MODERNIZING THE DISPERSED ENTERPRISE WITH CLOUD STORAGE GATEWAYS AND OBJECT STORAGE

ABSTRACT
To reduce the cost and complexity of Remote Office Branch Office IT, many firms are centralizing applications and delivering them via cloud. However, this does not necessarily eliminate the requirement for local storage resources that are needed for fast, “always-on” access and local file sharing. This white paper explains how CTERA cloud gateways and Dell EMC® Elastic Cloud Storage (ECS™) Appliance deliver efficient, low-cost, cloud-enabled local storage for enterprises and service providers.

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EXECUTIVE SUMMARY

Software-as-a-Service and enterprise cloud services are changing the way companies deliver technology to Remote Office Branch Office (ROBO) workers. ROBOs are particularly challenging due to the scarcity—or lack—of on-site IT staff, their dispersion (sometimes across great distances) that make WAN connectivity challenging, and, in some cases, the sheer number of sites, which multiply cost and IT management overhead.

Off to the Cloud

Today, the Web services movement has allowed organizations to support their branches with applications served via cloud from centralized data centers. The flattening of the data center with commodity hardware has further reduced the cost of application centralization.

Data at the Edge

But network virtualization and the availability of high-powered applications via the cloud are not enough. Organizations still need to create, manage, and store some data at the edge. This data is related to resources that cannot tolerate cloud latency such as home directories, desktop/laptop backup, collaboration, and surveillance video.

Legacy Technologies Not Up to the Task

While the necessity of supporting some local storage in the ROBO environment persists, that doesn't mean that the currently installed technologies are up to the task. In fact, the requirements of edge storage in the cloud-based world cannot be met by traditional technologies for a number of reasons that will be discussed in this white paper.

Searching for Simplicity

Enterprise and service provider storage engineers, IT and storage architects, and CIOs are searching for simple, centrally managed cloud-based solutions that are augmented by cloud storage gateways to deliver low-cost, zero-latency, and always-on services to the branch office or customer.

Enterprises need a single fully cloud-enabled solution that modernizes both the ROBO and data center environments and—at the same time—simplifies the way they serve, protect, share, and secure corporate data via the cloud.

Reduce the Cost of Ownership

Dispersed architectures can now be radically modernized using a combination of next-generation cloud-enabled storage tools and object storage. Through this approach enterprises can slash the cost of ownership by 50 to 90 percent compared to current solutions that are based on previous generation, non-cloud-enabled technology. This combination is available today with the integration of CTERA cloud storage gateways on the edge with Dell EMC ECS Appliance object services at the core.

AUDIENCE

This whitepaper is intended for systems architects, corporate IT architects, storage engineers, and CIOs. It focuses on the integration of the Remote Office Branch Office storage environment with centralized cloud-enabled application delivery.

Choosing the Right ROBO Solution

Many organizations have effectively eliminated the pains of ROBO IT management by centrally hosting remote office applications and delivering them as Web-based services. Without the need for the branch office server and business IT infrastructure of the past, organizations are re-thinking how they deploy data storage to remote offices.

Organizations have several options when it comes to deploying ROBO storage. You must take into account certain factors when finding the solution that meets your needs.

ROBO Storage should be able to lower TCO by replacing traditional file storage at the remote offices with a well-designed cloud based storage solution. To be a good fit, the solution must address the following three characteristics:
• Branch file storage with automatic replication: The solution must provide the benefits of cloud-based storage while also providing the performance of fast local storage.

• Strong security and WAN optimization: The solution must provide an efficient, fast, and secure environment for all cloud object data.

• Central management to minimize remote IT: The solution must provide a single point of management, as well as automation and self-provisioning mechanisms.

Today’s ROBO user needs simple, centrally managed solutions that leverage the cloud for low-cost and highly available:

• Remote office storage
• Local file sharing
• Hybrid backup
• Snapshots
• End-point data protection
• Security
• Mobile collaboration

Let’s take a look at the approaches available for ROBO IT today.

• Traditional
• Caching
• Sync/replicating (CTERA/Dell EMC)

Option 1 Traditional

Architectural Description

OPTION 1 TRADITIONAL

Architectural Description

Figure 1

Traditional Approach Pros and Cons
- Characterized by legacy file servers, tape or D2D backup systems, deduplication tools, and inefficient silos of storage, ROBO Storage is often expensive to maintain and difficult to control and keep secure.

- Traditional approaches to ROBO storage rely on file servers and dedicated remote backup solutions. These are invariably expensive and difficult to manage on a large scale.

- Conversely, approaches that call for fully centralized storage with only remote access for branches are often too expensive or simply technically impractical to implement at scale.

- What's more, they are highly susceptible to network availability and performance issues, and ignore the local storage and file sharing needs of the ROBO environment.

- The applications at the edge don’t require the capacity afforded by traditional technologies. This leads to costly underutilization.

- Traditional technologies are ill-equipped to handle new styles of cloud storage and disaster recovery. They do not integrate well with other file protection and serving resources such as backup and file sync and share. And they can’t be managed centrally at scale. Add that up and you have lower productivity, tremendous overhead, and high hardware and software operating costs.

**OPTION 2: CACHING**

**Architectural Description**

- A subset of the total volume is cached locally.
- One Volume Can Be Exposed Across Many Gateways.
- Data Archived to Cloud
- Data Retrieved When Needed

**Figure 2**

**Figure 3**

**Example Application:**
- Branch Office Backup SW

**Windows Server 2012 R2**
- SMB File Services
- NFS File Services
- iSCSI Software Target
- DFS Replication
- BranchCache
- Data Deduplication
- Storage Spaces
- Print Services

**Backup to Azure with Microsoft System Center and Azure Backup Agent**
Caching Approach Pros and Cons

- Cloud-caching gateways are built with high-cost flash storage and require expensive server technology so the cost is prohibitive for small to medium data sets.

- De-dupe is performed in-server. The data is then rehydrated and sent to the cloud.

- While most caching gateways have the option of pinning data to always keep a local copy, this pinning capability is very limited, and assumes that the primary storage medium will be the cloud and not the local appliance.

- It is also possible to synchronize several gateways across a unified name-space, allowing for collaborative file-locking for use-cases such as work on architectural drawings.

- Caching gateways are suitable to cases where the bulk of data is “on-ramped” to the cloud with the expectation that it will not require frequent access, and for sharing files on a global namespace across a small number of sites.

- Caching gateways are ill-suited to use-cases where lots of local storage and sharing takes place, or for implementations that include more than a handful of sites, due to cost and management considerations.

OPTION 3: SYNC/REPLICATING GATEWAYS

Architectural Description

Figure 4

Figure 5
Sync/Replicating Gateways Approach Pros and Cons

- Replicating gateways act as local NAS devices with efficient, configurable replication to the cloud for DR and sharing purposes.
- In comparison to caching gateways of similar capacity, they are far more cost-effective.
- Sync services work across physical, virtual, and mobile devices.
- Syncs to other gateways, to the cloud, and to mobile devices and more.

Dell EMC/CTERA Solution Architecture

It is possible to greatly simplify ROBO storage and dramatically lower TCO by replacing traditional file storage at the remote offices with a well-designed cloud-based storage solution.

The solution must address the following four needs:

- Branch file storage with automatic replication: The solution must provide the benefits of cloud-based storage while also providing the performance of fast local storage.
- WAN optimization: The solution must provide an efficient protocol to minimize impact on WAN connections and function even in high-latency environments.
- Built-in security: The solution must provide strong encryption capabilities and ensure that data is not compromised on its way between the ROBO and the cloud, as well as while it is stored in the cloud.
- Central management to minimize remote IT: The solution must provide a single point of management, as well as automation and self-provisioning mechanisms.

The solution must leverage the cloud for low-cost and highly available:

- Remote office storage
- Hybrid backup
- Snapshots
- End-point data protection
- Security
- Mobile collaboration

CTERA cloud storage gateways and Dell EMC ECS Appliance object storage deliver those requirements along with a significant reduction in IT management overhead and hardware and software costs. The Dell EMC/CTERA solution provides a complete cloud storage solution that combines managed cloud storage gateway appliances and end-point software agents.
This comprehensive solution eliminates legacy file servers, proprietary backup systems, and inefficient storage silos.

**CTERA Overview**

At the heart of the solution is the CTERA Portal. The Portal provides a centralized way to manage all aspects of storage and data protection service provisioning. CTERA Portal streamlines storage task management, including user account management, storage quotas, real-time monitoring, firmware upgrades, extensive logging, and reporting.

**CTERA Portal Deployment**

- Remote sites install CTERA Cloud Storage Gateways for local storage access performance, coupled with cloud-based data protection aggregated for all on-premises users.
- Individual users install the CTERA agent on their workstations for file synchronization and reliable backup, both done directly to the cloud.
- Mobile workers use the CTERA Mobile App to access and share files from smartphones and tablets.

This combination of the CTERA Platform’s enterprise cloud storage services with Dell EMC ECS object storage enables enterprises and service providers to provide a future-proof design with support for leading enterprise and commodity-based NAS, block storage and next-generation object storage software.

**CTERA Portal Features**

- CTERA gateways support SSO and global, source-based encryption across thousands of gateways with customers as the exclusive key owners.
- Within the CTERA platform, all data is stored and accessed via cloud storage gateways, desktop agents, server agents, CTERA’s mobile app, and over WebDAV API. These clients connect to the CTERA Portal, which sits in the data path and acts as a broker between the clients and one or more cloud storage systems (ECS, Dell EMC Atmos®, etc.) configured as storage nodes.
- The CTERA Portal application stores objects on storage nodes—deduplicated and encrypted—using the appropriate REST APIs for the node’s storage type. The relevant portal storage nodes include Dell EMC Atmos, Amazon S3, and OpenStack Swift.
- By leveraging scalable cloud storage and managed appliances, CTERA can deliver solutions starting at under $1,000 per branch that far exceed the capabilities of more expensive, separate components.
• Patented management tools enable tens of thousands of appliances to be supported from one central console simplifying ROBO appliance administration, updates, and support.

• Appliance snapshots are synced to a cloud storage system of your choice, on-premises, or to a public cloud, where CTERA’s support for object storage saves up to 50% on data center storage.

• Source-based encryption and source-based deduplication to the cloud ensure that WAN communication is secure and efficient.

• CTERA Cloud Storage Gateways were designed to reduce organizational costs at every level. Designed from the ground-up for the era of cloud storage, CTERA gateways are lean cloud appliances that don’t suffer from traditional IT bloat.

• CTERA’s centralized management tools enable organizations to centrally push firmware and configuration updates remotely. Support headaches are eliminated when IT can diagnose branch office appliance and backup software issues remotely. CTERA’s delivery middleware has proven to scale to manage tens of thousands of devices.

• In the cloud data center, CTERA’s middleware supports next-generation Dell EMC object storage including Atmos and ECS Appliance to dramatically increase storage scalability and lower data center costs. This provides organizations with the flexibility to pick the cost parameters, scale, and features to meet the needs of the business.

Dell EMC Object Based Software-defined Storage
Dell EMC Software-Defined Storage helps organizations lower traditional storage costs by abstracting hardware and software resources to allow compute and storage resources to scale independently. This paves the way for rapid deployment of modern scale-out storage architectures.

DELL EMC ELASTIC CLOUD STORAGE (ECS)
A turnkey, software-defined object storage cloud platform, ECS Appliance integrates powerful software on Dell EMC-certified commodity hardware. It combines the cost advantages of commodity infrastructure with the reliability, availability, and serviceability of traditional arrays. The ECS Appliance supports multiple data types and access protocols to support the broadest range of applications on a single platform. ECS Appliance also provides a single management view of a globally distributed infrastructure and supports multi-tenancy and detailed metering. This enables enterprises and service providers to easily deploy Storage-as-a-Service.

Other features include:
• Complete, turnkey commodity hardware platform provides up to 60% lower TCO than public cloud storage services
• Assures the broadest application support—object, file, and HDFS—from a single platform
• Patent pending object storage engine delivers an unmatched combination of storage efficiency and global access to data
• Terabyte to exabyte architecture gives customers flexibility and control to scale-out as dictated by business need
• Commodity hardware deployment delivers public cloud economics but retains enterprise-level reliability, availability, and serviceability
• Cloud storage in a box with seamless management, multi-tenancy, metering, and self-service access

THE CTERA AND ECS CONNECTION
ECS provides a variety of REST-based API protocols to create and manipulate its object data storage. CTERA connects to ECS using its S3 API. The S3 API is a commonly understood industry-standard protocol that allows developers to create, update, and delete objects. By using the S3 API, CTERA replaces the complexity of proprietary APIs, allowing them to build on an industry-proven interface and facilitate increased speed to market.

Dell EMC/CTERA Use Cases
CTERA cloud storage gateways and Dell EMC ECS Appliance offer solutions for two distinct use case scenarios:

• Enterprise ROBO
### ROBO

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Criterion Met?</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branch File Storage with Automatic Replication</td>
<td>Yes</td>
<td>Remote office and branch employees have the benefit of fast local storage through the CTERA platform’s centrally managed cloud gateway appliances, user agents, and mobile apps, while its integration with cloud object systems like Dell EMC ECS seamlessly integrates all data with all locations.</td>
</tr>
<tr>
<td>Strong Security and WAN Optimization</td>
<td>Yes</td>
<td>Customers own and control all data, authentication, and encryption information. The CTERA platform does not require communication or operation with any third-party service or data center, and tenants can control all of their user authentication as well as own their own private encryption keys. Data deduplication across its three data services typically provides high optimization ratios saving bandwidth and delivering faster file operation performance.</td>
</tr>
<tr>
<td>Central Management to Minimize Remote IT</td>
<td>Yes</td>
<td>The CTERA platform provides single-pane-of-glass management of: • Remote agents, mobile apps, appliances, and users with role-based delegation and control over tenant user and administrator privileges. • Template-based management allows for centralized provisioning and adjustment to user and appliance configuration. • System event logging with real-time monitoring and alerting on connectivity, backup failures, etc.</td>
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### SERVICE PROVIDERS

Service providers face additional challenges as they attempt to make cloud storage usable for applications that are not purely in the cloud. Security of data as it moves to and from the cloud, WAN speed and latency in remote sites, and integration with existing IT systems and applications are all issues that service providers require their services to resolve.

To be a good fit, the solution must address the following three characteristics:

- **Enterprise endpoint and branch office storage solutions**: The solution must efficiently extend cloud-based NAS and backup functionality to remote offices and mobile users.

- **White-label ready enterprise data storage services**: The solution must support service provider and large enterprise IT branding requirements.

- **Infrastructure and services need to be 100% on premises**: The solution must support private cloud infrastructure for the service provider, and allow customers to own and control all data, authentication, and encryption information.

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</tr>
<tr>
<td>White-label ready enterprise data storage services</td>
<td>Yes</td>
<td>The CTERA Data Services Platform and all data storage services are white-label ready.</td>
</tr>
<tr>
<td>Infrastructure and services need to be 100% on premises</td>
<td>Yes</td>
<td>All customer data, metadata, authentication and encryption traffic can be contained entirely within a customer’s data center and firewall.</td>
</tr>
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Case Study
A recent CTERA project involved the upgrade of 10,000+ remote offices from Windows to CTERA. The customer spent around $30M while saving $70M (Figure 7) compared to the former approach. It is an enterprise platform managed as one solution. The nuts and bolts of the company depend on it but it is not costly.

- Centrally managed devices using CTERA Portal software
- Replication to geo-redundant object storage cloud
- SSO with tight Active Directory integration
- Dramatic savings vs. single-site alternatives

Figure 7

Conclusion
Enterprises and service providers need simple, centrally managed, cloud-based solutions that are augmented by cloud storage gateways to deliver low-cost, zero-latency, and always-on services to the branch office or customer. As shown in this white paper, CTERA’s efficient cloud storage gateways and Dell EMC ECS Appliance deliver a single, fully cloud-enabled solution that modernizes and simplifies the way data is served, protected, shared, and secured via the cloud.

The CTERA platform’s extensible hybrid architecture addresses the major barriers to cloud storage adoption—including cost, performance, security, and management—with cost-effective appliances, source-based encryption, and full compatibility with existing IT authentication systems to easily integrate into any distributed IT environment.

Dell EMC ECS Appliance is a complete, turnkey, commodity hardware platform with an unmatched combination of storage efficiency and global access to data. It delivers public cloud economics but retains enterprise-level reliability, availability, and serviceability. What’s more, its terabyte to exabyte architecture gives enterprises and service providers the flexibility to scale-out as dictated by business needs.

Together, CTERA cloud storage gateways on the edge and Dell EMC ECS Appliance object services at the core deliver efficient, low-cost, cloud-enabled local storage.