



Performance Report

PAC Storage Scale-Out NAS Customer Demo Results

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Summary

This is the demo results report for a test project within the media and entertainment industry.



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1. Applicable Models

This document contains performance test results of PAC Storage PS 6460 with system configuration and network topology.

2. Audience

This performance report is intended for the PAC Storage partners, customers, and employees who are familiar with rich media applications and want to deploy PAC Storage Scale-Out NAS as their shared media storage.

3. Terminology

- **PAC Mgmt** – Management software for PAC Storage Scale-Out NAS.
- **Disk Pool** – A storage device with file system that can be accessed via file system shared protocols.
- **Shared folder** – A location for shared storage access via file system protocol.



4. Performance Results

Here we demonstrate the performance results of maximum system throughput tested by Vdbench benchmark tool and maximum number of playback streams tested by real-world media workloads with Final Cut Pro. For detailed storage configurations and network topology, please refer to the next section.

4.1 Maximum CIFS Throughput

We conducted the performance test by simulating 1MB sequential workloads with all-HDDs configurations. Each node has 2 data port IP, and we mount each client to the 2 data port of each node. There are 20 10GbE connections/mount points to the host in total.

Vdbench format thread = 1 means that number of concurrent threads for each client. For video playback and editing, we think 1 is the suitable setting.

Model	PS 6460	
FW version	1.42P.08	
Number of clients	10	
Internal/Front-end network	10GbE *2/10GbE *2	
Protection Level	Erasure code 4+1	
RAID mode	Optimal performance (RAID5)	
Vdbench 1MB Sequential Vdbench format thread = 1	Read	Write
NFS	19,539 MBPS	14,545 MBPS
SMB	18,351 MBPS	13,999 MBPS
RAID mode	Optimal performance (RAID6)	
Vdbench 1MB Sequential Vdbench format thread = 1	Read	Write
NFS	17,958 MBPS	11,618 MBPS
SMB	17,596 MBPS	11,390 MBPS



We create one mount point for each client to one node. There are 28 mount points in total.

Model	PS 6460	
FW version	1.42P.08	
Number of client	28	
Internal/Front-end network	10GbE *2/10GbE *2	
Protection Level	Erasure code 4+1	
RAID mode	Optimal protection (RAID6)	
Vdbench 1MB Sequential Vdbench format thread = 1	Read	Write
NFS	15,995 MBPS	10,930 MBPS

4.2 Maximum Stream Count

The following table shows the number of playback streams for PS 6460 by testing with common video formats and codecs. We also listed the corresponding video frame rate (FPS) and PS 6460 read throughput on the table for your reference. Using MAC servers to run 84 streams with the sample video provided by customer, since there are 84 streams in total in customer's environment.

The software we adopted is Final Cut Pro. With the MAC servers we have, playing 84 streams of video with Final Cut Pro is already reaching the limitation of our MAC servers. All the CPUs are fully loaded.

For Adobe Premiere, each MAC server of ours can only run 8 streams, and the CPU is fully loaded. The performance bottleneck is on the MAC server. 10 nodes cluster of PS 6460 is able to play 84 streams of full HD video simultaneously.

Note: The performance will slightly vary depending on your specific environment.

Material		Stream Count
Codec	FPS	PS 6460 300 HDD
HD ProRes 422 1920 x 1080	30	84

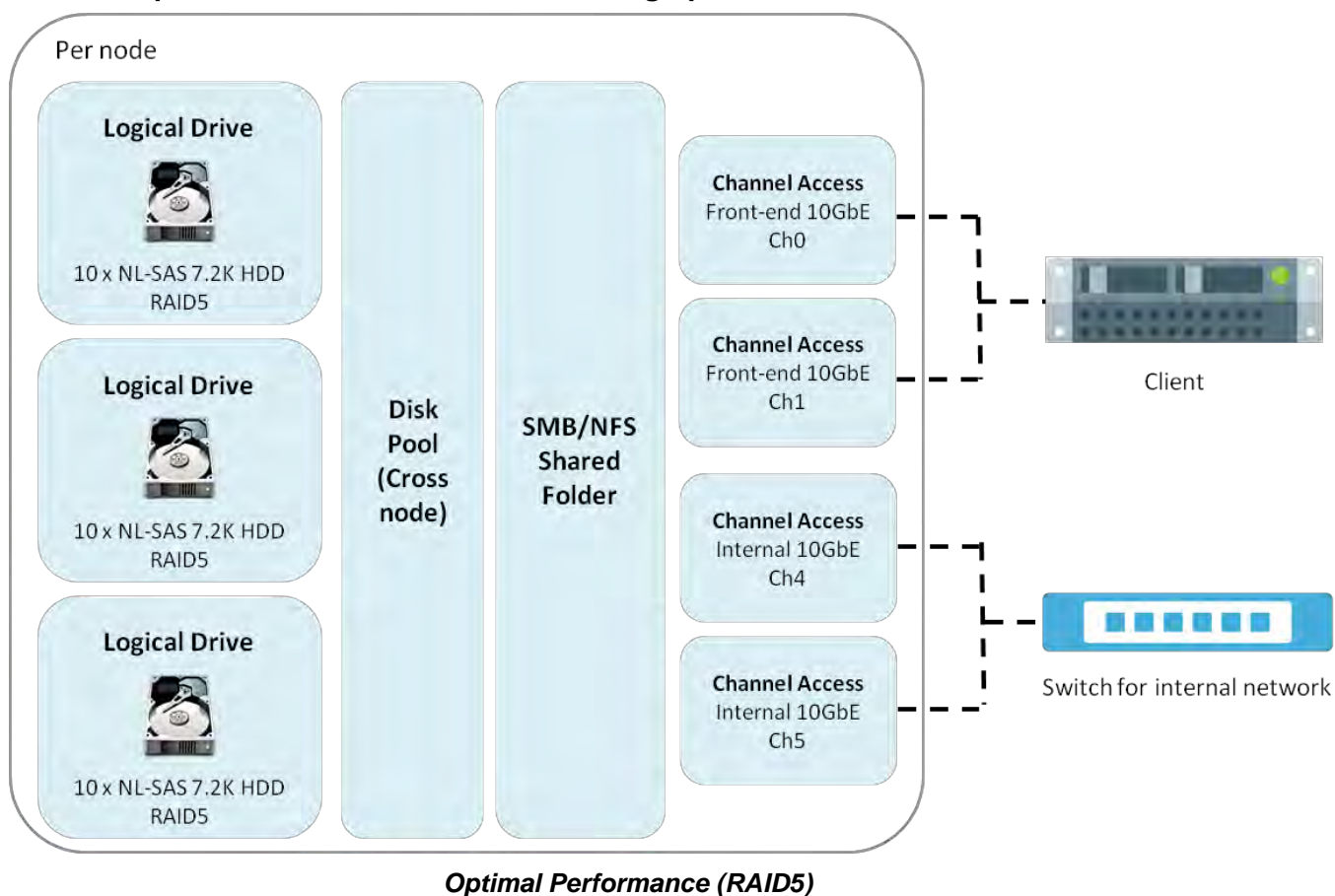
5 Topology

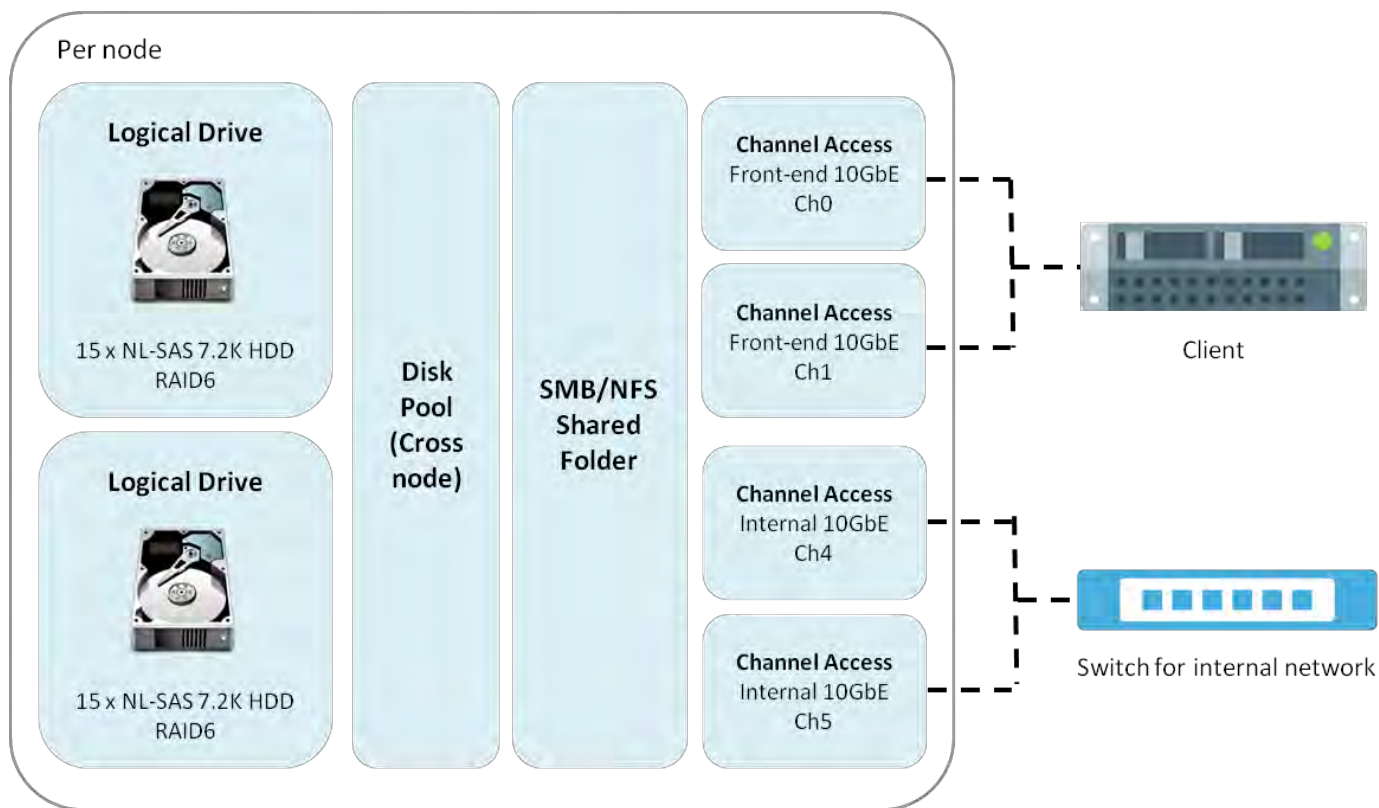
5.1 Maximum CIFS Throughput

The figure below illustrates the configuration we adopted in the POC test. The RAID mode is “Optimal Performance (RAID5)” and the internal and front-end network are both 10GbE (2 port for each network).

In order to leverage the multi-thread, we create multiple shared folders for each client, and map each folder to each client.

Note: Multiple shared folders are needed for high performance.

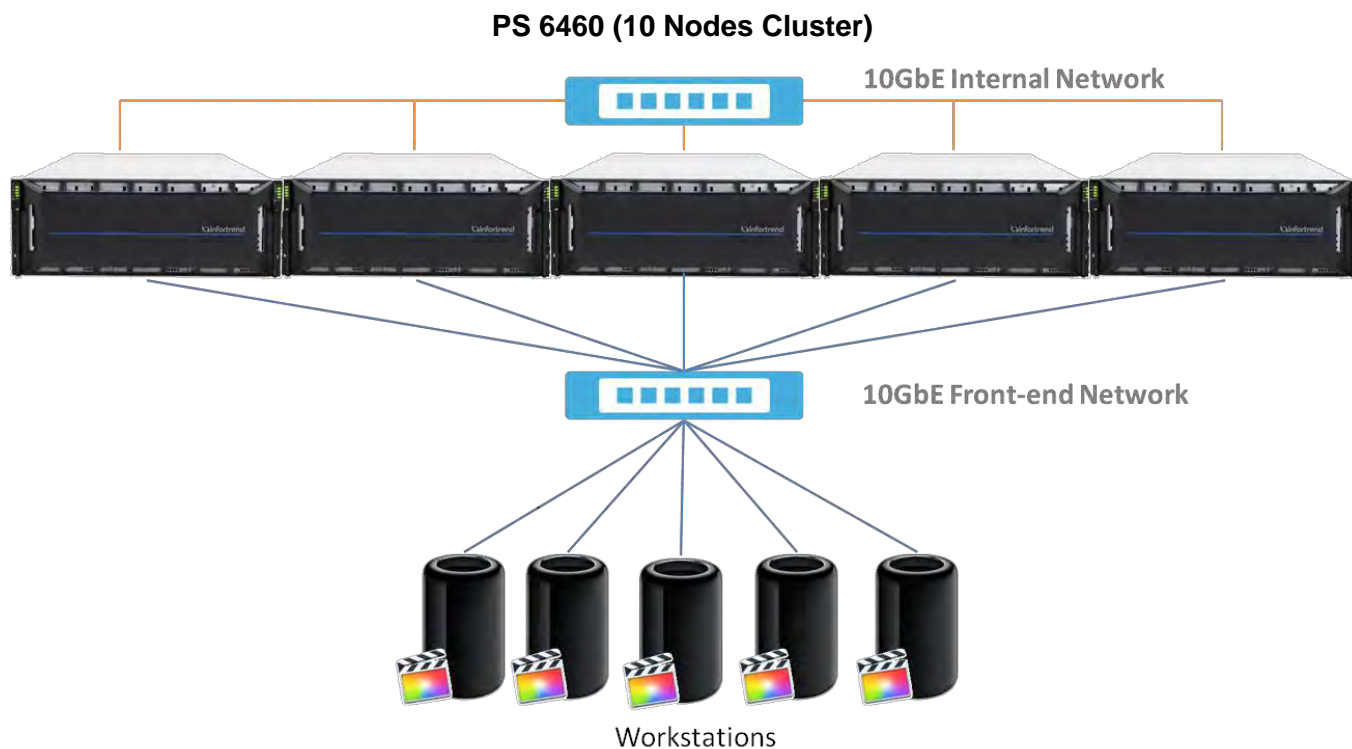




Optimal Protection (RAID6)

5.2 Maximum Stream Count

We adopted 5 MAC servers and ran 84 streams with the sample video provided by customer. The figure below illustrated the architecture of our test environment.



6 System Configurations

6.1 Storage Configuration Profile

The following table shows the configuration adopted from our PS 6460 best practice with a storage pool and a shared folder.

Model	# of Node	# of Drive	RAID mode	Erasure Code	# of Folder	# of Client
PS 6460	10	300	Optimal Performance (RAID5)	4+1	10	10
PS 6460	10	300	Optimal Protection (RAID6)	4+1	10	10/14



6.2 Storage System Settings

We use the following parameters to optimize the media workload, which differs from the PS 6460 default settings. For detail parameter settings on PAC Mgmt for PS 6460, please refer to the software manual.

RAM (per system)	64GB
Firmware version	1.42P.08
Internal Network (per node)	10GbE *2 (Jumbo frame: 9K)
Front-end Network (per node)	10GbE *2 (Jumbo frame: 9K)
RAID Level	Optimal performance (RAID5)
Read-ahead for NAS file transfer	2M
Maximum Tag Count	64
Jumbo Frame	Enabled (9K)
Keep connected with the storage system	Disable
AV Optimization	Disable
Read Ahead	SD Stream
Periodic SAF-TE and SES Device Check Time	Disable
Verification on Normal Drive Writes	Disable
Verification on LD Rebuild Writes	Disable



6.3 Benchmark Tool Settings

Vdbench Configuration:

messagescan=no

create_anchors=yes

hd=host1,system=172.24.110.31,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host2,system=172.24.110.27,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host3,system=172.24.110.68,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host4,system=172.24.110.54,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host5,system=172.24.110.119,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host6,system=172.24.110.40,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host7,system=172.24.110.30,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host8,system=172.24.110.83,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host9,system=172.24.110.46,vdbench=/root/vdbench50406,user=root,shell=vdbench

hd=host10,system=172.24.110.81,vdbench=/root/vdbench50406,user=root,shell=vdbench

fsd=fsdS0_\$host,anchor=/SMB0/193s1/\$host,width=1,files=16,distribution=bottom,size=1g

fsd=fsdS1_\$host,anchor=/SMB1/194s/\$host,width=1,files=16,distribution=bottom,size=10g

fsd=fsdN0_\$host,anchor=/NFS0/193/\$host,width=1,files=16,distribution=bottom,size=10g

fsd=fsdN1_\$host,anchor=/NFS1/194/\$host,width=1,files=16,distribution=bottom,size=10g

7 Conclusion

- 10GbE for internal and front-end network is enough for the NLSAS HDD node, and the test result also shows that 10GbE can reach the performance requirement.
- At least 30 drives in each node are needed to reach this performance result.
- We adopted 64GB RAM memory for each node. If the memory can be enlarged to 128GB per node, we expect the performance can be further enhanced.
- Multiple shared folders are needed for high performance.
- For other detailed settings, please check the [storage system settings section](#).
- Since the capacity requirement is 3PB, we can offer 3 kinds of configuration to meet both performance and capacity requirement.
 - PS 6416 *10 + PS16J3 * 20:
 - ◆ Number of HDD: 480
 - ◆ Usable capacity: $[(16-2)*12TB*0.9*3]*10 \text{ nodes} * 4/5 = 3628.8TB = 3.5PB$
 - ◆ Internal network: 10GbE *2
 - ◆ Front-end network: 10GbE *2
 - ◆ Total rack space: $3U *10 + 3U *20 = 90U$
 - PS 6460 *5 + PS16J3 *10:
 - ◆ Number of HDD: 460
 - ◆ Usable capacity: $[(15-2)*12TB*0.9*2]*10 \text{ nodes} * 4/5 + [(16-2)*12TB*0.9]*10 = 3758.4TB = 3.67PB$
 - ◆ Internal network: 10GbE *2
 - ◆ Front-end network: 10GbE *2
 - ◆ Total rack space: $4U *5 + 3U *10 = 50U$
 - PS 6460 *7:
 - ◆ Number of HDD: 420
 - ◆ Usable capacity: $[(15-2)*12TB*0.9*2]*14 \text{ nodes} * 4/5 = 3144.96TB = 3.07PB$
 - ◆ Internal network: 10GbE *2
 - ◆ Front-end network: 10GbE *2
 - ◆ Total rack space: $4U *7 = 28U$



Contact Information

Website

For more information of Infortrend's products and services, visit:

<https://www.pacstorage.com>

Customer Support

Contact your system vendor or visit the following support site.

<http://www.pacstorage.com/pac-storage-product-support.html>