

# RELDATA

NETWORK STORAGE FOR EVERYONE

## PERFORMANCE TEST

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### RELDATA IP Storage Gateway 9200



### with Dot Hill SANnet II FC Disk Array



10 April 2006

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**Content:**

Summary..... 3

*Test Results*..... 3

Test Configuration and Layout..... 4

Test 1: RELDATA 9200 ISCSI Performance ..... 5

Test 2: RELDATA 9200 CIFS Performance..... 6

Test 3: Microsoft® Windows® Share Performance..... 7

## Summary

This paper describes an interoperability and performance test of the RELDATA IP Storage Gateway 9200 (RELDATA 9200) with the Fibre Channel disk array Dot Hill SANnet II FC. The test was carried out at the RELDATA test centre in Stuttgart, Germany.

For the purposes of this test, a single LUN with a size of 180 GB was carved out from six 36GB FC hard disks configured as RAID 5. The array was connected to a single RELDATA IP Storage Gateway 9200, where the administrator configured two virtual LUNs, one as an iSCSI target, the other as CIFS/SMB filesystem. The RELDATA 9200 was connected to a test server with a 1 Gbit IP network that included a 1 GbE DLINK switch (without jumbo frames). Performance tests were carried out with the Intel IOMeter tool, which ran on a Windows® 2003 test server equipped with 2 x 3 GHz Intel XEON CPUs and 2 GB RAM, and an installed Microsoft® iSCSI Initiator 2.0. All test results were achieved without caching data on the RELDATA 9200.

The RELDATA 9200 runs Linux-based firmware and is powered with 2 x 3 GHz Intel XEON CPUs in hyper-threading mode, 2 GB RAM, 2 x 2 Gb Qlogic FC ports and 6 x 1 GbE ports. The RELDATA Gateway is approved by Microsoft® for the "Designed for Windows® XP" logo. This means that the RELDATA 9200 is compatible with the latest Microsoft® iSCSI initiator driver used for connecting disk, tape and media changer storage devices over IP, and with the Microsoft®'s iSNS server, used for discovering iSCSI-enabled storage devices.

## Test Results

The IOMeter test measured the performance of sequential write and read operations against iSCSI and CIFS/SMB volumes, at various block sizes from 0,512 KB to 1024 KB, with both 100 percent read and 100 percent write access patterns. This type of test has been selected because it minimizes the impact imposed by the mechanical performance limitations of the disk array.

In the first test run, the performance of reads and writes via iSCSI was measured. The RELDATA 9200 showed a read-throughput of 110 MB/s already at 32 KB blocks, and the highest value of 112 MB/s with 256 KB and larger blocks. In this test, performance was clearly limited only by the maximum theoretical wire speed of the 1 GbE network. The write operations achieved the maximum performance of about 95 MB/s with 256 KB and larger blocks.

In the second test, the read and write performance of the RELDATA 9200 was measured with the Windows CIFS file system. With 32 KB blocks, the RELDATA 9200 showed a read performance of 111 MB/s and with 512 KB blocks a maximum of 112 MB/s. A write performance of 107 MB/sec was achieved with 16 KB blocks. The maximum write performance was 109 MB/sec with 1024 KB blocks.

For benchmarking purposes, a third test was carried out using besides the test server a second Windows® 2003 Server in place of the RELDATA 9200, to measure a native "Windows® CIFS Share" result. The Windows® 2003 Server was again equipped with 2 x 3 GHz Intel XEON CPUs and 2 GB RAM, and an additional FC HBA to connect directly to the same Dot Hill SANnet II FC disk array used in the previous tests. Storage capacity was then provisioned as a Windows® share to the test server over the GbE network. In this configuration the read and write performance measurements showed on average 20% less throughput of the Windows server® CIFS share compared to the throughput of the share provisioned by RELDATA 9200.

## Conclusion

Based on the results of this simple testing it is clear that even with the most basic setup the RELDATA 9200 IP Storage Gateway outperforms an industry-standard file-sharing server configuration and is capable of delivering the best throughput with both block-level iSCSI and file-level CIFS/SMB storage access protocols.

Even better throughput could be obtained if the test server uses specialized, performance-optimizing iSCSI HBA or TOE cards and if two or more 1 GbE connections are aggregated into a trunk. A further improvement would be to use jumbo (9000 byte) frames on the GbE network reducing Ethernet frame overhead, which will result in a 5-10% throughput increase. RELDATA 9200 supports standard IEEE 802.3ad link aggregation and trunking and can take advantage of jumbo frames.

## Test Configuration and Layout

### Physical Storage

Dot Hill SANnet II FC  
RAID5 with 6 x 36GB FC disks  
1 RAID controller used

### IP Storage Gateway

RELDATA 9200

### GbE Switch

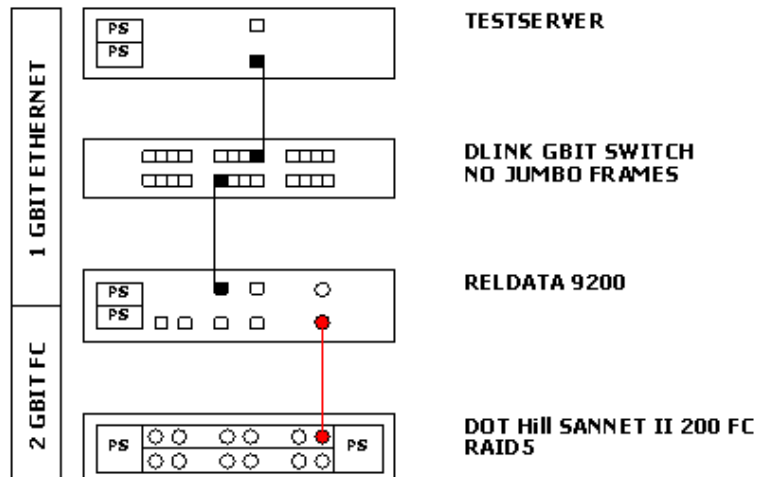
DLINK DGS-3024 1 Gigabit-Switch  
No Jumbo Frames

### Test Server

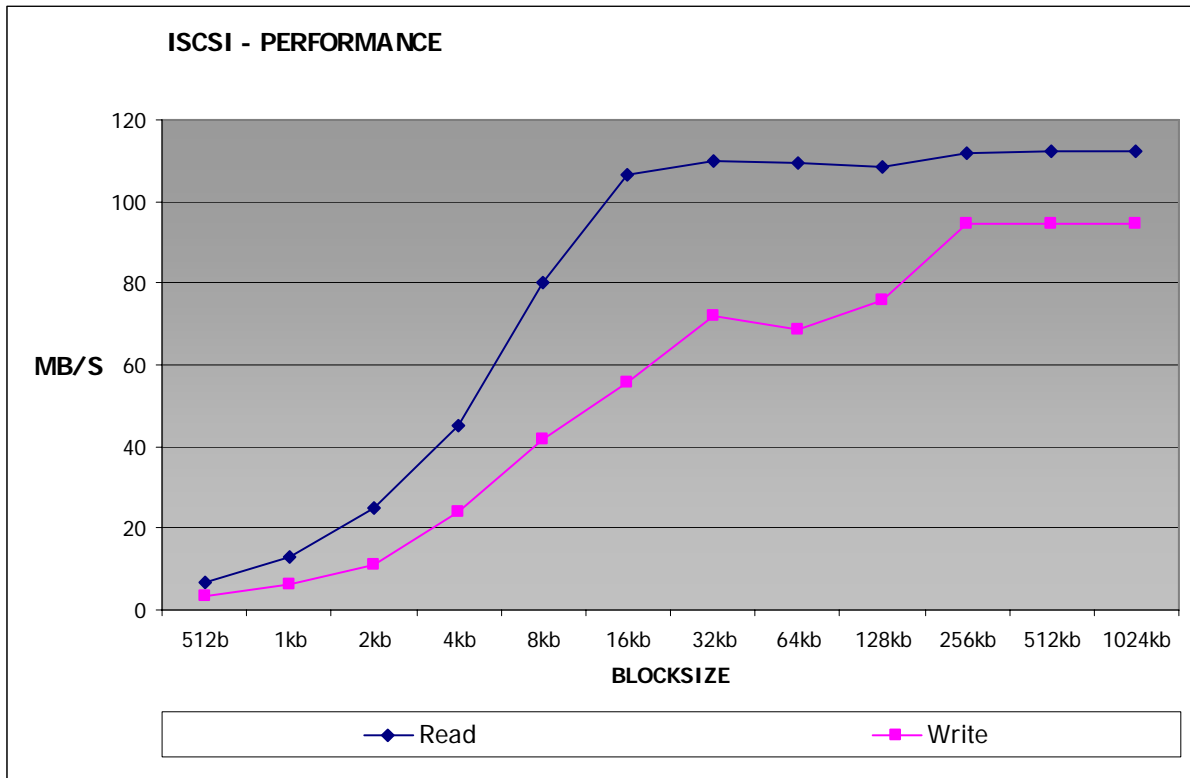
2 x 3.0 GHz Intel XEON CPUs  
2 GB RAM  
1 Gbit NIC  
18 GB SCSI disk for Operating System  
Windows 2003 Server  
Microsoft iSCSI Initiator 2.0

### Test Software

IOmeter: <http://www.iometer.org>  
Using 4 workers with 10 outstanding IOs each



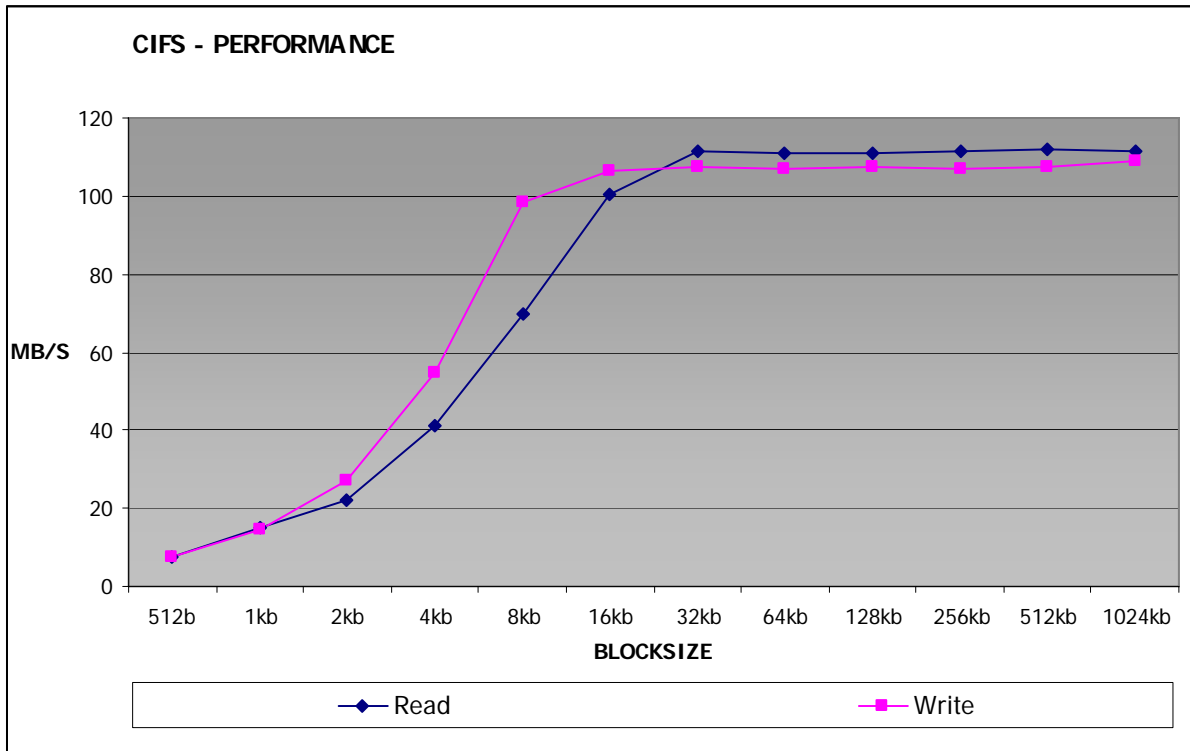
## Test 1: RELDATA 9200 iSCSI Performance



Block Size	iSCSI Performance (MByte/s)	
	read	write
512b	7	3
1kb	13	6
2kb	25	11
4kb	45	24
8kb	80	42
16kb	107	56
32kb	110	72
64kb	109	69
128kb	109	76
256kb	112	95
512kb	112	95
1024kb	112	95

Block Size	iSCSI Performance (IO/s)	
	read	write
512b	13844	6393
1kb	13510	6503
2kb	12714	5547
4kb	11545	6113
8kb	10242	5336
16kb	6835	3556
32kb	3517	2301
64kb	1748	1100
128kb	868	607
256kb	447	379
512kb	225	189
1024kb	112	95

## Test 2: RELDATA 9200 CIFS Performance

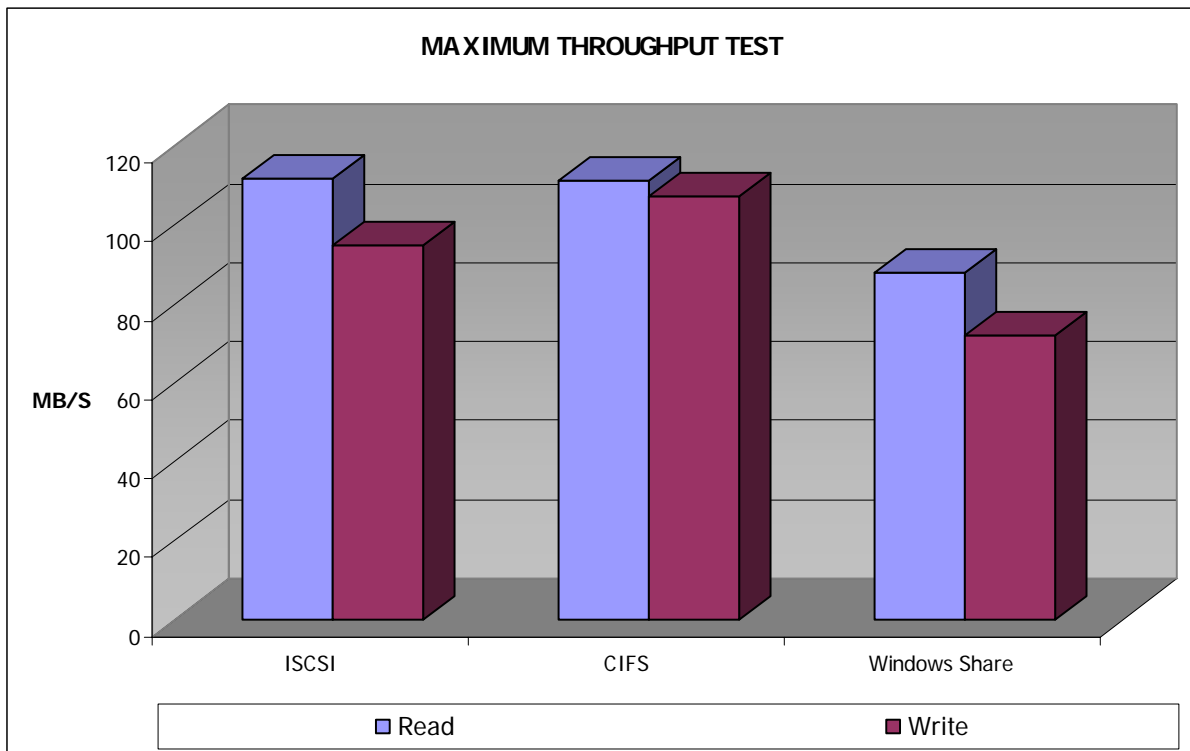
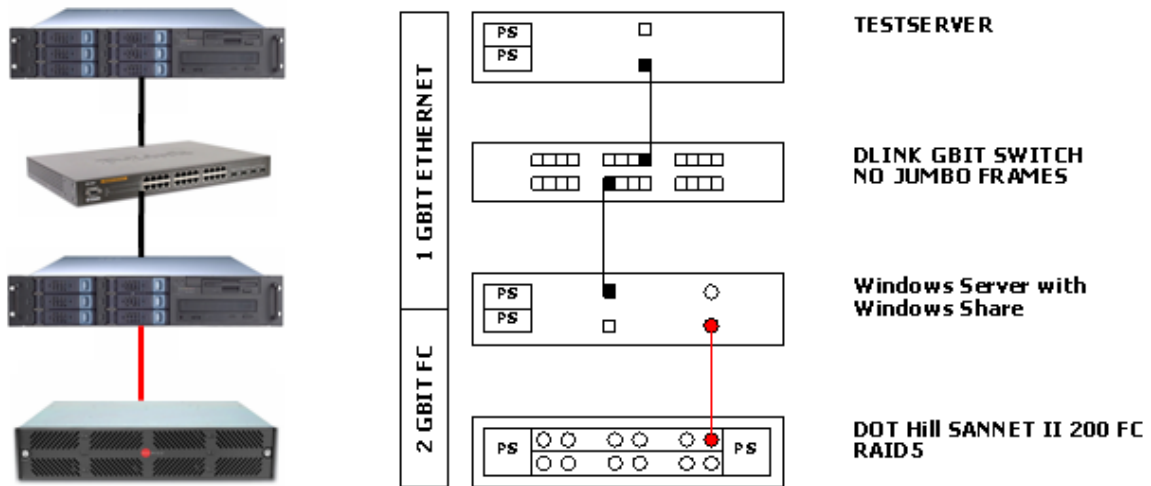


Block Size	CIFS Performance (MByte/s)	
	read	write
512b	8	7
1kb	15	14
2kb	22	27
4kb	41	55
8kb	70	99
16kb	101	107
32kb	111	107
64kb	111	107
128kb	111	107
256kb	111	107
512kb	112	107
1024kb	112	109

Block Size	CIFS Performance (IO/s)	
	read	write
512b	15483	15098
1kb	15488	14770
2kb	11412	13985
4kb	10572	13960
8kb	8914	12628
16kb	6437	6817
32kb	3567	3436
64kb	1779	1709
128kb	889	860
256kb	445	429
512kb	224	215
1024kb	112	109

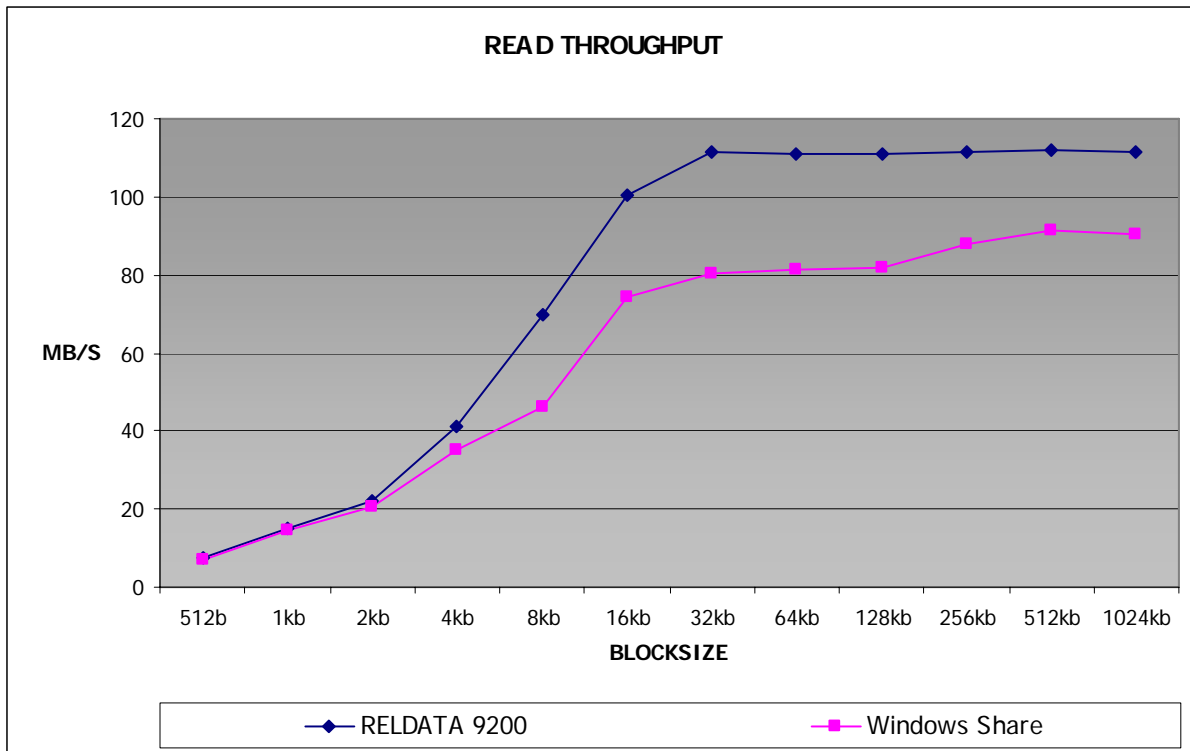
### Test 3: Microsoft® Windows® Share Performance

For benchmarking purposes a standard Windows® 2003 Server was used instead of the RELDATA 9200, to measure a native "Windows® CIFS Share" performance. The Windows® 2003 Server was equipped with 2 x 3 GHz Intel XEON CPUs and 2 GB RAM, and an FC HBA to connect the same Dot Hill SANnet II FC disk array used for the previous iSCSI and CIFS tests. The storage was then provisioned as a Windows® share to the test server over a GbE network.

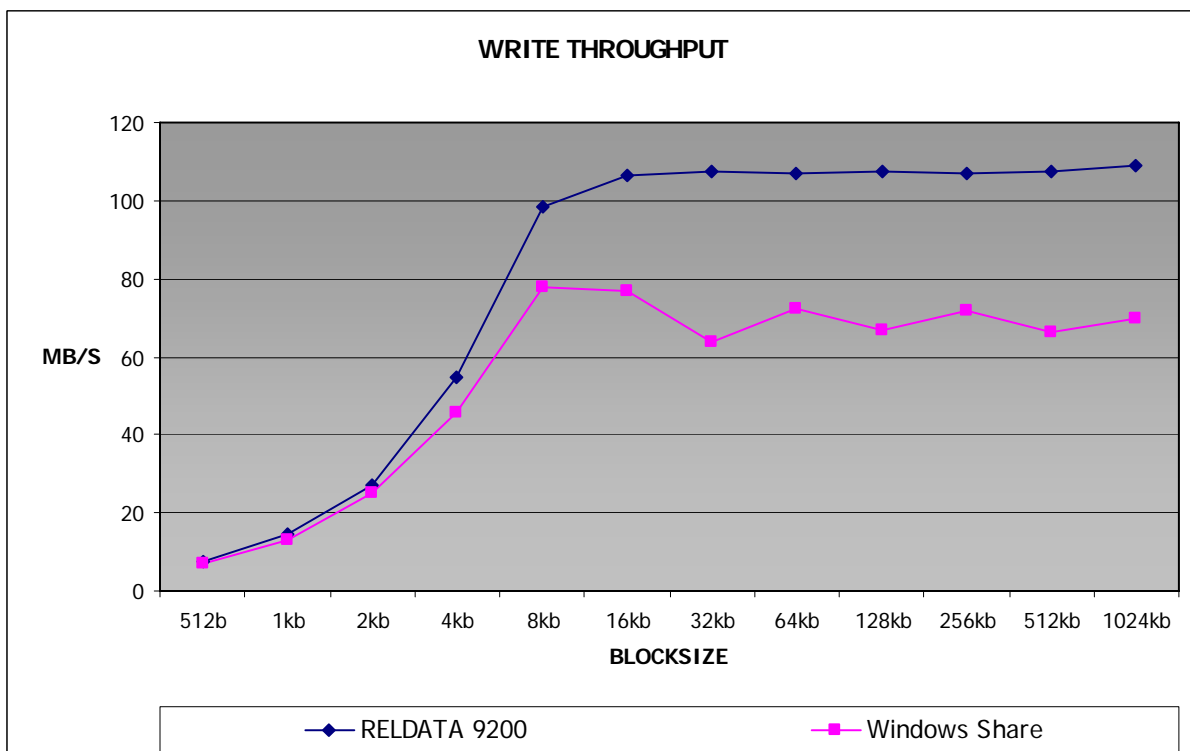


This combined diagram shows the results of the maximum throughput tests with RELDATA iSCSI target, RELDATA CIFS share and Windows® share with a block size of 256 KB. IO meter parameters: 256 KB blocks with 100% sequential write, 100% sequential read access.

Comparison RELDATA 9200 CIFS and Windows Share:



The diagram shows the result from the RELDATA 9200 CIFS Read Performance and the Read Performance from the Windows Share.



The diagram shows the result from the RELDATA 9200 CIFS Write Performance and the Write Performance from the Windows Share.