Storageflex

NETWORK DATA STORAGE SOLUTIONS

HA3969 & HA3969U

Performance Testing Report for

16 Bay with 4x10GbE System

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1. Performance Configuration

Below is a description of the benchmarking testing environment and includes specifications for the server hardware, disk drive, subsystem, management tools of the subsystem and the software-testing tool. The industry standard test application IOMeter was used to measure the performance of the unit. This system comes with the standard HA3969 & HA3969U management software. Telnet and RS-232 connections can be used to manage the subsystem as well.

1.1 Testing Configuration

NAS	NAS Server	HA3969U
	JBOD	JBOD x 5
	ISO	3.1.10
	RAM	DDRIII-1333 4GB x 8 (Each Controller has 4)
	Drives	HITACHI SAS 1.2TB (Model: HUC101212CSS600 ; Capacity: 1.2TB; Speed: 6G; 10,000 RPM) x 80 STEC SSD 200G x 8 (2 Read/Write Cache for Each Pool) STEC SSD 400G x 8 (2 Read/Write Cache for Each Pool)
	NIC	Jumbo Frame Enable
	10G NIC	Jumbo Frame Enable
RAID	Controller	NAS3016RT
	RAID Level	RAID 0, 50,
	Pool	8 Pools, 10 Disks per Pool
	LD	2 LD per Pool,
Server* 4 (Host)	M/B	Intel Server Board S5520HC
	CPU	Intel Xeon CPU E5620 2.4GHz (2 Processors)
	RAM	DDR III 1333 2G*12
	PCI	PCI Express*Gen2 X8 *4 ; PCI Express* X4 *1 : PCI *1
	System Drive	SATA WD1500HLFS 150G(WXL908026216)
	NIC	Jumbo Frame and Flow Control Enable, Max receive buffer, Max transfer buffer

	10G NIC	Jumbo Frame and Flow Control Enable, Max receive buffer, Max transfer buffer
SMB / CIFS	OS.	Microsoft Windows Server 2008 Enterprise Edition R2 (With Service Pack 1)
	Pool	8 Pools, 16LDs, 16 Share Folders. Each Pool has 2 Share Folder *10G, Each server use 2 pool
	IOmeter	2006.07.27
	I/O Tool Setting	Outstanding I/O – (16 for MB/s; 256 for Random IO/s)
		Ramp Up Time: 20 Mins
		Run Time: 1 Min.
		One LD Corresponds to One Worker.
		Align I/Os on
NFS	OS.	Microsoft Windows Server 2008 Enterprise Edition R2 (With Service Pack 1) + SFU 3.5
	Pool	8 Pools, 64 Share Folders. Each Pool has 8 Share Folder (Each Pool assign one share folder for SSD cache) *10G, Each server uses 2 pool
	IOmeter	2006.07.27
	I/O Tool Setting	Outstanding I/O – (16 for MB/s; 256 for Random IO/s)
		Ramp Up Time: 20 Mins.
		Run Time: 1 Min.
		One LD Corresponds to One Worker.
		Align I/Os on
iSCSI	OS.	Microsoft Windows Server 2008 Enterprise Edition R2 (With Service Pack 1)
	Pool	8 Pools, 8 iSCSI Disk. Each Pool has 1 Disk
	Iometer	2006.07.27
	I/O Tool Setting	Outstanding I/O – (16 for MB/s; 256 for Random IO/s)
		Ramp Up Time: 20 Mins.
		Run Time: 1 Min.
		One LD Corresponds to One Worker.
		Sequential Write first then Sequential Read will get the best performance in iSCSI
		Align I/Os on

		Microsoft Windows Server 2008 Enterprise Edition R2 (With Service Pack 1)
10G iSCSI	Server x4	Each Server connect Two 10G HBA
	Pool	8 Pools, 8 iSCSI Disk. Each Pool has 1 Disk
FTP-1	Pool	8 Pools, 8 Share Folders. Each Pool has 1 Share Folder
	I/O Tool Setting	8 session, 2 session per port, 5GB per R/W file
	Fiber RAID	Server need Fiber RAID attached
	OS.	Microsoft Windows Server 2008 Enterprise Edition R2 (With Service Pack 1)
FTP-2	Pool	8 Pools, 8 Share Folders. Each Pool has 1 Share Folder
	FTP Software	FileZilla 3.5.1
	I/O Tool Setting	8 session, 2 session per port, 15GB per R/W file
	Fiber RAID	Server need Fiber RAID attached

2. Performance Test Results

The Performance test results are listed below.

2.1 SMB/CIFS

2.11 (End-to-end Sequential I/O)

- **RAID0 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	64K Bytes	15058.57	941.16	12737.04	796.07
	256K Bytes	3769.49	942.37	3207.09	801.77
	1M Bytes	943.46	943.46	804.99	804.99

- **RAID0 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	64K Bytes	36093.18	2255.82	31028.73	1939.30
	256K Bytes	9685.29	2421.32	5910.92	1477.73
	1M Bytes	2845.60	2845.60	1478.42	1478.42

- **RAID5 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	64K Bytes	15065.66	941.60	12569.82	785.61
	256K Bytes	3770.14	942.54	3127.60	781.90
	1M Bytes	941.97	941.97	781.17	781.17

- **RAID5 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	64K Bytes	37761.52	2360.09	27176.13	1698.51
	256K Bytes	9808.09	2452.22	5562.96	1390.74
	1M Bytes	2646.14	2646.14	1386.06	1386.06

2.12 End-to-end Random I/O

- **RAID0 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	2K Bytes	38453.44	75.10	19174.12	37.45
	4K Bytes	38885.62	151.90	19909.12	77.77
	8K Bytes	40160.35	313.75	21098.48	164.83

- **RAID0 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	2K Bytes	32089.08	62.67	18462.61	36.06
	4K Bytes	32173.13	125.68	18375.86	71.78
	8K Bytes	32682.75	255.33	18504.22	144.56

- **RAID5 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	2K Bytes	13849.55	27.05	7551.32	14.75
	4K Bytes	14231.39	55.59	7820.49	30.55
	8K Bytes	15387.41	120.21	7430.75	58.05

- **RAID5 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	2K Bytes	13624.53	26.61	6260.60	12.23
	4K Bytes	13980.40	54.61	6321.25	24.69
	8K Bytes	14378.60	112.33	5942.81	46.43

2.13 End-to-end Degraded Status

- **RAID5**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	1M Bytes	801.21	801.21	787.38	787.38
	8K Bytes	6903.77	53.94	4071.25	31.81

- **RAID5 – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	1M Bytes	1362.77	1362.77	1476.83	1476.83
	8K Bytes	6684.98	52.23	3230.92	25.24

2.2 NFS

2.21 End-to-end Sequential I/O

- **RAID0 Normal Status**

I/O Parameters		Read		Write	
Host Channels	I/O Size	IOPS	MB/sec	IOPS	MB/sec
Eight Channels	64K Bytes	14753.97	922.12	13520.59	845.04
	256K Bytes	3685.97	921.49	3375.56	843.89
	1M Bytes	922.40	922.40	846.08	846.08

- **RAID0 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	I/O Size	IOPS	MB/sec	IOPS	MB/sec
Four Channel	64K Bytes	25852.82	1615.80	30830.15	1926.88
	256K Bytes	6434.00	1608.50	7755.44	1938.85
	1M Bytes	1601.10	1601.10	1941.66	1941.66

- **RAID5 Normal Status**

I/O Parameters		Read		Write	
Host Channels	I/O Size	IOPS	MB/sec	IOPS	MB/sec
Eight Channels	64K Bytes	14443.09	902.69	13066.11	816.63
	256K Bytes	3612.74	903.18	3226.84	816.71
	1M Bytes	903.36	903.36	817.26	817.26

➢ **RAID5 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	I/O Size	IOPS	MB/sec	IOPS	MB/sec
Four Channel	64K Bytes	22878.38	1429.90	26712.71	1669.54
	256K Bytes	5806.37	1451.59	6693.94	1673.49
	1M Bytes	1463.24	1463.24	1653.16	1653.16

2.22 End-to-end Random I/O

➢ **RAID0 Normal Status**

I/O Parameters		Read		Write	
Host Channels	I/O Size	IOPS	MB/sec	IOPS	MB/sec
Eight Channels	2K Bytes	29188.19	57.01	23989.60	46.85
	4K Bytes	29403.93	114.86	24977.82	97.57
	8K Bytes	29531.65	230.72	25175.59	196.68

➢ **RAID0 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	I/O Size	IOPS	MB/sec	IOPS	MB/sec
Four Channel	2K Bytes	27267.22	53.26	23990.29	46.86
	4K Bytes	27289.89	106.60	23927.80	93.47
	8K Bytes	27534.23	215.11	24584.91	192.07

- **RAID5 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	2K Bytes	14550.47	28.42	12221.50	23.87
	4K Bytes	14278.02	55.77	12446.73	48.62
	8K Bytes	14692.07	114.78	13665.97	106.77

- **RAID5 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	2K Bytes	13820.91	26.99	11957.58	23.35
	4K Bytes	13584.23	53.06	12088.58	47.22
	8K Bytes	14059.12	109.84	13031.05	101.81

2.23 End-to-end Degraded Status

- **RAID5**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	1M Bytes	901.04	901.04	814.30	814.30
	8K Bytes	10173.56	79.48	7845.23	61.29

- **RAID5 – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	1M Bytes	1409.54	1409.54	1611.04	1611.04
	8K Bytes	12442.28	97.21	9407.17	73.49

2.3 iSCSI

2.31 End-to-end Sequential I/O

- **RAID0 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	64K Bytes	14960.77	935.05	13772.97	860.81
	256K Bytes	3763.92	940.98	3429.27	857.32
	1M Bytes	932.97	932.97	885.80	885.80

- **RAID0 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	64K Bytes	45469.75	2841.86	30295.70	1893.48
	256K Bytes	11483.98	2871.00	7736.50	1934.12
	1M Bytes	2877.24	2877.24	1929.26	1929.26

- **RAID5 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	64K Bytes	15031.69	939.48	13175.58	823.47
	256K Bytes	3764.75	941.19	3325.50	831.38
	1M Bytes	939.05	939.05	856.36	856.36

- **RAID5 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	64K Bytes	43269.29	2704.33	27602.74	1725.17
	256K Bytes	11324.86	2831.22	6861.84	1715.46
	1M Bytes	2863.35	2863.35	1724.70	1724.70

2.32 End-to-end Random I/O

- **RAID0 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	2K Bytes	53597.54	104.68	26352.41	51.47
	4K Bytes	53797.08	210.14	25888.63	101.13
	8K Bytes	54236.89	423.73	25907.42	202.40

- **RAID0 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	2K Bytes	72776.15	142.14	30268.64	59.12
	4K Bytes	72504..92	283.22	30205.29	117.99
	8K Bytes	72029.45	562.73	29468.85	230.23

- **RAID5 Normal Status**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	2K Bytes	19263.17	37.62	9736.69	19.02
	4K Bytes	18208.24	71.13	9525.76	37.21
	8K Bytes	18671.90	145.87	9946.61	77.71

- **RAID5 Normal Status – 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	2K Bytes	22160.96	43.28	9441.04	18.44
	4K Bytes	22569.08	88.16	9663.82	37.75
	8K Bytes	23862.63	186.43	10613.53	82.92

2.33 End-to-end Degraded Status

- **RAID5**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Eight Channels	1M Bytes	928.23	928.23	876.86	876.86
	8K Bytes	9423.74	73.62	5031.91	39.31

- **RAID5– 10G**

I/O Parameters		Read		Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Four Channel	1M Bytes	1802.53	1802.53	1538.07	1538.07
	8K Bytes	13498.27	105.46	6979.97	54.53

2.4 FTP

2.41 End-to-end Sequential I/O

- **RAID0 Normal Status**

I/O Parameters		Read	Write
Host Channels	**Session**	**MB/sec**	**MB/sec**
Eight Channels	8	829.13	750.43
Eight Channels (EZ)	8	936.9	922.7

- **RAID0 Normal Status – 10G**

I/O Parameters		Read	Write
Host Channels	**Session**	**MB/sec**	**MB/sec**
Four Channel	8	2143.26	2452.81
Four Channel(FZ)	8	1866.50	1560.2

- **RAID5 Normal Status**

I/O Parameters		Read	Write
Host Channels	**Session**	**MB/sec**	**MB/sec**
Eight Channels	8	825.37	751.51
Eight Channels (EZ)	8	995.1	913.9

- **RAID5 Normal Status – 10G**

I/O Parameters		Read	Write
Host Channels	**Session**	**MB/sec**	**MB/sec**
Four Channel	8	1969.52	2171.19
Four Channel(FZ)	8	1706.70	1246.90

2.42 End-to-end Degraded Status

- **RAID5 Normal Status**

I/O Parameters		Read	Write
Host Channels	**Session**	**MB/sec**	**MB/sec**
Eight Channels	8	835.43	756.38
Eight Channels (EZ)	8	990.0	913.0

- **RAID5 Normal Status – 10G**

I/O Parameters		Read	Write
Host Channels	**Session**	**MB/sec**	**MB/sec**
Four Channel	8	1748.77	725.94
Four Channel(FZ)	8	1822.00	795.01