Subsystem Performance Testing Report for

EonStor® DS F16F-R4840

Table of Contents

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 Infortrend management software SANWatch®. Telnet and RS-232 connections can be used to manage the subsystem as well.

1.1 Testing Configuration

RAID	Controller	DS F16F-R4840
	FW	3.85B.08 (FA385B08_142_IFT_ESDSG6F4G.BINN)
	RAM	2GB DDR II SDRAM
	Drives	RAID: Seagate Fibre 73GB (Model: Seagate ST373455FC; Capacity: 73GB; Speed: 4G; 15000 RPM) JBOD: Seagate Fibre 73GB (Model: Seagate ST373455FC; Capacity: 73GB; Speed: 4G; 15000 RPM)
	Channels	Host Channel - Channel 0, 1 , 2 , 3
		Drive Channel - Channel 4, 5
		RCC Channel – Channel 6
	Virtual Volumes (RAID5/6) (Dual Hosts)	LV0 - Host channel 0; AID 112; LUN 0; 16 drives/channel; 1 partition
		LV1 - Host channel 1; BID 113; LUN 0; 16 drives/channel; 1 partition
	Virtual Volumes (RAID5/6) (Four Hosts)	LV0 - Host channel 0; AID 112; LUN 0; 8 drives/channel; 1 partition
		LV1 - Host channel 0; BID 113; LUN 0; 8 drives/channel; 1 partition
		LV2 - Host channel 1; AID 112; LUN 0; 8 drives/channel; 1 partition
		LV3 - Host channel 1; BID 113; LUN 0; 8 drives/channel; 1 partition

	Virtual Volumes (RAID5/6) All Cache Hit (Eight Hosts)	LV0 - Host channel 0; AID 112; LUN 0; Host channel 1; AID 112; LUN 0; 8 drives/channel; 1 partition
		LV1 - Host channel 0; BID 113; LUN 0; Host channel 1; BID 113; LUN 0; 8 drives/channel; 1 partition
		LV2 - Host channel 2; AID 112; LUN 0; Host channel 3; AID 112; LUN 0; 8 drives/channel; 1 partition
		LV3 - Host channel 2; BID 113; LUN 0; Host channel 3; BID 113; LUN 0; 8 drives/channel; 1 partition
	Setting	Optimization for – Sequential, (Raid 5 / 6 Default stripe size 128K)
		Periodic Drive Check Time – Disable
		Periodic SAF-TE and SES Device Check Time – Disable
		Verification on Normal Drive Writes – Disable
		Verification on LD Rebuild Writes – Disable
		Max Drive Response Timeout – Disable
		Drive Delayed Write – Disable
		SDRAM ECC – Enable
		BBU – On
Data Service	Snapshot Copy on Write	V.V Size : 100GB Virtual Volume 1 : Host channel 0; ID 112; LUN 0 Virtual Volume 2 : Host channel 1; ID 112; LUN 0
	Split mirror	V.V Size: 100GB (Source) Virtual Volume 1 : Host channel 0; ID 112; LUN 0 (Target) Virtual Volume 2
Software	SANWatch	SANWatch_2.1.a.01.SW_DBFlushAgent_2.0.a.44-20091223_CM_2.0.a.50-20091229
HBA	OS Register	MaximumSGList : FF (Hexadecimal)
		NumberOfRequests: FF (Hexadecimal)
	QLogic	QLE2562 (Driver VER: 9.1.7.18) ,Bios : v2.02
Server * 2 (Host)	M/B	SUPERMICRO X7DBE Single
	CPU	Intel Quad-Core Xeon 2.0GHz
	RAM	Kingston 2GB DDRII 667 DIMM * 8
	PCI	PCI-X 64-bit/133MHz *3
	System Drive	IDE Seagate 120G (ST3120026A)
	OS.	Microsoft Windows Server 2003 Enterprise R2 (With Service Pack 2)

Benchmark	IOmeter	2004.07.30
	I/O Tool Setting	Outstanding I/O - 16 for MB/s; (Random - 256 for IO/s , Sequential - 64 for IO/s)
		Ramp Up Time: 40 sec.
		Run Time: 30 sec.
		One LD Corresponds to One Worker.
		All Cache : Maximum Disk Size 10240
		Align I/Os on

2. Performance Test Results

The Performance test results are listed below.

NOTE:

1. In the following sections, “write-back” is abbreviated as **WB** and “write-through” is abbreviated as **WT**.
2. End-to-End four-channel IOPS Read having a lower performance than dual-channel configuration is a known issue, and will be resolved in the coming release of firmware.

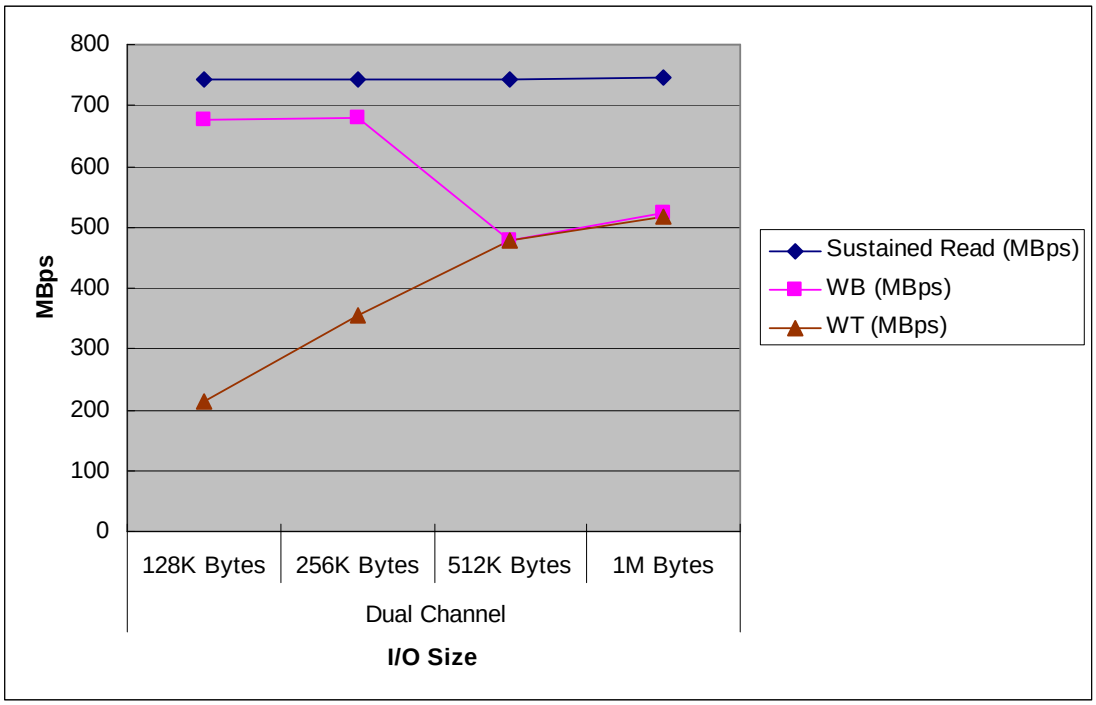
2.1 End-to-End RAID 5 Performance

2.11 Sequential I/O

>> Dual Channel

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)	WT (MB/sec)
Host Channels	**I/O Size**			
Dual Channel	128K Bytes	742.69	677.80	213.32
	256K Bytes	742.26	679.02	354.57
	512K Bytes	742.34	477.58	479.23
	1M Bytes	747.15	523.04	515.86



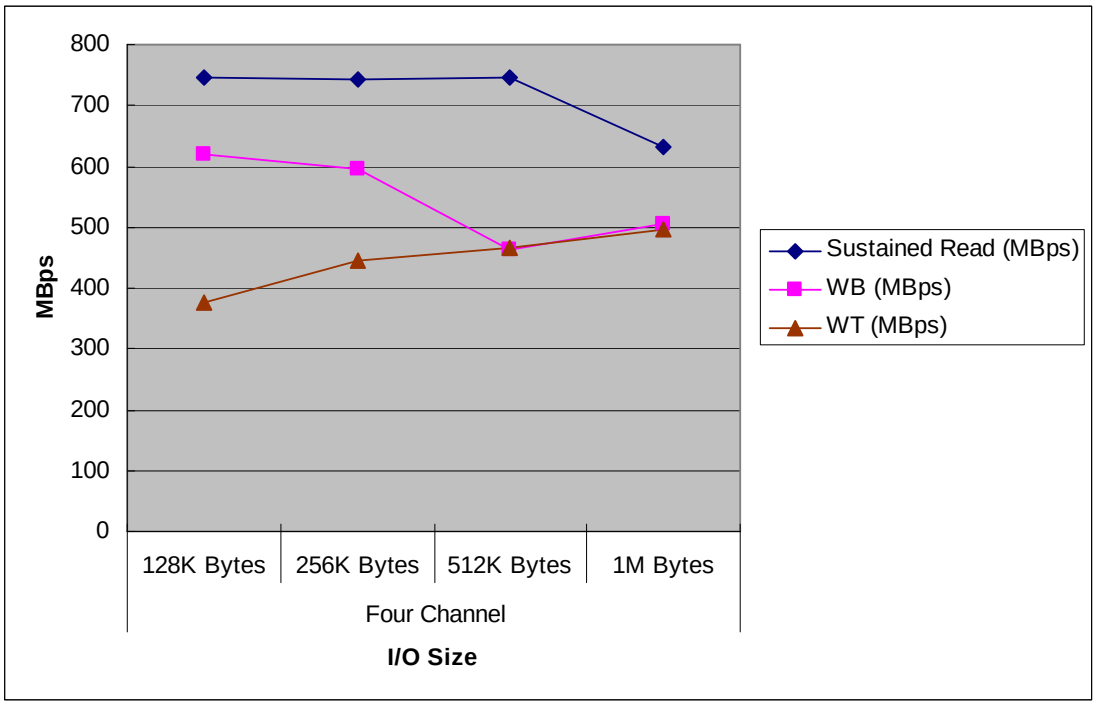
Data Access Rate (IOPS)

I/O Parameters		Read (IOPS)	WB (IOPS)
Host Channels	**I/O Size**		
Dual Channel	512 Bytes	155502.66	6722.14
	4K Bytes	135125.37	36812.86

>> Four Channel

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)	WT (MB/sec)
Host Channels	**I/O Size**			
Four Channel	128K Bytes	746.13	619.48	374.58
	256K Bytes	743.52	595.33	445.92
	512K Bytes	746.13	464.52	467.43
	1M Bytes	631.58	505.11	494.82



Data Access Rate (IOPS)

I/O Parameters		Read (IOPS)	WB (IOPS)
Host Channels	**I/O Size**		
Four Channel	512 Bytes	144248.13	11312.96
	4K Bytes	123942.98	23003.08

2.12 Random I/O

>> Dual Channel

Data Transfer Rate (IOPS)

I/O Parameters		Read (IOPS)	WB (IOPS)
Host Channels	**I/O Size**		
Dual Channel	512 Bytes	6457.48	3383.26
	4K Bytes	6459.33	3352.29

>> Four Channel

Data Transfer Rate (IOPS)

I/O Parameters		Read (IOPS)	WB (IOPS)
Host Channels	**I/O Size**		
Four Channel	512 Bytes	7087.02	3150.49
	4K Bytes	7127.73	3151.20

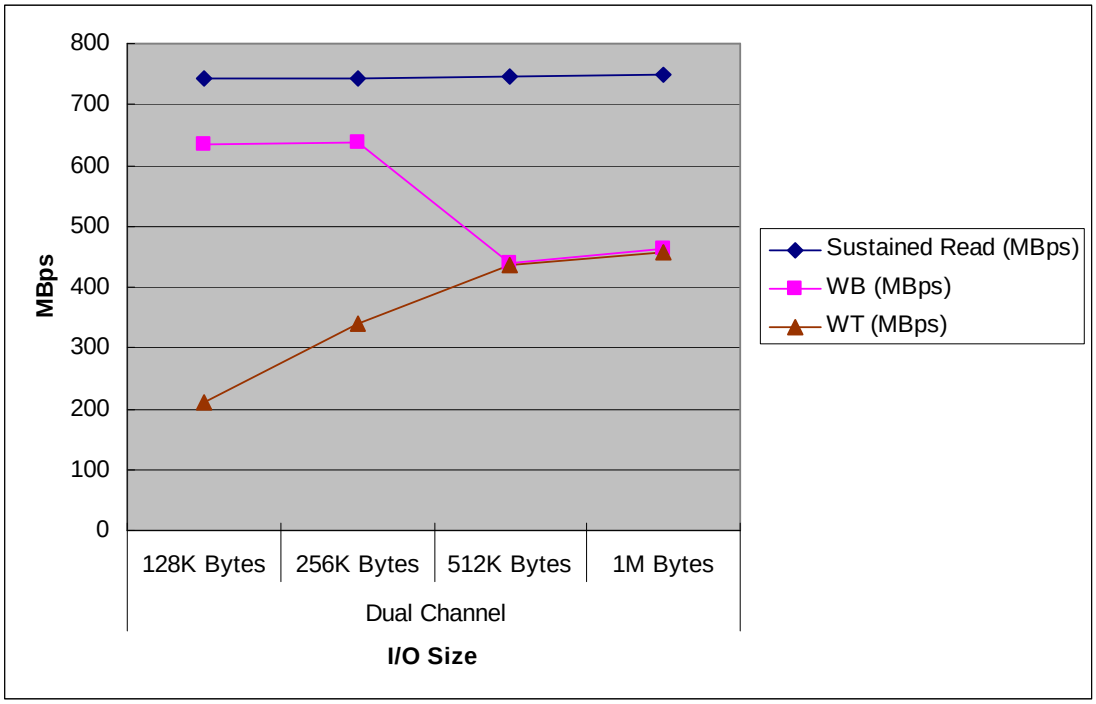
2.2 End-to-End RAID 6 Performance

2.21 Sequential I/O

>> Dual Channel

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)	WT (MB/sec)
Host Channels	I/O Size			
Dual Channel	128K Bytes	742.65	634.46	211.99
	256K Bytes	744.31	637.08	340.08
	512K Bytes	746.80	437.60	436.94
	1M Bytes	748.46	463.11	456.40



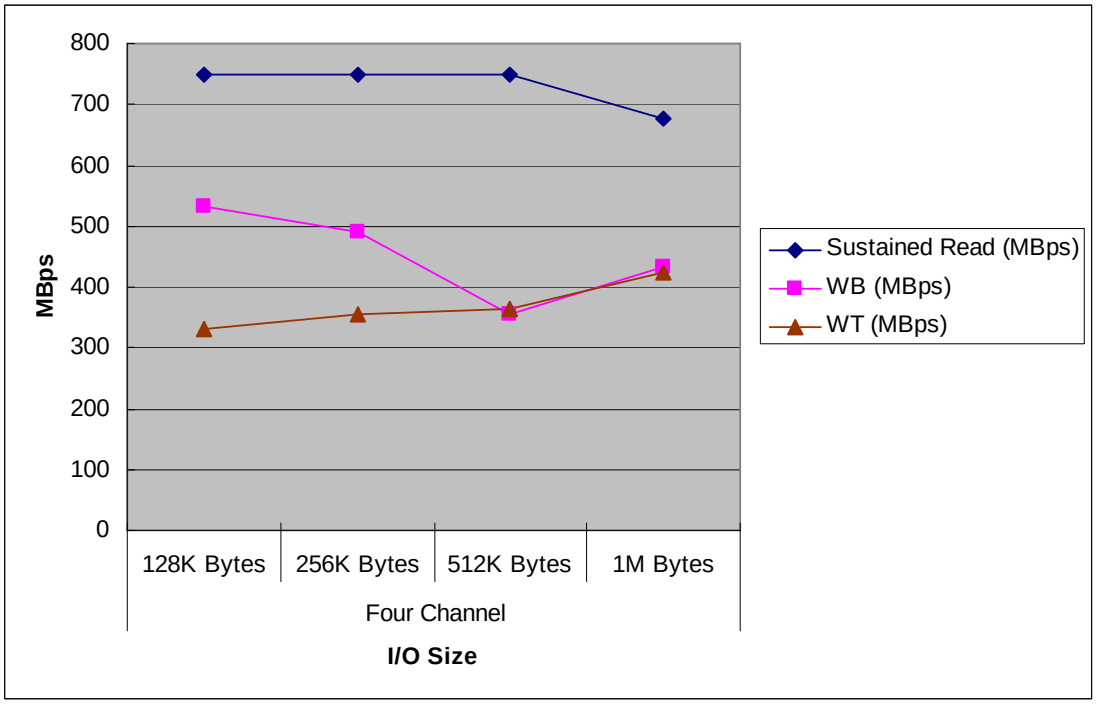
Data Access Rate (IOPS)

I/O Parameters		Read (IOPS)	WB (IOPS)
Host Channels	I/O Size		
Dual Channel	512 Bytes	155112.65	6492.52
	4K Bytes	131516.06	29467.62

>> Four Channel

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)	WT (MB/sec)
Host Channels	**I/O Size**			
Four Channel	128K Bytes	748.42	531.55	330.37
	256K Bytes	748.18	491.35	355.23
	512K Bytes	748.89	354.72	363.47
	1M Bytes	676.90	432.27	423.99



Data Access Rate (IOPS)

I/O Parameters		Read (IOPS)	WB (IOPS)
Host Channels	**I/O Size**		
Four Channel	512 Bytes	144513.67	10747.22
	4K Bytes	121297.22	21382.39

2.22 Random I/O

>> Dual Channel

Data Transfer Rate (IOPS)

I/O Parameters		Read (IOPS)	WB (IOPS)
Host Channels	**I/O Size**		
Dual Channel	512 Bytes	6457.03	2365.17
	4K Bytes	6475.94	2375.83

>> Four Channel

Data Transfer Rate (IOPS)

I/O Parameters		Read (IOPS)	WB (IOPS)
Host Channels	**I/O Size**		
Four Channel	512 Bytes	7248.21	2192.21
	4K Bytes	7117.66	2177.59

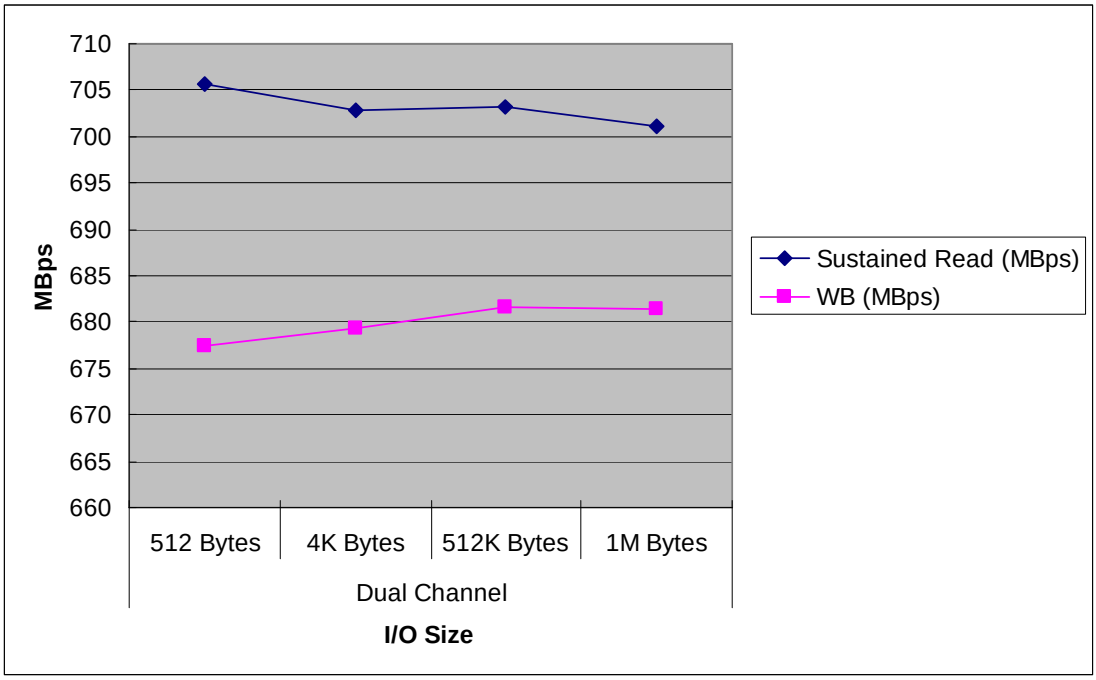
2.3 Degraded RAID 5 Performance

2.31 Sequential I/O

>> Dual Channel

Data Transfer Rate (MBps)

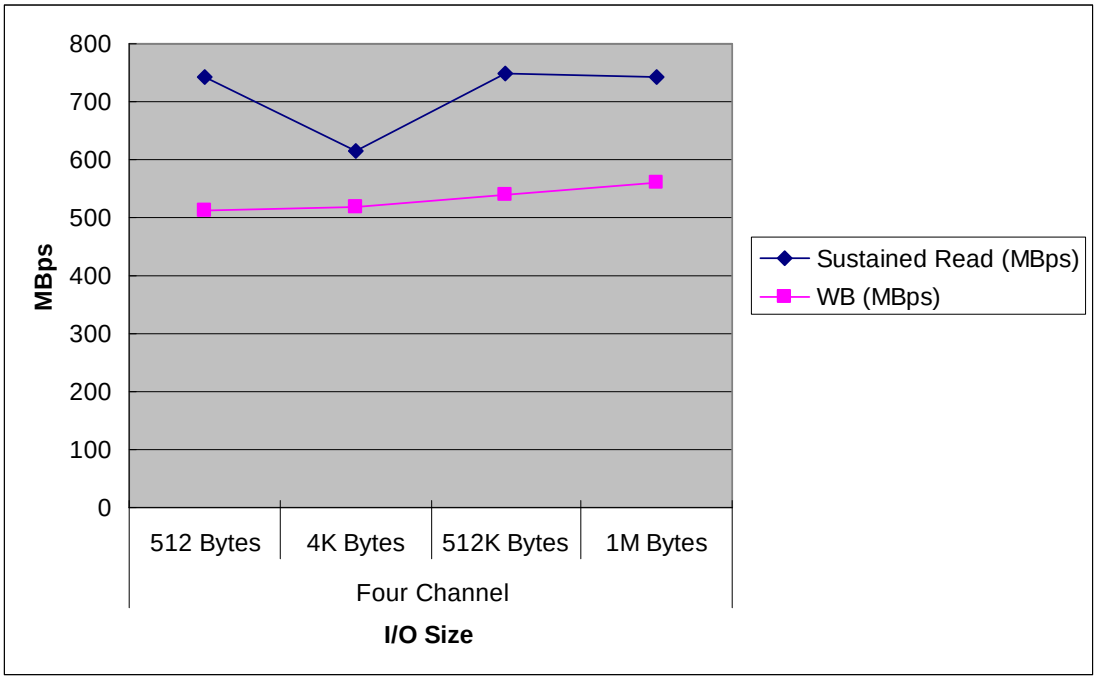
I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Dual Channel	128K Bytes	705.58	677.40
	256K Bytes	702.81	679.33
	512K Bytes	703.14	681.54
	1M Bytes	701.13	681.34



>> Four Channel

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Four Channel	128K Bytes	743.16	510.81
	256K Bytes	615.30	517.29
	512K Bytes	749.94	537.93
	1M Bytes	742.45	560.81



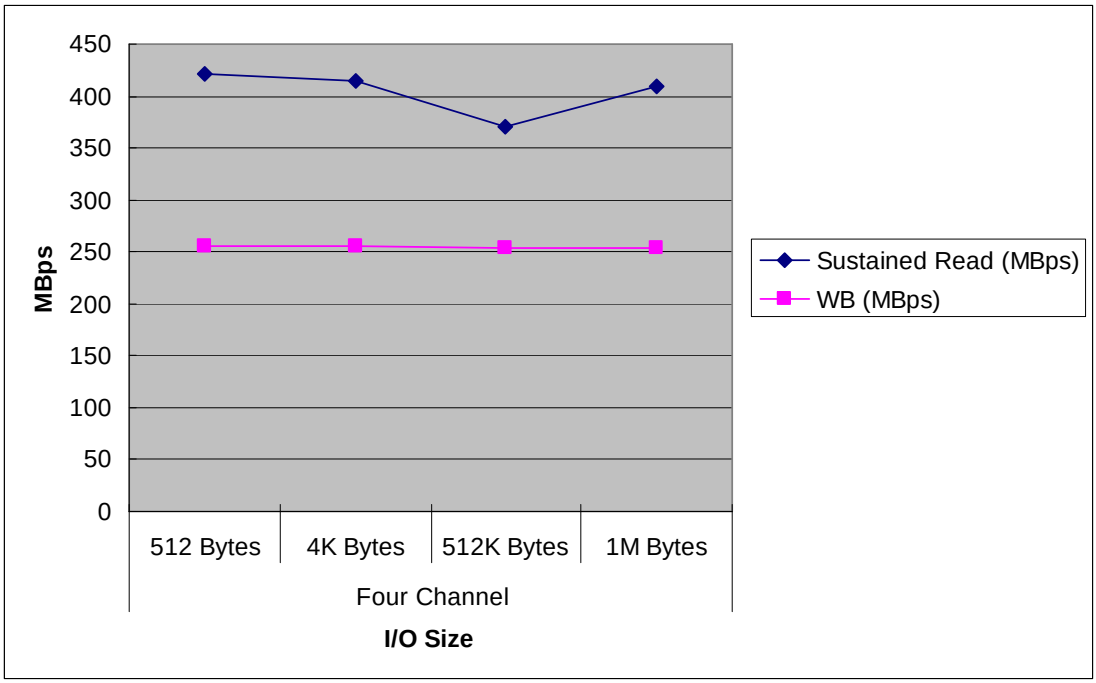
2.4 Degraded RAID 6 Performance

2.41 Sequential I/O – 1 Drive Failed

>> Four Channel

Data Transfer Rate (MBps)

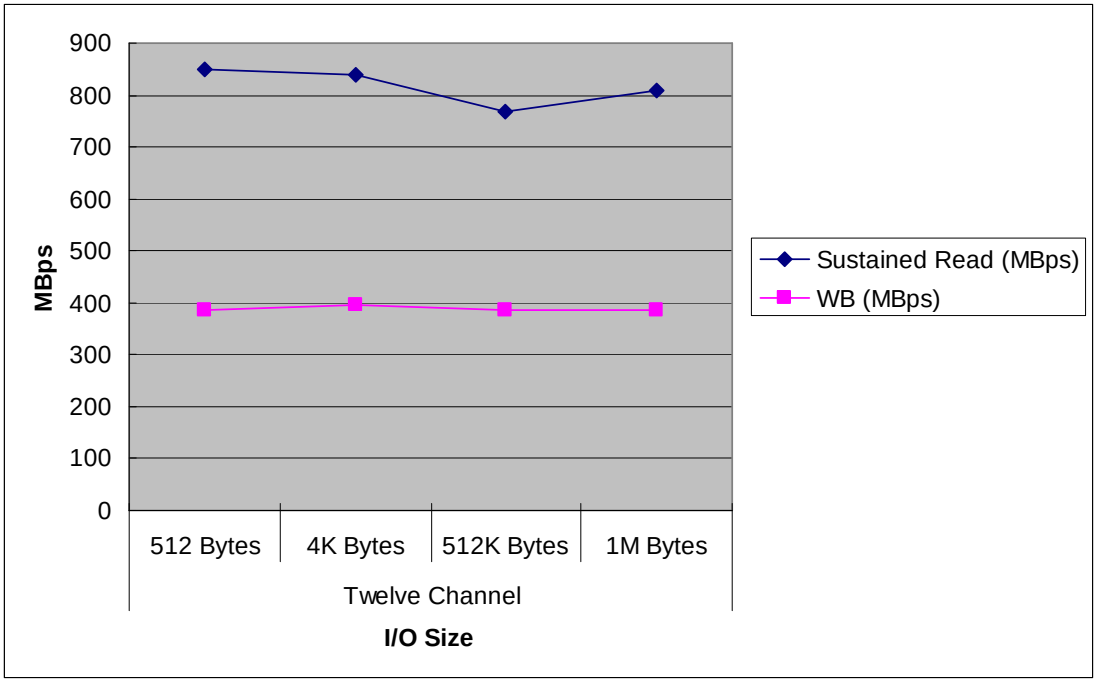
I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Four Channel	128K Bytes	420.55	254.67
	256K Bytes	413.98	256.29
	512K Bytes	370.59	253.74
	1M Bytes	409.59	253.32



>> Twelve Channel (4 Channels in 1 gourp)

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Twelve Channel	128K Bytes	847.63	385.02
	256K Bytes	839.92	396.15
	512K Bytes	769.30	385.21
	1M Bytes	806.98	385.64

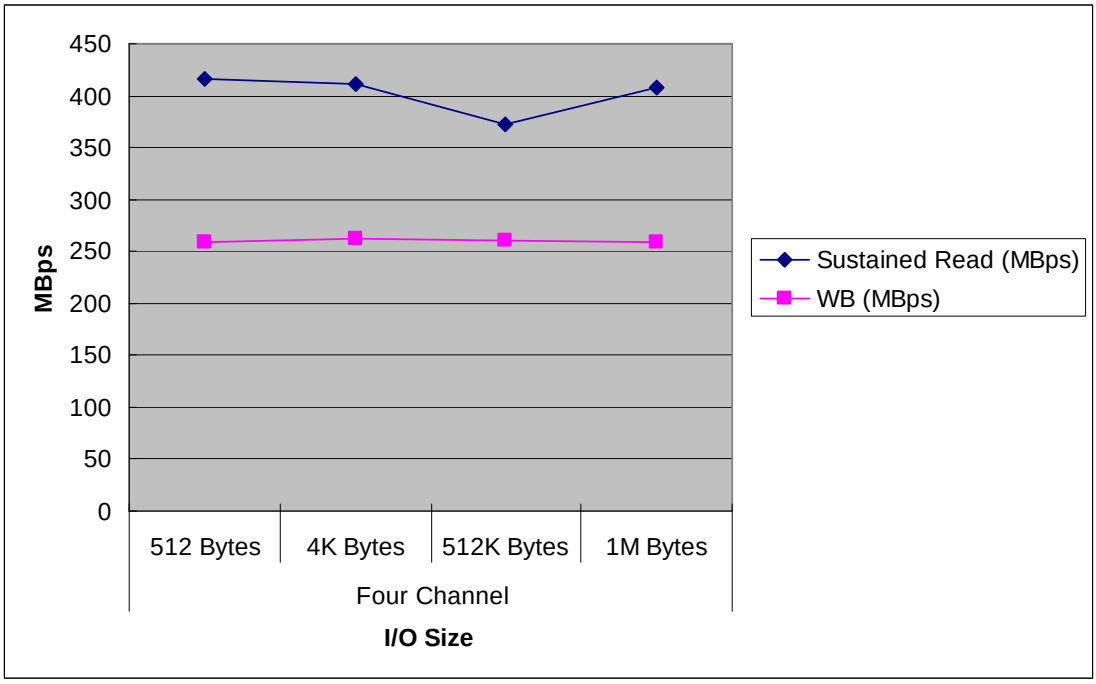


2.42 Sequential I/O – 2 Drives Failed

>> Four Channel

Data Transfer Rate (MBps)

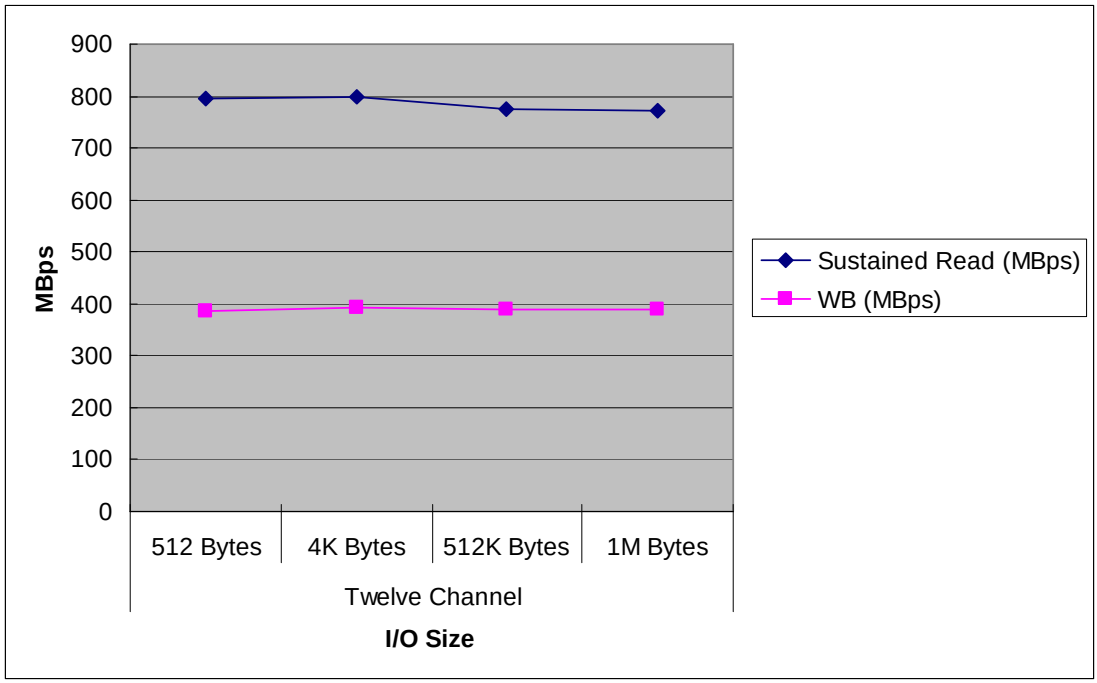
I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	**I/O Size**		
Four Channel	128K Bytes	416.61	259.34
	256K Bytes	410.34	261.82
	512K Bytes	371.52	259.93
	1M Bytes	407.52	258.61



>> Twelve Channel (4 Channels in 1 group)

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	**I/O Size**		
Twelve Channel	128K Bytes	793.79	386.71
	256K Bytes	799.45	393.56
	512K Bytes	774.22	388.42
	1M Bytes	771.16	388.84



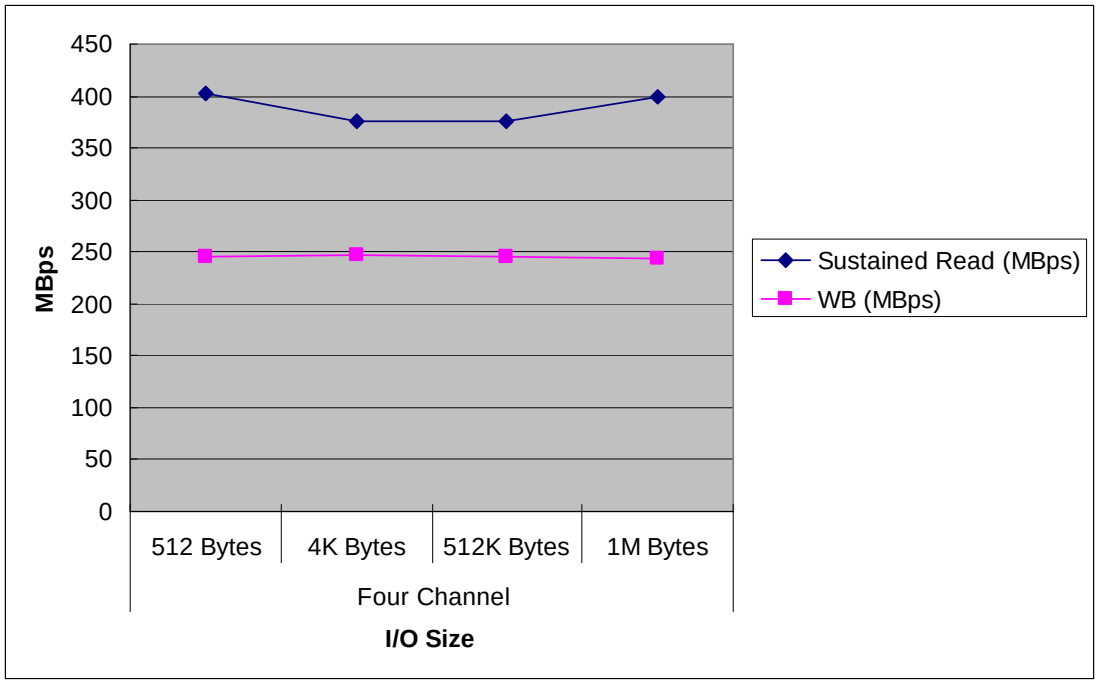
2.5 Rebuilding RAID 5 Performance

2.51 Sequential I/O

>> Four Channel

Data Transfer Rate (MBps)

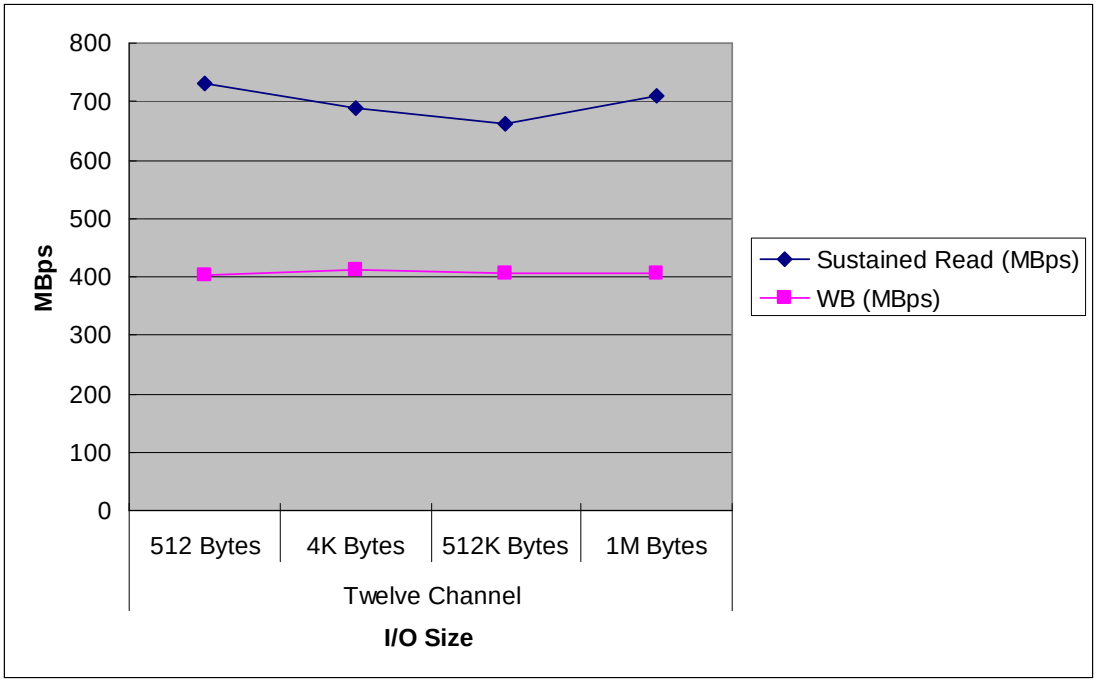
I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Four Channel	128K Bytes	402.42	245.28
	256K Bytes	375.46	247.00
	512K Bytes	376.04	244.85
	1M Bytes	399.38	243.17



>> Twelve Channel (4 Channels in 1 group)

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Twelve Channel	128K Bytes	732.15	402.09
	256K Bytes	689.22	412.54
	512K Bytes	661.27	406.89
	1M Bytes	709.08	407.14



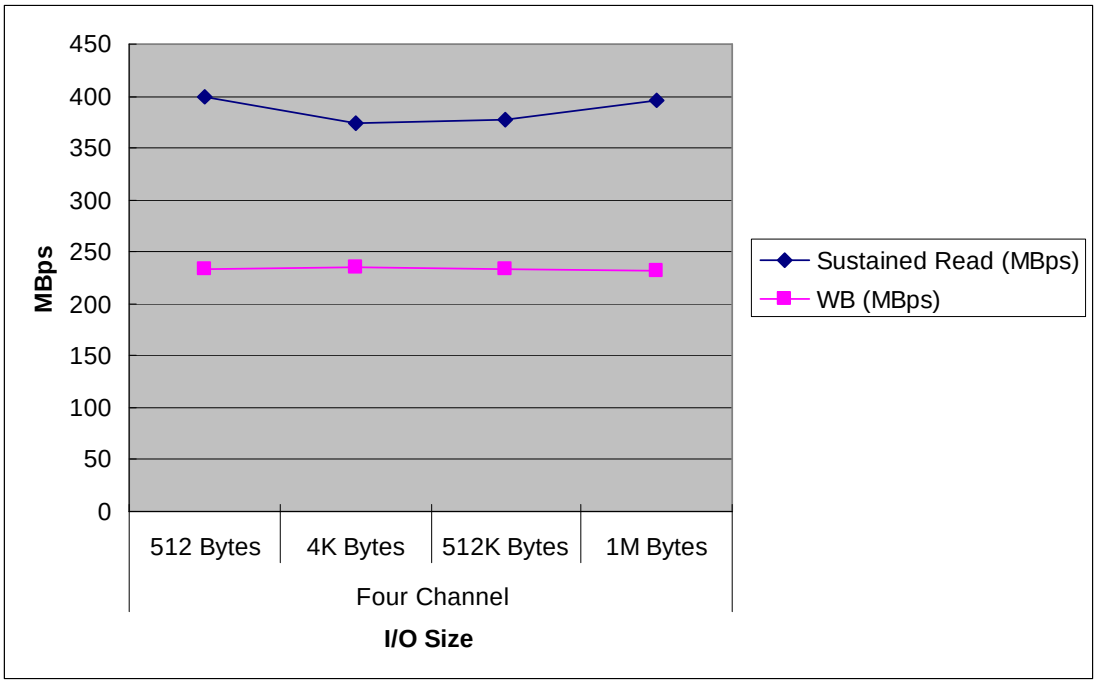
2.6 Rebuilding RAID 6 Performance

2.61 Sequential I/O – 2 Drives Rebuilding

>> Four Channel

Data Transfer Rate (MBps)

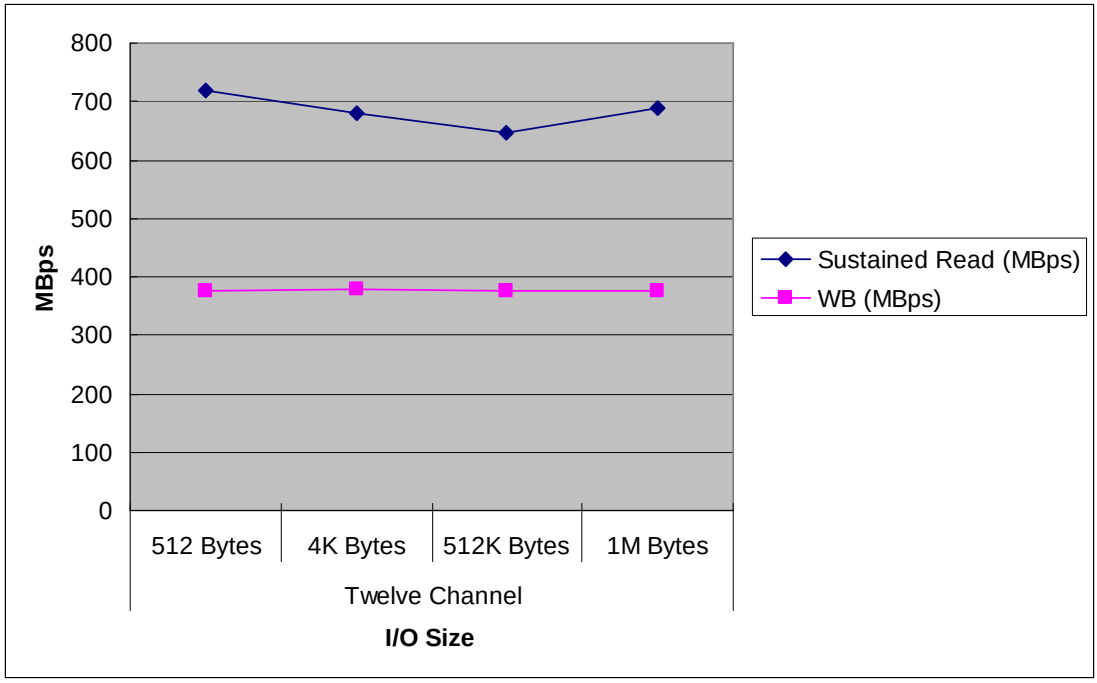
I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	**I/O Size**		
Four Channel	128K Bytes	398.70	234.08
	256K Bytes	373.46	235.26
	512K Bytes	377.65	232.72
	1M Bytes	395.38	232.47



>> Twelve Channel (4 Channels in 1 gourp)

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	**I/O Size**		
Twelve Channel	128K Bytes	717.48	375.16
	256K Bytes	680.85	380.21
	512K Bytes	647.61	376.99
	1M Bytes	687.44	376.34



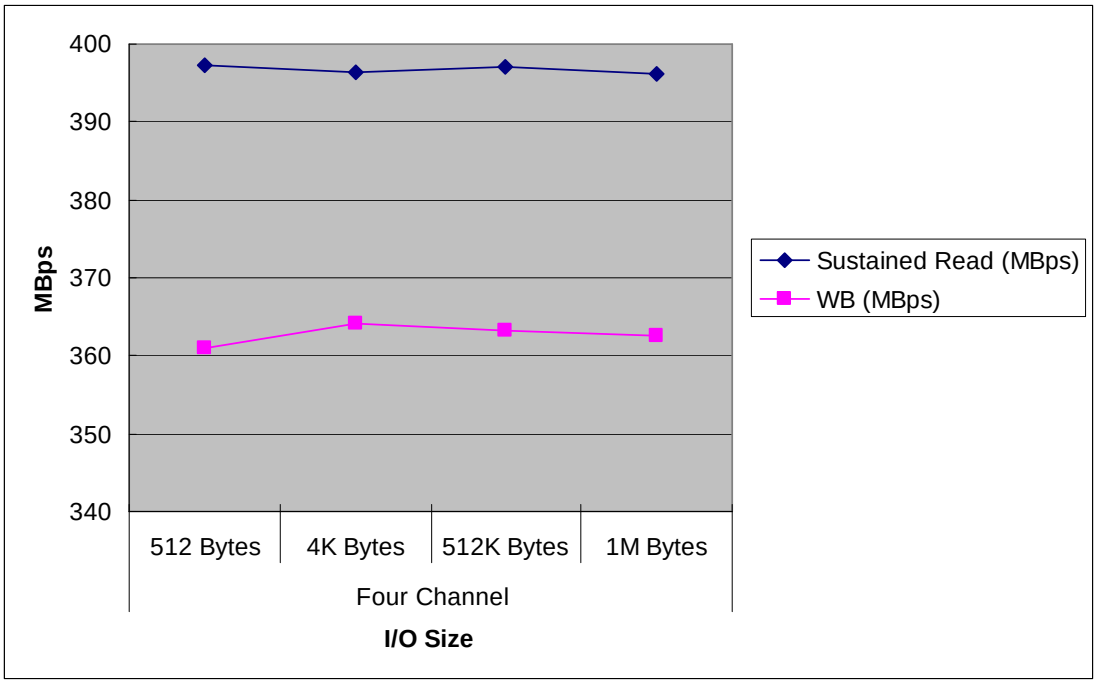
2.7 All Cache Hit RAID 5 Performance

2.71 Sequential I/O

>> Four Channel

Data Transfer Rate (MBps)

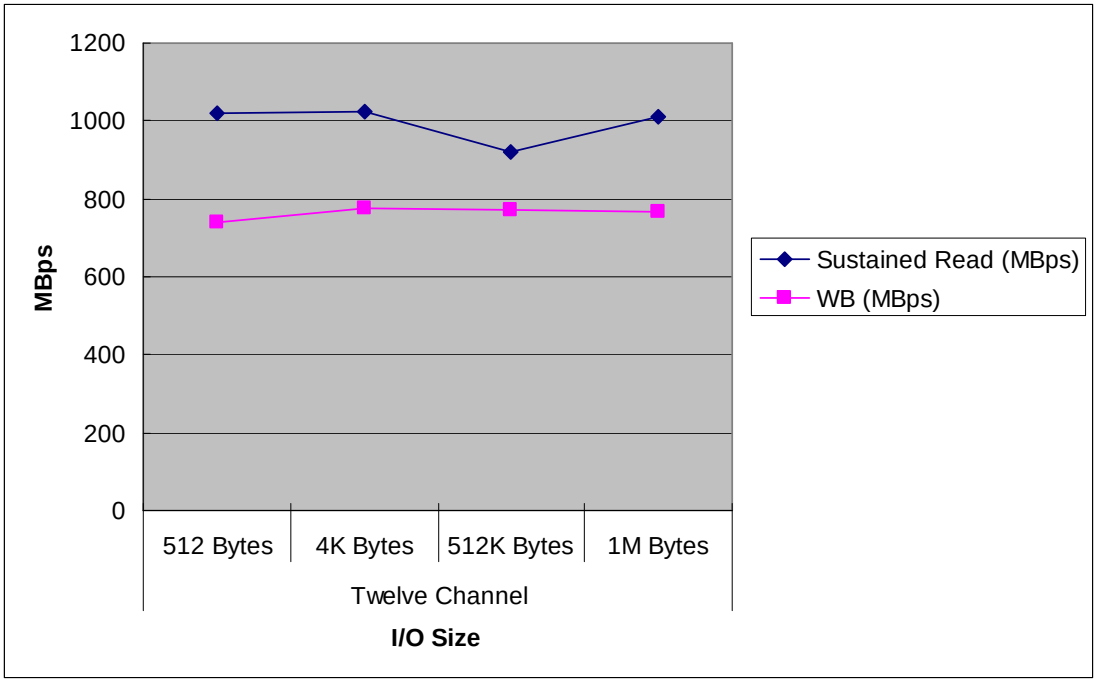
I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Four Channel	128K Bytes	397.20	361.02
	256K Bytes	396.42	364.17
	512K Bytes	397.10	363.20
	1M Bytes	396.23	362.65



>> Twelve Channel (4 Channels in 1 gourp)

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Twelve Channel	128K Bytes	1019.70	740.16
	256K Bytes	1023.26	773.99
	512K Bytes	921.66	770.38
	1M Bytes	1011.56	765.02



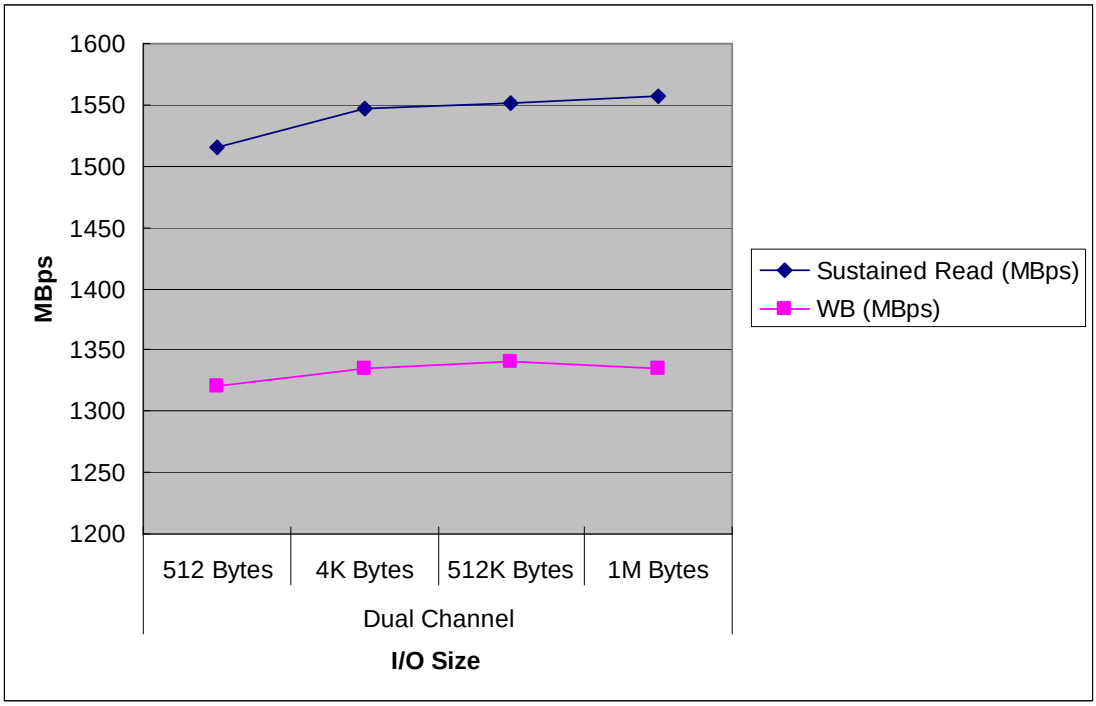
2.8 All Cache Hit RAID 6 Performance

2.81 Sequential I/O

>> Dual Channel

Data Transfer Rate (MBps)

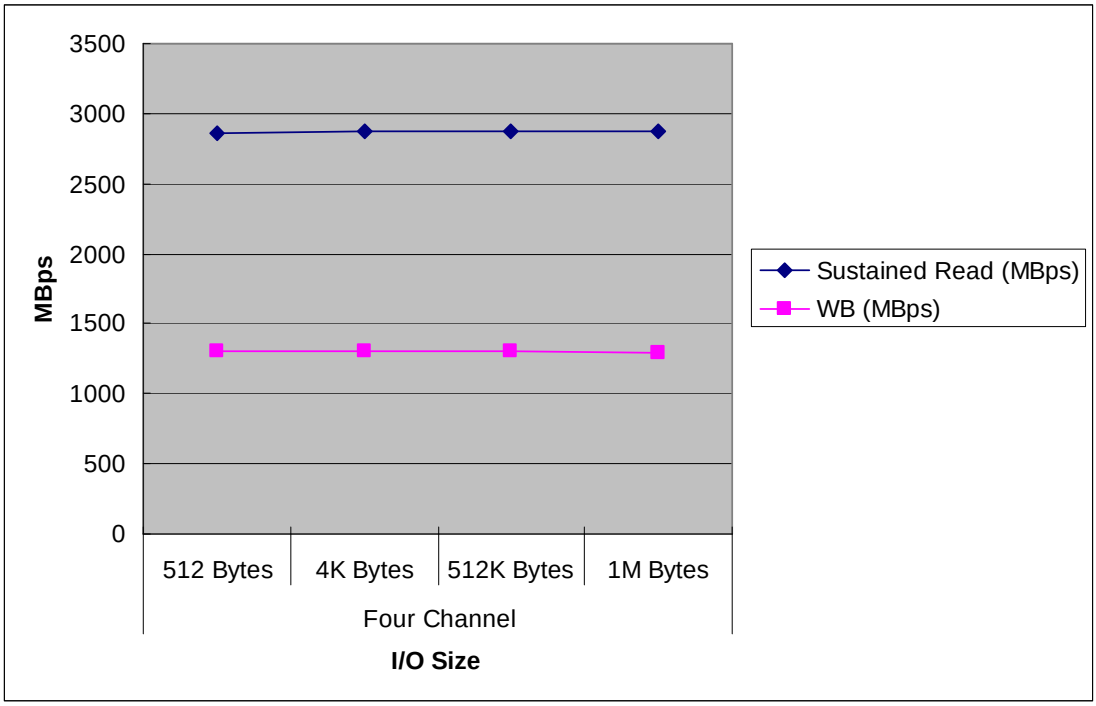
I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Dual Channel	128K Bytes	1516.06	1320.91
	256K Bytes	1546.63	1335.31
	512K Bytes	1551.52	1339.84
	1M Bytes	1557.55	1334.18



>> Four Channel

Data Transfer Rate (MBps)

I/O Parameters		Read (MB/sec)	WB (MB/sec)
Host Channels	I/O Size		
Four Channel	128K Bytes	2861.96	1308.27
	256K Bytes	2869.17	1310.36
	512K Bytes	2873.23	1309.58
	1M Bytes	2872.02	1297.47



3. Performance Test Results with Data Service enable

3.1 Snapshot Copy-on-Write End-to-End RAID 5 Performance

3.11 Sequential I/O

>> Dual Channel

Data Transfer Rate (MBps)

I/O Parameters		Read		WB	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Dual Channel	1M Bytes	744.20	744.20	347.18	347.18

3.12 Random I/O

>> Dual Channel

Data Transfer Rate (MBps)

I/O Parameters		Read		WB	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
Dual Channel	8k Bytes	2058.30	16.08	749.06	5.85

I/O Parameters		OLTP : 60 % Read / 40 % Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**
Dual Channel	8K Bytes	1141.65	8.92

3.2 Split Mirror End-to-End RAID 5 Performance (Source to 1 Target)

3.21 Sequential I/O

>> One Channel

Data Transfer Rate (MBps)

I/O Parameters		Read		WB	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
One Channel	1M Bytes	778.06	778.06	244.30	244.30

3.22 Random I/O

>> One Channel

Data Transfer Rate (MBps)

I/O Parameters		Read		WB	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
One Channel	8k Bytes	4720.06	38.88	1527.57	11.93

I/O Parameters		OLTP : 60 % Read / 40 % Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**
One Channel	8K Bytes	2741.59	21.42

3.3 Split Mirror End-to-End RAID 5 Performance (Source to 2 Targets)

3.31 Sequential I/O

>> One Channel

Data Transfer Rate (MBps)

I/O Parameters		Read		WB	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
One Channel	1M Bytes	777.40	777.40	157.63	157.63

3.32 Random I/O

>> One Channel

Data Transfer Rate (MBps)

I/O Parameters		Read		WB	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**	**IOPS**	**MB/sec**
One Channel	8k Bytes	4617.69	36.08	1037.88	8.11

I/O Parameters		OLTP : 60 % Read / 40 % Write	
Host Channels	**I/O Size**	**IOPS**	**MB/sec**
One Channel	8K Bytes	2111.52	16.50

3.33 Volume Copy / Virtual Volume Size 100GB / Data Size 10GB

Subsystem	**1 Raid**
Parameters	1 Source to 1 Target
Finish Time	10 Min