



CONVENTIONAL WISDOM IS WRONG – PUBLIC CLOUD STORAGE COSTS MORE

Ask any storage analyst or IT storage professional about public cloud storage costs and they will say with complete confidence that it's cheaper than on-prem storage. They are incorrect, much to their surprise. It doesn't matter whether the public cloud storage in question is block, file or object, the on-prem storage is just about always less costly. The primary exception are those rare circumstances when the storage is temporary or short term, less than 18 months, and is specifically public cloud object storage. The question becomes how often is storage consumed just temporarily or for short term? The answer is not very often.

This assertion indeed goes against the conventional wisdom and as a result raises many additional questions among IT storage pros.

- How was this conclusion reached?
- What is being compared?
- What assumptions were made?
- Are they realistic?
- Over what period of time?
- Is the public cloud storage "on-demand" feature being taken into consideration?
- What about operating expense costs of on-prem storage?

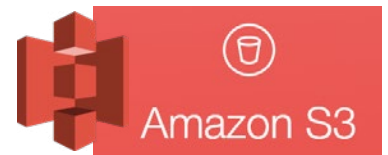
These are all sound valid questions. The best way to answer them is to take a look at a realistic comparison example. Since public cloud storage is primarily utilized by small to medium IT organizations and the mid-tier, a good comparison for on-prem would be unified storage such as the Nexsan Unity™ Unified Storage System. Nexsan Unity is production proven, easy to deploy, easy to access multi-protocol system (NFS, SMB a.k.a. CIFS, iSCSI), with optional secure active archiving, significant scalability, and is in the mainstream for cost. For the public cloud storage, the choice is the definitive market leader AWS simple storage service (S3) standard object storage.

S3 is significantly slower than Nexsan Unity with appreciably higher latencies and would not do nearly as well in any performance test. On the other hand, S3 delivers essentially unlimited scalability and maintains a replica within the local region or out of region. AWS S3 standard public cloud storage is what most IT storage pros mean when referring to cloud storage. And even though AWS also provides elastic block storage (EBS) and elastic file storage (EFS) that would be more competitive on a performance basis, they are simply non-competitive from a cost basis. In other words they cost way too much. This brief will provide a comparison between AWS S3 standard and Nexsan Unity, and then do a quick look at AWS EFS (which is half the cost of EBS). The key to any comparison is to start with the assumptions first.



COMPARISON ASSUMPTIONS

BASELINE ASSUMPTIONS FOR BOTH AWS S3 AND NEXSAN UNITY
5 yr comparison
480TB of consumed capacity to start
Unstructured data growth rate @ ~ 15%/yr or 1.19%/mo compounded
~ 960TB consumed at the end of 5 yrs <ul style="list-style-type: none"> Note: Is below analyst projections - faster growth favors Nexsan over AWS Works out to an average of 695TB/mo total over the 5 yrs



AWS S3 SPECIFIC ASSUMPTIONS CONCERNING STORAGE COSTS & TRANSIT FEES [‡]
Avg file (object) size is 1 MB
Avg read-out to internet/mo = ~ 15% of total capacity <ul style="list-style-type: none"> 15% read-out aligned with industry avg^{‡‡} of active data frequently accessed
Avg PUT, COPY, POST, LIST requests/mo @ ~ 15% file # total
AWS prices based on lowest cost US East Region (VA)
Storage costs <ul style="list-style-type: none"> \$.023/GB/mo for 1st 50TB \$.022/GB/mo for next 450TB \$.021/GB/mo for next 500TB
PUT, COPY, POST, LIST request costs from S3 <ul style="list-style-type: none"> \$.05/1,000 requests
GET and other request costs from S3 <ul style="list-style-type: none"> \$.04/10,000 requests – assume these costs are near zero so not calculated
S3 Storage management inventory pricing <ul style="list-style-type: none"> \$.0025/million objects listed/mo
S3 Storage class analysis pricing <ul style="list-style-type: none"> \$.10/million objects monitored/mo

[#]All AWS pricing publicly available from the AWS website and subject to change without notice

^{##}2014-2015 DS Consulting survey of 376 IT organizations: active files ranged from 5 to 20% of total



NEXSAN UNITY SPECIFIC ASSUMPTIONS
Unity 4400 or 6900 active-active system configured w/>1PBs raw capacity <ul style="list-style-type: none">• Formatting & RAID consumes (conservatively) ~ 25% of raw capacity
Sophisticated data reduction technology increases effective usable capacity <ul style="list-style-type: none">• Effective usable capacity depends on data dependent data reduction ratios• Data deduction ratios range from 2:1 to 5:1 of usable capacity• Effective usable capacity then ranges from 1.5PB to 3.75PB
5 yr Total Cost of Ownership (TCO) for Unity 4400 <ul style="list-style-type: none">• \$379,120 – based on street prices• Includes 5 yr premium 7x24x365 4 hr onsite services• Includes power and cooling costs @ \$.11/KW hr• Includes annual rack cost @ \$12,000
5 yr TCO for Unity 6900 <ul style="list-style-type: none">• Includes 2x DRAM and a flash SSD FASTier cache of 1.6TB per controller• NOTE: there is no AWS S3 comparable• \$414,382 based on street prices

CALCULATING THE COSTS

Running the numbers reveals some staggering numbers. AWS S3 will cost **\$1,451,799¹** over 5 years versus the Nexsan Unity having a 5 yr TCO of between **\$379,170²** and **\$414,382²** depending on performance requirements. It means AWS S3 is **350%** to **383%** more costly than Nexsan Unity on-prem.

Using the average monthly total storage consumption of 695TB³, the average AWS S3 monthly cost/GB = **\$0.0363**. Using that same average monthly total storage consumption, the average Nexsan Unity on-prem monthly cost/GB ranges from **\$0.009** to **\$0.01**. Breakeven for the Nexsan Unity versus the AWS S3 typically occurs in less than 18 months. Every month thereafter with the Nexsan Unity is money in the bank.

It's always possible that the AWS transit fees assumptions may be estimated a bit too high, although anecdotal user reports that the estimated transit fees are probably too conservative. But rather than debate the point it is a simple matter to eliminate them for the sake of argument. In doing so, the 5 yr TCO for AWS drops down to **\$908,436⁴**. In this grossly underestimated AWS S3 TCO scenario it's still more than twice as costly as either the Nexsan Unity 4400 or 6900. The average AWS S3 standard monthly cost/GB drops down to **\$0.0218**. Granted this is an unrealistically low estimate of the S3 standard costs. However, it's still a worthwhile exercise to demonstrate the point that public cloud storage is not less expensive than on-prem storage and is in fact substantially more costly.

¹AWS S3 standard TCO calculations are based on the assumptions listed in the tables above and this equation: 60 month SUM total of AWS S3 storage costs + PUT, COPY, POST, and LIST S3 transit fees + S3 storage management inventory fees + S3 data storage analysis fees.

²Nexsan Unity TCO is based on the typical street price for these configurations and OpEx assumptions in the tables above.

³Calculated by summing the storage capacity consumed each month during the 5 years and then dividing by 60.

⁴AWS S3 TCO calculation only based on the 60-month sum total of the S3 storage costs based on assumptions in tables above.

⁵Calculated with the following formula: 695TB*1000*.3/GB*60 = \$12,510,000.



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About the author: Marc Staimer, as President of the 19-year-old Dragon Slayer Consulting in Beaverton, OR, is well known for his in-depth and keen understanding of user problems, especially with storage, networking, applications, and virtualization. Marc has published thousands of technology articles and tips from the user perspective for internationally renowned online trades including many of TechTarget's Searchxxx.com websites as well as Network Computing. Marc has additionally delivered hundreds of white papers, webinars, and seminars to many well-known industry giants such as: Brocade, Cisco, DELL, EMC, Emulex (Avago), HDS, HP, LSI (Avago), Mellanox, NEC, NetApp, Oracle, QLogic, SanDisk; as well as smaller, less well-known vendors/ startups including: Asigra, Clustrix, Conduvix, DH2i, Diablo, FalconStor, Gridstore, Nexenta, Neuxpower, NetEx, NoviFlow, Permabit, Qumulo, StorONE, Tegile, and many more. His speaking engagements are always well attended, often standing room only, because of the pragmatic, immediately useful information provided. Marc can be reached at marcstaimer@me.com, (503)-579-3763, in Beaverton OR, 97007.

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Yeah but...

Then why do so many people believe that public cloud storage such as AWS S3 is less costly? Perception and reality do not always align. And as previously pointed out, public cloud storage can be less costly if the timespan for that storage is less than 18 months. Most of the time, non-S3 users will only look at the S3 storage costs and ignore the transit and other fees assuming they are not much. In some cases a non-S3 user will presume S3 infrequent or glacier with their lower storage costs and much higher transit and retrieval fees will server their purpose when it does not. There is legitimate rationale to use S3 object storage including:

- The business or organization does not currently have an IT data center.
- They want to get rid of the data center or data centers they have.
- Or building, maintaining, and managing a data center, storage, and infrastructure are too costly.

When an organization decides it doesn't want their own data center and on-prem storage, lower on-prem storage costs will not change that decision.

There are also several erroneously perceived public cloud storage technical advantages such as:

- Better data resilience because of data being stored in more than one data center and potentially out of region. Storing the data in multiple data centers only protects it in the event of the rare site disaster. It does not protect against human errors, human maliciousness, Ransomware, Malware of all kinds, or software corruption. That needs some form of data protection such as zero capacity snapshots like those provided with Nexsan Unity.
- Better data resilience because of erasure coding. Erasure coding only protects against disk or object storage node hardware failures. Similar, albeit more robust than parity RAID, erasure coding commonly adds significant latency negatively affecting application performance a.k.a. response time.

In the end, on-prem storage systems such as Nexsan Unity, offer more functionality (zero capacity snapshots, data reduction, higher performance, local control, automated archiving, and more) for a much lower total cost of ownership than public cloud object storage such as AWS S3 standard.

And what about AWS Elastic File Services (EFS)? How does that compare? EFS is more than an order of magnitude (10x) more expensive than AWS S3 for storage at \$.30/GB/month plus EC2 costs. EFS is only available for EC2 applications. To put this in perspective, the same storage costs for EFS alone would be more than **\$12.5M⁵** (does not include any EC2 costs). It is a non-starter and simply not a competitive public cloud storage alternative.