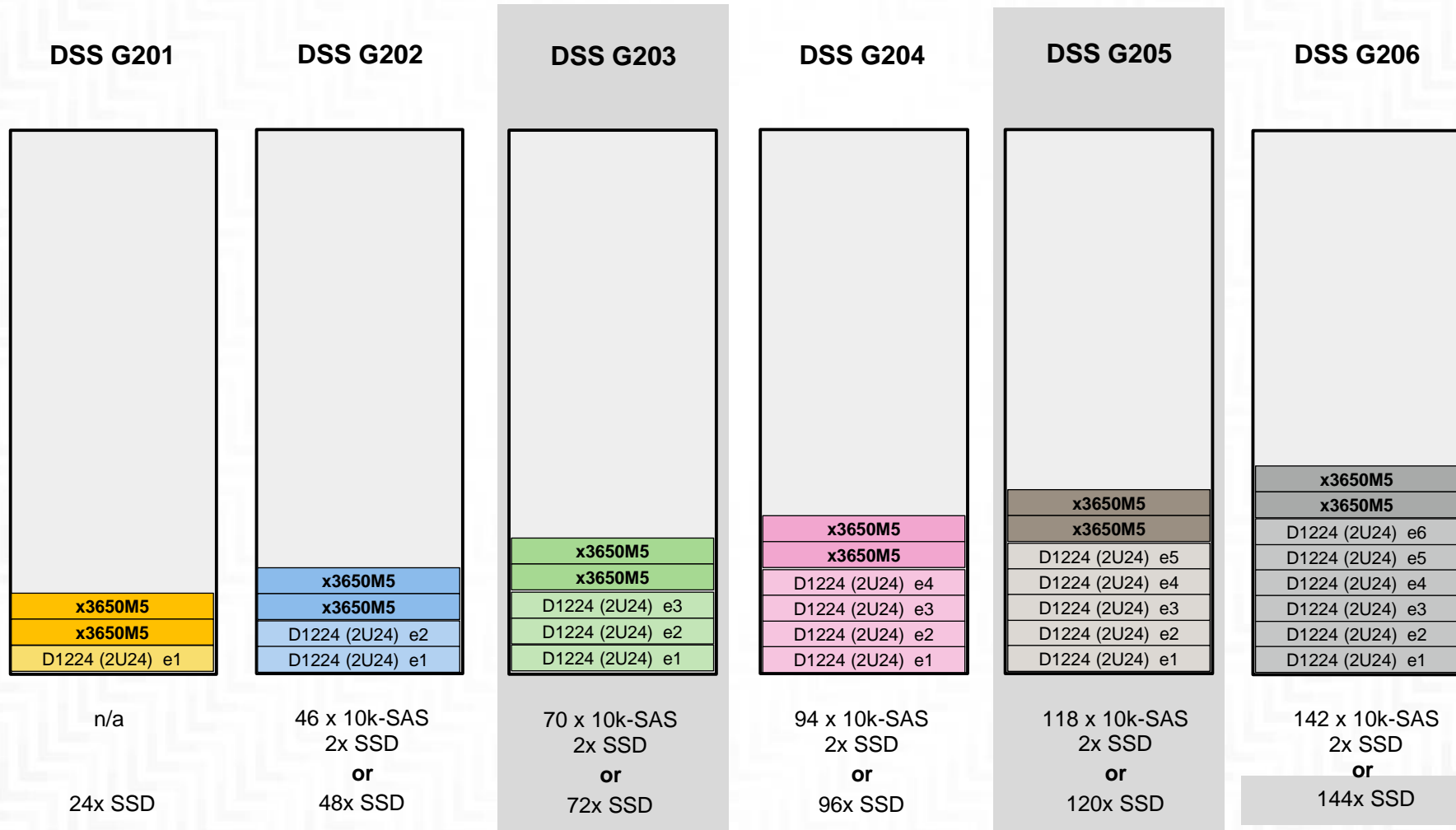
+ DSS for Spectrum Scale with D3284 – NL-SAS Capacities

~4Q2017

		NL-SAS Drive Capacity [TB]:				4		6		8		10		12 (*)		
DSS-G Model:	Size [U]	Drives	Spares	Usable Drives	Capacity per DSS-G building block										Metric	
					PB	PiB	PB	PiB	PB	PiB	PB	PiB	PB	PiB		
DSS-G 2 1 0	9	82	2	80	0.328	0.291	0.492	0.437	0.656	0.583	0.820	0.728	0.984	0.874	raw	
					0.320	0.284	0.480	0.426	0.640	0.568	0.800	0.711	0.960	0.853	unrepl.	
					0.256	0.227	0.384	0.341	0.512	0.455	0.640	0.568	0.768	0.682	8+2P	
					0.233	0.207	0.349	0.310	0.465	0.413	0.582	0.517	0.698	0.620	8+3P	
DSS-G 2 2 0	14	166	4	162	0.664	0.590	0.996	0.885	1.328	1.180	1.660	1.474	1.992	1.769	raw	
					0.648	0.576	0.972	0.863	1.296	1.151	1.620	1.439	1.944	1.727	unrepl.	
					0.518	0.460	0.778	0.691	1.037	0.921	1.296	1.151	1.555	1.381	8+2P	
					0.471	0.419	0.707	0.628	0.943	0.837	1.178	1.046	1.414	1.256	8+3P	
DSS-G 2 3 0	19	250	6	244	1.000	0.888	1.500	1.332	2.000	1.776	2.500	2.220	3.000	2.665	raw	
					0.976	0.867	1.464	1.300	1.952	1.734	2.440	2.167	2.928	2.601	unrepl.	
					0.781	0.693	1.171	1.040	1.562	1.387	1.952	1.734	2.342	2.080	8+2P	
					0.710	0.630	1.065	0.946	1.420	1.261	1.775	1.576	2.129	1.891	8+3P	
DSS-G 2 4 0	24	334	8	326	1.336	1.187	2.004	1.780	2.672	2.373	3.340	2.967	4.008	3.560	raw	
					1.304	1.158	1.956	1.737	2.608	2.316	3.260	2.895	3.912	3.475	unrepl.	
					1.043	0.927	1.565	1.390	2.086	1.853	2.608	2.316	3.130	2.780	8+2P	
					0.948	0.842	1.423	1.263	1.897	1.685	2.371	2.106	2.845	2.527	8+3P	
DSS-G 2 5 0	29	418	10	408	1.672	1.485	2.508	2.228	3.344	2.970	4.180	3.713	5.016	4.455	raw	
					1.632	1.450	2.448	2.174	3.264	2.899	4.080	3.624	4.896	4.349	unrepl.	
					1.306	1.160	1.958	1.739	2.611	2.319	3.264	2.899	3.917	3.479	8+2P	
					1.187	1.054	1.780	1.581	2.374	2.108	2.967	2.635	3.561	3.163	8+3P	
DSS-G 2 6 0	34	502	12	490	2.008	1.783	3.012	2.675	4.016	3.567	5.020	4.459	6.024	5.350	raw	
					1.960	1.741	2.940	2.611	3.920	3.482	4.900	4.352	5.880	5.222	unrepl.	
					1.568	1.393	2.352	2.089	3.136	2.785	3.920	3.482	4.704	4.178	8+2P	
					1.425	1.266	2.138	1.899	2.851	2.532	3.564	3.165	4.276	3.798	8+3P	

+ DSS for Spectrum Scale RAID building blocks

New DSS-G models with Lenovo D1224 JBODs (models without JBOD intermix)



Greyed-out items are not available in initial DSS-G v1.0 release.

+ DSS for Spectrum Scale with D1224 – 10k SAS Capacities

~4Q2017

	10k SAS Drive Capacity [GB]:				600	900	1200	1800	2400 (*)						
DSS-G Model:	Size [U]	Drives	Spares	Usable Drives	Capacity per DSS-G building block								Metric		
					TB	TiB	TB	TiB	TB	TiB	TB	TiB		TB	TiB
DSS-G 2 0 1	6	22	4	18	13.2	12.0	19.8	18.0	26.4	24.0	39.6	36.0	52.8	48.0	raw
					10.8	9.8	16.2	14.7	21.6	19.6	32.4	29.5	43.2	39.3	unrepl.
					8.6	7.9	13.0	11.8	17.3	15.7	25.9	23.6	34.6	31.4	8+2P
					7.9	7.1	11.8	10.7	15.7	14.3	23.6	21.4	31.4	28.6	8+3P
DSS-G 2 0 2	8	46	4	42	27.6	25.1	41.4	37.7	55.2	50.2	82.8	75.3	110.4	100.4	raw
					25.2	22.9	37.8	34.4	50.4	45.8	75.6	68.8	100.8	91.7	unrepl.
					20.2	18.3	30.2	27.5	40.3	36.7	60.5	55.0	80.6	73.3	8+2P
					18.3	16.7	27.5	25.0	36.7	33.3	55.0	50.0	73.3	66.7	8+3P
DSS-G 2 0 3	10	70	6	64	42.0	38.2	63.0	57.3	84.0	76.4	126.0	114.6	168.0	152.8	raw
					38.4	34.9	57.6	52.4	76.8	69.8	115.2	104.8	153.6	139.7	unrepl.
					30.7	27.9	46.1	41.9	61.4	55.9	92.2	83.8	122.9	111.8	8+2P
					27.9	25.4	41.9	38.1	55.9	50.8	83.8	76.2	111.7	101.6	8+3P
DSS-G 2 0 4	12	94	8	86	56.4	51.3	84.6	76.9	112.8	102.6	169.2	153.9	225.6	205.2	raw
					51.6	46.9	77.4	70.4	103.2	93.9	154.8	140.8	206.4	187.7	unrepl.
					41.3	37.5	61.9	56.3	82.6	75.1	123.8	112.6	165.1	150.2	8+2P
					37.5	34.1	56.3	51.2	75.1	68.3	112.6	102.4	150.1	136.5	8+3P
DSS-G 2 0 5	14	118	10	108	70.8	64.4	106.2	96.6	141.6	128.8	212.4	193.2	283.2	257.6	raw
					64.8	58.9	97.2	88.4	129.6	117.9	194.4	176.8	259.2	235.7	unrepl.
					51.8	47.1	77.8	70.7	103.7	94.3	155.5	141.4	207.4	188.6	8+2P
					47.1	42.9	70.7	64.3	94.3	85.7	141.4	128.6	188.5	171.4	8+3P
DSS-G 2 0 6	16	142	12	130	85.2	77.5	127.8	116.2	170.4	155.0	255.6	232.5	340.8	310.0	raw
					78.0	70.9	117.0	106.4	156.0	141.9	234.0	212.8	312.0	283.8	unrepl.
					62.4	56.8	93.6	85.1	124.8	113.5	187.2	170.3	249.6	227.0	8+2P
					56.7	51.6	85.1	77.4	113.5	103.2	170.2	154.8	226.9	206.4	8+3P

+ DSS for Spectrum Scale with D1224 – SSD Capacities

~4Q2017

		SSD Capacity [GB]:				400 (3 or 10 DWPD)		800 (3 or 10 DWPD)		1600 (3 or 10 DWPD)		3840 (1 DWPD)		7680 (1 DWPD)		
DSS-G Model:	Size [U]	Drives	Spares	Usable Drives	Capacity per DSS-G building block								Metric			
					TB	TiB	TB	TiB	TB	TiB	TB	TiB		TB	TiB	
DSS-G 2 0 1	6	24	4	20	9.6	8.7	19.2	17.5	38.4	34.9	92.2	83.8	184.3	167.6	raw	
					8.0	7.3	16.0	14.6	32.0	29.1	76.8	69.8	153.6	139.7	unrepl.	
					6.4	5.8	12.8	11.6	25.6	23.3	61.4	55.9	122.9	111.8	8+2P	
					5.8	5.3	11.6	10.6	23.3	21.2	55.9	50.8	111.7	101.6	8+3P	
DSS-G 2 0 2	8	48	4	44	19.2	17.5	38.4	34.9	76.8	69.8	184.3	167.6	368.6	335.3	raw	
					17.6	16.0	35.2	32.0	70.4	64.0	169.0	153.7	337.9	307.3	unrepl.	
					14.1	12.8	28.2	25.6	56.3	51.2	135.2	122.9	270.3	245.9	8+2P	
					12.8	11.6	25.6	23.3	51.2	46.6	122.9	111.8	245.8	223.5	8+3P	
DSS-G 2 0 3	10	72	6	66	28.8	26.2	57.6	52.4	115.2	104.8	276.5	251.5	553.0	502.9	raw	
					26.4	24.0	52.8	48.0	105.6	96.0	253.4	230.5	506.9	461.0	unrepl.	
					21.1	19.2	42.2	38.4	84.5	76.8	202.8	184.4	405.5	368.8	8+2P	
					19.2	17.5	38.4	34.9	76.8	69.8	184.3	167.6	368.6	335.3	8+3P	
DSS-G 2 0 4	12	96	8	88	38.4	34.9	76.8	69.8	153.6	139.7	368.6	335.3	737.3	670.6	raw	
					35.2	32.0	70.4	64.0	140.8	128.1	337.9	307.3	675.8	614.7	unrepl.	
					28.2	25.6	56.3	51.2	112.6	102.4	270.3	245.9	540.7	491.7	8+2P	
					25.6	23.3	51.2	46.6	102.4	93.1	245.8	223.5	491.5	447.0	8+3P	
DSS-G 2 0 5	14	120	10	110	48.0	43.7	96.0	87.3	192.0	174.6	460.8	419.1	921.6	838.2	raw	
					44.0	40.0	88.0	80.0	176.0	160.1	422.4	384.2	844.8	768.3	unrepl.	
					35.2	32.0	70.4	64.0	140.8	128.1	337.9	307.3	675.8	614.7	8+2P	
					32.0	29.1	64.0	58.2	128.0	116.4	307.2	279.4	614.4	558.8	8+3P	
DSS-G 2 0 6	16	144	12	132	57.6	52.4	115.2	104.8	230.4	209.5	553.0	502.9	1,105.9	1,005.8	raw	
					52.8	48.0	105.6	96.0	211.2	192.1	506.9	461.0	1,013.8	922.0	unrepl.	
					42.2	38.4	84.5	76.8	169.0	153.7	405.5	368.8	811.0	737.6	8+2P	
					38.4	34.9	76.8	69.8	153.6	139.7	368.6	335.3	737.3	670.6	8+3P	



thanks.



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