

CONTRASTING ECHOLEAF SAFEROOM™ AND CLOUD STORAGE FOR RAPID RECOVERY



INTRODUCTION

When comparing cloud storage and local EchoLeaf SafeRoom™ LTO (linear tape-open) tape data storage for assets that are frequently accessed and/or need to be retrieved quickly after a malware attack, several factors come into play. These include network security requirements, costs (both short-term and long-term), implementation complexity, ease of access, and return on investment (ROI). While this paper focuses principally on the higher costs, security, accessibility, complexity, risks, and resource demands of public clouds, they apply to private clouds as well.

THE ECHOLEAF SafeRoom Suite™

The patented EchoLeaf SafeRoom Suite™ solution leverages and adds value to linear-tape-open (LTO) technology, which has been a mainstay in data storage for decades and is renowned for its reliability, longevity, and cost-effectiveness. Immutable LTO tape storage adds a crucial layer of security by ensuring that data, once written, cannot be altered, or deleted. This feature makes it an ideal choice for archival storage, compliance, and protection against ransomware and other cyber threats.

COSTS

EchoLeaf SafeRoom™ LTO

The EchoLeaf SafeRoom™ delivers the lowest cost per Terabyte using LTO tape storage when compared to other storage mediums like disk or solid-state drives (SSDs). There are never any charges incurred when you store or retrieve your data from the EchoLeaf storage library. LTO tapes have a long lifespan (typically 30 years), and the per-gigabyte cost decreases as the amount of data stored increases.

Also, unlike active storage systems that require continuous power, LTO tapes do not consume power when not in use or have the maintenance costs of spinning disk. This significantly reduces energy and operational costs, making the EchoLeaf SafeRoom™ a ‘green’ and cost-effective storage solution.

This cost efficiency makes it an attractive option for organizations looking to store data needing immediate recovery and/or large volumes of data, without incurring high expenses.

Public Cloud Storage

Public cloud storage on the other hand, typically involves a pay-as-you-go model, where you pay for the storage space you use along with the network and transfer fees. This may provide lower upfront costs but in the long term, costs add up and can become increasingly unpredictable based on volume and usage. This is especially true if you require large amounts of storage or frequent access to data.

There are additional costs associated with cloud data transfer and retrieval, including egress charges, as well as delays in data retrieval. These delays can be exceptionally long if the cloud provider has moved the data offline, as data will first need to be transferred to the cloud provider’s servers, perhaps across regions, then transferred across a public/private network to your facility.

EASE OF ACCESS

EchoLeaf SafeRoom™ LTO

Access Speed: With EchoLeaf, data access is local to the customer environment unless an off-site or on-site redundant system is in place using, for example, EchoLeaf Gemini™, which enables automated multi-site / multi-system data replication for higher redundancy protection.

The EchoLeaf SafeRoom™ access and transfer speeds are not constrained by external networking conditions, persistence of connection to the cloud, public/private internet latencies, and packet loss. A nominal load-to-ready time of 17 seconds and tape-to-local-disk transfers of over 400MB/s (native) per LTO drive over SAS, makes access to data reliable and rapid.

Scalability: The EchoLeaf SafeRoom™ solution is easily and cost-effectively scalable from 10’s of Terabytes to over 11 Petabytes by expanding the in-library Sentry software license, adding additional tapes (within or external to the library), adding library modules, and adding drives.

Public Cloud Storage

Access Speed: Access to your assets is impacted by many factors, including how and where the assets are stored by the cloud provider (disk, tape, etc.), if data is in a high-availability region, if data transfer is within or across regions, and the type, quality, and persistence of your network connection.

Scalability: Cloud storage is highly scalable, but the meter never stops running, which results in increasing prices for both storage and retrieval.

NETWORK SECURITY AND REQUIREMENTS

EchoLeaf SafeRoom™ LTO

Security: By definition, The EchoLeaf SafeRoom™ physical air gap and immutable storage provide the highest level of security and the strongest defense against cyberattacks, including ransomware.

When LTO tapes are not in a drive, they are isolated and completely offline, not physically connected to ANY network or IT device - they can even be removed from the library and stored in a physical safe or alternate off-site location.

Malware cannot directly infiltrate a true physical air-gapped system.

Network: The EchoLeaf SafeRoom™ solution is non-disruptive to existing systems and appears as a simple drive location, making it compatible with any backup operation that can read/write to an NFS target, and is easy to deploy. Minimal networking requirements for

data transfer are needed, as data is stored locally.

Public Cloud Storage

Security: This relies on the cloud provider's security measures, which can vary and are impacted heavily by internet connectivity. There are potential vulnerabilities to external threats that require robust cybersecurity measures for data in transit.

Cloud storage is also vulnerable to cyber threats like Distributed-Denial-of-Service (DDoS) attacks, insider threats, or potential breaches of the cloud provider's infrastructure.

In addition, according to a recent IBM studyⁱ - Phishing, Compromised Credentials, and Cloud Misconfigurations are the top three attack vectors for data breaches.

Although 'logically' isolated, online cloud storage (aka 'virtual' air-gapped systems) operates within the same physical network infrastructure. If malware breaches the network and exploits vulnerabilities in the backup software or configuration, it could reach the cloud backups.

Network: Cloud requires a persistent, stable, and fast internet connection for both accessing and transferring data. During a network interruption, accessing data becomes problematic and slow, if not completely unavailable.

Cloud also introduces multiple variables that delay the download of data. Even with a fast connection, high network

latency, network congestion or bandwidth throttling (common with cloud providers or ISPs during high-demand periods) can cause delays in establishing secure connections, or negotiating data transfers, resulting in a slow and unpredictable retrieval.

RETURN ON INVESTMENT (ROI)

EchoLeaf SafeRoom™ LTO

ROI Considerations: For organizations that have datasets with long-term retention needs or requiring frequent or immediate access, as in the case of disaster recovery, LTO tape storage offers a significantly higher ROI due to lower long-term storage costs, local nature of the datasets, and no added hidden costs to access.

Longevity: While the LTO consortiumⁱⁱ notes that when properly stored the life of LTO media is rated at 30+ years, each generation of LTO tape introduces substantial improvements in speed, capacity, and accessibility to meet changing business needs and growing data volumes, so it makes sense that migration to the latest technology will likely occur sooner.

Today's LTO 9 has a capacity of 18TB per cartridge (native) and a data transfer rate of over 1TB/hr, and the LTO roadmap plans to increase capacity to 576TB native by Generation 14.

Lowest Cost per Terabyte: LTO technology is unrivaled as a low-cost, high-capacity, reliable, portable, and secure solution for data protection. The

ten-year storage cost of LTO compared to 'all disks' systems is over 86% lower and for 'all cloud' is over 66% lower. Add the extra egress costs, data retrieval latency, and unpredictability with cloud storage, and it is clear that LTO is an easy choice for long term archive and defense against ransomware, with rapid and effective recovery.

Public Cloud Storage

ROI Considerations: The ROI of cloud storage depends on the organization's data access patterns. For businesses that require infrequent access to large datasets, cloud storage can offer flexibility and low upfront costs. However, over the long term, recurring costs can significantly diminish ROI. Cloud storage may also have hidden and variable costs like egress fees for large data retrievals.

Cost Management: Optimizing ROI requires selecting appropriate storage tiers (e.g., hot, cold, archive) based on data access needs, which necessitates more complex management and the need to change as operational requirements change. Recovery data must be stored in readily accessible (e.g. most expensive) hot storage to be usable and even then has a transfer delay to access and a dependence on stable and secure networking.

RECOVERY AFTER MALWARE ATTACK:

EchoLeaf SafeRoom™ LTO

The EchoLeaf SafeRoom™ physical air-gap data protection solution leverages storing backup data on LTO tape media that are

physically disconnected from any network.

With the EchoLeaf solution, LTO media are held in an automated robotic library with the ability to create multiple copies and automatic synchronization with remote off-site or on-site locations, typically a geographically separate facility.

This configuration, combined with other EchoLeaf patents, enables drive-virtualization, compartmentalization, and fast access to stored data, along with numerous other protection advantages and extremely rapid recovery from any malware attack, including Zero-Day.

Public Cloud Storage:

Many variables that greatly impact recovery from a malware attack or even human error come into play when attempting to access critical data from the cloud, such as level of storage, network reliability, speed of the network connections, quality and security of the

file transfer, size of the datasets, and unpredictable costs among others.

As can be seen in Table 1, data transfer from the cloud, under ideal conditions, be it TCP or UDP, can take days, weeks, and even months.

This time needed to transfer is AFTER the cloud-stored data is recovered from the deep archive and moved to the cloud provider's online servers.

In the case of UDP, aside from requiring installation and maintenance of the file acceleration application, such an application adds the risk that the file transfer application itself becomes compromised, as happened in last year's massive MOVEit software breachⁱⁱⁱ. Tens of millions of individuals and numerous organizations around the world in industries including, financial services, airlines, government agencies, pension funds, and more, had business and

Time to Complete Data Recovery of			
Method	1TB	10TB	Considerations
EchoLeaf SafeRoom Suite™ (with ONE LTO Drive)	1 Hour	10 Hours	• NO Egress Costs • NO Accelerated Transfer Software Cost • NO Impact/Delays from External Network Conditions • NO Security Concerns from use of an External Network • EchoLeaf Server "bare metal" restore to the original server or a different server
TCP from Cloud Archive (est xfer speed of 7.5Mbps)	1.9 weeks AFTER data is retrieved from deep cloud archive	4.5 Months AFTER data is retrieved from deep cloud archive	• PLUS - Egress Costs • PLUS - Manual Restore • PLUS - Requires an on-prem server and storage to be restored in order to perform the transfer
UDP from Cloud Archive	2.4 Hours AFTER data is retrieved from deep cloud archive	23.9 Hours AFTER data is retrieved from deep cloud archive	• PLUS Egress Costs • PLUS Manual Restore • PLUS Cost of Accelerated Transfer App • PLUS - Requires an on-prem server & storage to be restored • PLUS - Requires installation & maintenance of the file acceleration application

Assumptions: Network Bandwidth - 1Gbps, Latency - 40ms, Packet Loss - 0.24%, Transfer Locations - USA

Table 1. Time to Complete Data Transfer

personal data stolen by a Russian-affiliated cyber gang.

Cloud storage that is ‘online’ is also susceptible to the same malware that has impacted the local network. As noted earlier, if malware breaches the network and exploits vulnerabilities in the backup software or configuration, it could reach the cloud backups.

These performance considerations, vulnerabilities, costs, and the unpredictability of logical air-gap and cloud storage data retrieval, make it risky to rely on the cloud when time-to-recovery really matters.

SUMMARY

The best choice depends on the specific use case and needs of the organization, particularly the frequency of data access, the value placed on immediate

accessibility, the size of datasets, the length of archive time, and the desire for high security and immutability.

By providing a true physical air-gap versus a ‘virtual’ or ‘logical’ air-gap and cloud, the EchoLeaf SafeRoom™ solution delivers unparalleled security and the strongest defense against malware and ransomware through complete data isolation.

Combined with dramatically fast data recovery and rapid deployment that is non-disruptive to your current workflows, requiring only that any backup application or command be capable of writing to a simple NSF mount, and numerous other patented protection advantages, the unique EchoLeaf environment provides a cost-effective and scalable solution for businesses concerned with cyber threats and disaster recovery.

Echo Your Data Today™!

To learn more, please visit www.echoleafsystems.com.

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ⁱ IBM, Annual Cost of a Data Breach Report, 2024

ⁱⁱ <https://www.lto.org/benefits-of-lto/>

ⁱⁱⁱ https://en.wikipedia.org/wiki/2023_MOVEit_data_breach#References