

Accelerating Cloud Based Services



A White Paper

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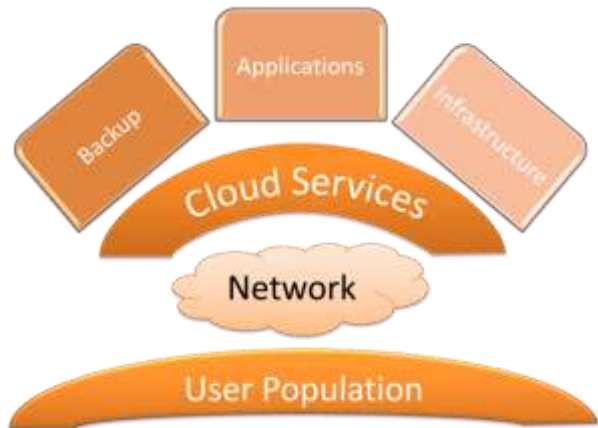
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Executive Summary

Many businesses are embracing Cloud Computing as a new way of providing IT services to users across their organizations. Cloud Computing promises to simplify IT by providing a low-cost service hosted and managed externally allowing immediate deployment of infrastructure and software, a rental model to avoid capital expenditure, and the ability to expand and retract IT resources as and when the business requires.

Cloud based services make a lot of sense. The customer gets a service at low-cost, easily managed, taking pressure off internal IT staff. Providers can deliver a service efficiently by focusing on specific features and functionality and providing it for many customers. Cloud-based applications have the advantage that they are available from anywhere at any time. Since the user is always remote, it is as easy for them to access a system while in the office, while working remotely or from home.



However, as the user is always remote, there is a fundamental issue with cloud services. Users are now always dependent on a quality and consistency of the network between them and the application. Bandwidth has increased, but the burden of network heavy applications transferring large content, and the effect of latency can significantly affect the experience the user gets when accessing a cloud application.

WAN optimization helps avoid issues with user acceptance of cloud based services by speeding up access to the remote applications. Replify Accelerator provides software-based WAN Optimization, designed from scratch to provide easy deployment and management in cloud environments. It is ideally suited to providing an excellent user experience, without introducing additional management overheads for either the cloud provider, or the customer. By cutting down network traffic by between 70 and 90 percent the user experience is dramatically improved and users can access cloud services as if they were accessing a local system.

“Through 2013, at least 60% of enterprises will experience slow or inconsistent application performance issues from externally placed applications due to improper network design”

*Bjarne Munch, Gartner from:
“Is Your Network Design the Weak Link in Cloud Computing?”, 27 August 2010.*

Introduction

Cloud computing is being adopted by the industry as the new way to provide IT services. Low cost, low management, immediate deployment and elasticity of resourcing and a rental model makes a cloud service much better aligned to the requirements of customers requiring IT compared with traditional capital purchasing. The large technical companies like Microsoft, Google, Salesforce and Amazon are investing heavily in new infrastructure, applications and services taking advantage of a cloud model.

Cloud computing began with online hosting services and quickly evolved into the automated provision of hosted infrastructure online. Services like Amazon's EC2 architecture made this process low-cost and seamless and drove the adoption of more advanced cloud services. This was followed with cloud backup which has become a dominant way to backup information without having to invest in costly storage and hardware infrastructure within business premises. Software solutions are now being provided online, with significant adoption of email, collaboration and CRM offerings provided by Microsoft, Salesforce.com, Google and others. All these cloud services provide an easy way to obtain a service that previously would have required costly and dedicated IT resources.

Cloud based services push all users remote from the systems and applications they are accessing. Gartner state: "The industry is poised for strong growth through 2014, when worldwide cloud services revenue is projected to reach \$148.8 billion."¹ This level of increase in cloud services will lead to pressures on the networks used to access these services.

The Network – a Barrier to Cloud Adoption

The network is the weak link in the benefits associated with cloud services. Cloud services require a high quality, consistent network connection between the user and the cloud service; otherwise the user's experience will suffer. Cloud services depend on two network characteristics: bandwidth and latency.

Bandwidth is the amount of information that can be sent along the network at any one time. Although it is increasing and getting cheaper, applications are becoming more network-dependent. By providing rich, interactive user experiences, they are demanding more and more bandwidth and a consistent network in order to provide an acceptable experience to the user.

Latency is another factor in network quality. Latency is the delay taken to communicate between the user and the application. Whenever the user is any distance from the target application, the latency can jump to hundreds of milliseconds – easily adding seconds to a transfer and making network performance unacceptable. In addition

Typical Latency	
<i>Distance between User and Application</i>	<i>Latency</i>
Within a country	< 50ms
Neighboring countries	150ms
Between continents	250ms
Across Globe	600ms

¹ From Gartner Press Release: "Gartner Says Worldwide Cloud Services Market to Surpass \$68 Billion in 2010", 22 June 2010.

due to the design of the base internet protocol TCP, latency affects the bandwidth that can actually be used when communicating across the network.

These issues often mean that applications don't have the bandwidth or the consistent network availability they require and the user experiences frustrating delays and interrupted access.

Effect of Latency on Bandwidth		
Latency (ms)	Maximum Usable Bandwidth (Mbps)	With 1% packet loss
50	10.49	2.33
100	5.24	1.16
200	2.62	0.58
300	1.75	0.38

Current Solutions

The global cloud providers can improve access to their services in three ways. They frequently install Application Delivery Controllers (ADC) in the cloud data center. These controllers optimize and compress content being retrieved from the cloud service as it leaves the data center. They also make use of Content Delivery Networks (CDN) – a way to provide a global caching service – bringing static content closer to the user and avoiding the impact of latency on transfers.

CDN and ADC technologies improve transfer times for content being retrieved from global web sites – however they are limited to optimizing traffic in one direction, and are therefore more appropriate for broadcast type sites, like consumer web portals, and video hosting sites. Cloud services are often much more interactive and dynamic, and therefore not suited to these optimizations.

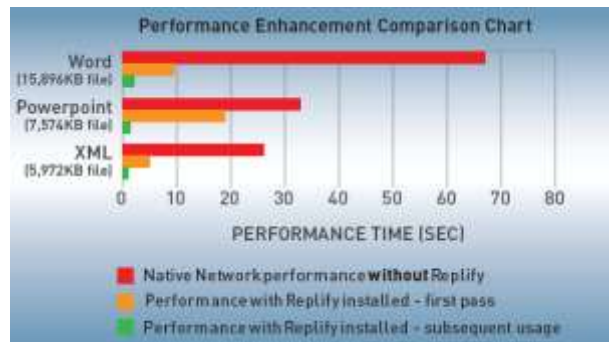
WAN optimization provides a third option. WAN optimization uses three techniques: protocol optimization, de-duplication and compression to remove unnecessary calls and data from travelling across the network. This overcomes the bandwidth and latency issues associated with limiting the user experience and provides two-way optimization especially suited to interactive and dynamic cloud services.

Normally WAN Optimization involves installation of hardware based devices or software appliances on both sides of the network - within the data center and on the customer site. This introduces extra management and deployment costs for both the customer and the cloud service provider. It works against the benefits of cloud – by requiring IT infrastructure in the customer location, and requiring management of that infrastructure.

Replify – providing a better network experience for cloud services

Replify Accelerator provides WAN optimization which has unique capabilities that avoid the problems typically associated with deploying WAN Optimization in cloud scenarios. Replify has been designed from inception as a software-based WAN optimization technology which does not require hardware devices when deploying. A software appliance can be deployed within any data center, accelerating access to the applications within the data center. In the customer location Replify Accelerator provides a fully functional software client – seamlessly deployed to each user’s PC. The software client avoids the need for any infrastructure on the customer location. It is easily deployed, and can be fully managed centrally with no maintenance or deployment headaches for the customer. Replify Accelerator is therefore ideal within cloud scenarios, providing optimization that dramatically improves the user experience, and ensures speedy, frustration-free access to cloud services.

A typical deployment of Replify Accelerator in a cloud scenario will provide between 70 and 90 percent offload of network traffic. Applications that were causing frustration, and taking minutes to access content and resources can now provide access in seconds.



De-duplication – the key to speeding up interactive applications

The web has originally evolved from a one-way broadcast of static information to support a lot more dynamic content and interaction from users. Cloud services often provide functions where the user’s actions result in dynamic changes to presented information or where the user actually submits information back to the service. This results in information frequently travelling backwards and forwards between the user and the service – often with repeated patterns, and minor changes between the transfers. Replify Accelerator includes block-level de-duplication that has been designed to detect patterns on a user’s interaction with a network-based service. Accelerator can replace repeated patterns with references to a block cache, avoiding repeating the transfer of the patterns across the network.

For dynamic, interactive content transfers, block-level de-duplication provides substantial savings in bandwidth, avoiding the impact of latency, and therefore improving the user experience. Replify Accelerator provides block-level de-duplication in software algorithms which are optimized for running on individual user PCs.

Personalizing the Experience

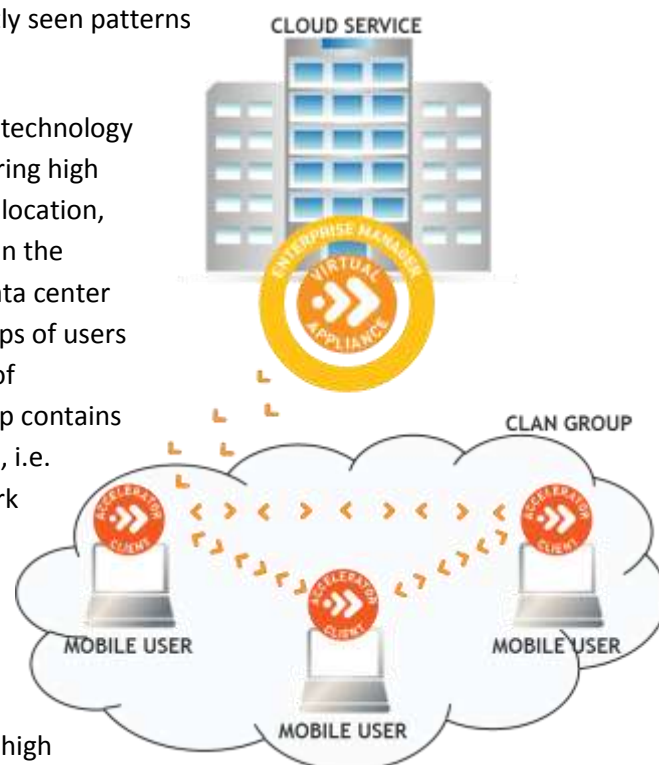
The hardware-based origins of WAN Optimization have led to a site-to-site focus for the technology, accelerating traffic between large, static sites and optimizing connections and protocols at the network level. A software-only approach provides an alternative, personalized experience. Since Replify Accelerator has been designed from inception to be installed as an individual accelerating client on a user’s PC, it provides optimizations focused on the particular user, and their patterns of

usage. The client can determine the profile of the user, the particular connection and service they are using. Optimizations can be tailored to the interaction the user has with the cloud service, based on the precise patterns of access that the user has previously had with the same service. Only a software client approach can base optimizations on an individual user - only Replify Accelerator focuses on providing this level of personalized acceleration.

Sharing the Personal Experience – a unique Replify solution

Replify Accelerator works at optimizing a user's access to cloud services, and ensuring that the optimization is based on the individual user's patterns of access – but in some scenarios additional benefit can be gained by sharing patterns across groups of users who access similar services. Typically WAN optimization solutions will introduce a shared appliance based on the customer location that provides shared caching capabilities which allow users to take advantage of patterns seen by other users at the same location. A shared appliance on the customer's side of the network is not appropriate for a cloud service - it introduces infrastructure in the customer location, and works against the primary benefits of decreased IT management at the customer site. However, there is a benefit in sharing some frequently seen patterns among users at the same location.

Replify Accelerator has introduced unique technology – CLAN – to meet the requirements of sharing high priority patterns among users at the same location, without introducing new IT infrastructure in the process. The software appliance on the data center side of the network is able to identify groups of users who would benefit from sharing patterns of information – a CLAN Group. A CLAN group contains users that share a similar network location, i.e. they are close to each other from a network standpoint, and also share a similar pattern of access to the cloud service (e.g. users who frequently access marketing information). By identifying this group of users, the system can then identify patterns of information which are high in usage and are likely to be required by more than one user within the group. CLAN gives the Replify client a mechanism to retrieve patterns of information already transferred by other users without having to transfer them across the slow network connection between the user and the cloud service. Users can now obtain personal optimization based on their own patterns of access and optimizations based on content important to users with similar patterns of access. CLAN is a technology unique to Replify Accelerator providing shared WAN Optimization capabilities without the need to deploy shared customer infrastructure.



Migrating Information into the Cloud

As well as affecting the user experience, network performance can also impact non-interactive cloud services. Services like backup, business continuity, content management and replication are all ideally suited to being provided as cloud services, but broadband connections are optimized for

downloading information. This design means broadband links provide a higher percentage of the available bandwidth in one direction only, assuming most information will be downloaded from the network to the customer's location. Typically this means that only a quarter of the available bandwidth is available for uploading information - moving information into the cloud becomes even more challenging as the bandwidth is not available. This introduces more barriers to adoption of these cloud services. Cloud services requiring upload of large amounts of information from the customer location to the service suffer as a result – impacting the efficiency and overall operation of these services, and the user-experience of other network users at the customer location.

As Replify Accelerator optimizes traffic being transferred in either direction it makes it possible to migrate large volumes of information efficiently to the cloud even with the lower bandwidth available during upload. Backup and business continuity services can now meet Recovery Point Objectives (RPO) by enabling faster transfer of information to the cloud. Content management applications can support the typical open, edit, save process necessary for users to add and change content. Cloud-based replicated storage can be utilized without impacting other network applications.

The graph in figure 1 shows replication being performed using Replify Accelerator. Traffic actually going across the network is shown in yellow – Accelerator has removed traffic shown in red through optimization.

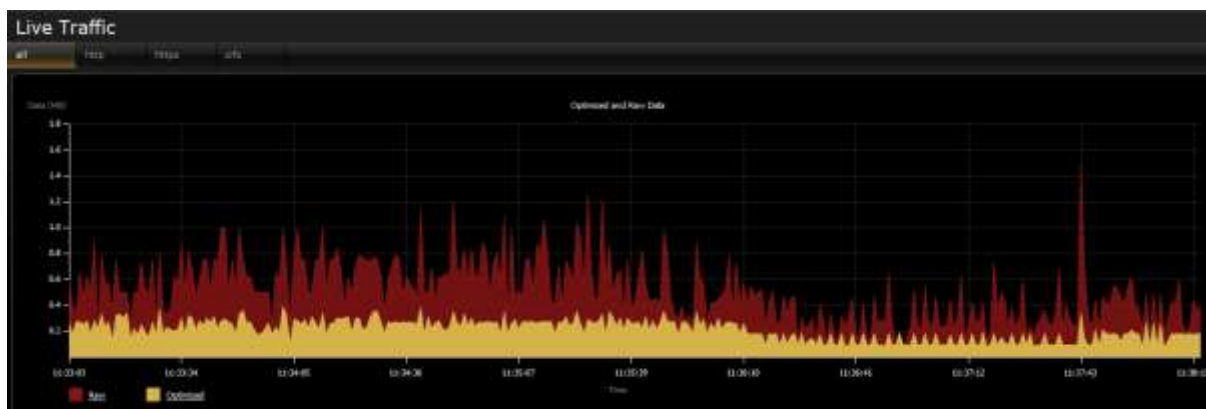


Figure 1 - Traffic optimization being provided for Dell EqualLogic replication

Supporting Uninterrupted Access Regardless of the Network

In some cases, when users are accessing services across mobile networks or from parts of the world where network coverage is particularly weak, actually achieving a consistent network that can support WAN optimization can be a frustrating or expensive experience. There are also times when users do not want even the smallest of delays waiting for a response when accessing cloud services. Replify has introduced an additional product to meet the requirements of these users. Replify SyncStor provides a local synchronized data store that persists even when the network is not available. Users have the best possible experience accessing, modifying, creating whatever content or documents their business requires from their own PC, and behind the scenes Replify Accelerator uses miniscule amounts of bandwidth when network connectivity is present, to synchronize everything back to the cloud service.

Conclusion

The benefits of cloud based services can be undermined by the quality of the network link between the user and the cloud based service. Dynamic and interactive user experiences can be impacted, resulting in frustrated users, and poor adoption of the cloud service. Non-interactive services like backup and replication become impractical, with transfers taking too long, or being frequently interrupted. Replify Accelerator provides software-based WAN optimization which is designed to be effective in cloud scenarios. Its focus on easy deployment and central management make it suited to optimizing access to any cloud service, without introducing operational overhead. Replify's unique approach of individual, personalized acceleration combined with the ability to share group-targeted content, provides the maximum acceleration without the overhead of additional infrastructure.

Try Replify Accelerator today, visit www.replify.com and sign up for a free trial.

"As enterprises move their applications into externally hosted cloud-computing services, they are likely to experience various degrees of application performance issues that can lower user satisfaction and degrade productivity."

Bjarne Munch, Gartner from:

"Optimizing Applications from Cloud Services: The Old Issues, but More Challenging to Solve", 17 November 2010.

"With Replify, we achieved dramatic improvement which was critical to the early adoption of our centralized SharePoint server. Consistently achieving 14 times performance improvement is simply incredible."

Mark Baxter, MIVAN

About Replify

Replify was founded in 2007 to solve the inefficiencies of existing hardware approaches to WAN Optimization. Designed from scratch with a software-only approach, Replify makes it possible to deploy optimization easily, on commodity hardware, without the high cost associated with custom appliances and their maintenance. Replify ensures that optimization is delivered for site-to-site and user-to-application scenarios without introducing complex configuration and deployment issues. Replify has worked hard to ensure that performance of its software-based solution is comparable to the leading hardware optimization vendors, and can meet the needs of the most demanding environment.

Replify is based in Belfast, Northern Ireland and is privately funded.