Virtualization of Video Infrastructure

State-of-the-Art Virtualization Techniques Make Large Scale Video Deployments More Affordable and Flexible

Stefan Karapetkov | January 2013

ABSTRACT: Both enterprises and service providers are deploying virtualization technology to lower cost, increase scale, improve resilience, and gain flexibility in their data centers. With video conferencing becoming a business-critical mainstream application, the calls for virtualization of this application are getting louder. This is however not a trivial technical problem and, not surprisingly, all eyes are on market disruptor Vidyo. Why is Vidyo uniquely positioned to deliver on the promise of virtualized videoconferencing? This paper explains how virtualization magnifies the benefits of Vidyo's routing architecture and floating licensing model; it also acts as a catalyst for immensely more efficient geographically dispersed, large scale deployments.

Table of Contents

Introduction

We increasingly live in a virtual world. We establish new relationships online, we attend virtual classes, and we meet in virtual environments. Take virtual meetings, for example. In many global organizations, they are so much the norm today that one has to explicitly ask for a face-to-face meeting if they really truly want to meet the old-fashioned way. But we have even moved a step beyond that – with advanced video technology, the definition of "face-to-face" becomes blurry. Large displays and great audio quality today deliver an immersive experience (telepresence) that is as face-to-face as it gets. The popularity of virtual meetings can be explained with increased efficiencies and lower cost in organizations of any type: enterprise, government, education, and healthcare[1]. A recognized innovator and leader, Vidyo has been at the forefront of virtual video meeting technology since its founding.

Virtualization is also about making real things (servers, desktops) virtual and brings similar benefits: increased efficiencies and lower cost. Long gone are the days of each application running on a separate server in a separate office and managed by a separate administrator. Data centers – both within organizations and external (that is, run by service providers) – today combine hundreds of applications and are bursting with computing power. VMware is a leader in data center virtualization that enables more efficient use of computing resources.

So what happens when these two companies mesh their technologies for the first time in history? This paper will explain the benefits of virtualized video infrastructure, explain and illustrate the various deployment models, and compare Vidyo's virtualized video infrastructure with other vendors' attempts to address the virtualization trend.

[1] To avoid repetition in this paper, the term "enterprise" is used to describe not only companies but also organizations in healthcare, government, and education.

Virtualization Overview

What is Virtualization?

The traditional computer architecture - both on personal computers and servers - includes hardware (generally based on x86 hardware architecture), operating system (Windows, Linux, Mac, etc.) and applications running on top of the OS. See Figure 1. This architecture is highly inefficient in server environments. First, having just one OS on a server limits its flexibility. Second, server administrators avoid conflicts of multiple applications running on a server by having each application run on a separate server. But running a single application on a server cannot guarantee consistent performance – unless the server is designed to handle peek application loads. Therein lies the inherent inefficiency of the traditional server model: servers end up having a lot of resources to meet peek application performance requirements but usually operate at 10-15% capacity on average. The cost is staggering since the equipment cost is just a small portion of the total cost of operating servers. The complete tab includes power and cooling, space in the data center, maintenance, and administrative personnel.

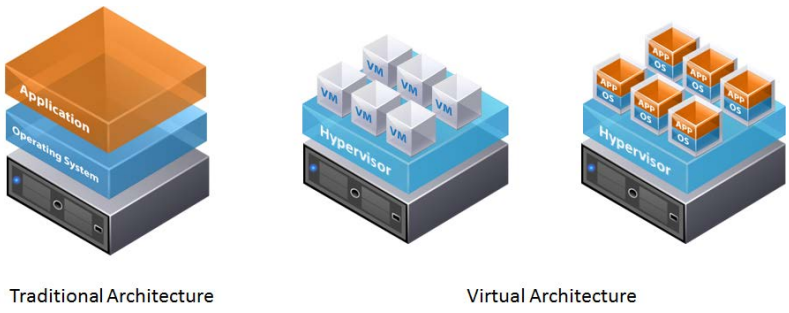

Figure 1: Towards virtual architecture in the data center

Virtualization hides server resources, including the number and identity of individual physical servers, processors, and operating systems, from the application. Special software called a hypervisor divides one physical server into multiple isolated virtual environments, that is, virtual machines (VMs). The virtual machine typically emulates a physical computing environment, but requests for CPU, memory, hard disk, network and other hardware resources are managed by a virtualization layer which translates these requests to the underlying physical hardware. As depicted in Figure 1, each virtual machine has its own OS and application, both of which do not have the slightest idea that they are not running on dedicated hardware, or that they are sharing hardware with other operating systems and applications. Virtualization technology therefore completely decouples the OS and application from the hardware. As a result of server virtualization the number of servers running in the data center can dramatically be decreased. For example, 20 traditional servers running at 15% of capacity each can be replaced with 4 servers, each performing at 80%. (20/4*15% = 75% plus additional 5% for the hypervisor).

Virtualization terminology is sometimes confusing. For example, the term “virtual appliance” is used for a virtual machine image file consisting of a preconfigured operating system environment and a single application. Deploying an application as a virtual appliance eliminates problems with installation and configuration, such as software or driver compatibility issues. In the communications industry, however, “appliance” is commonly used to describe a piece of hardware with preinstalled OS and application. This simplifies the sales process and assures that the hardware is tested to support the application. In order to avoid any confusion due to terminology, this paper does not use the term “virtual appliance” and refers to “virtualization” and “virtual machines” instead.

Virtualization and VidyoConferencing

So how can we apply virtualization to VidyoConferencing? The left part of Figure 2 depicts the architecture of a typical Vidyo appliance. All Vidyo servers – VidyoRouter, VidyoPortal, VidyoGateway, etc. – are software applications running on top of a common OS and general purpose x86 computers. That makes porting the applications to virtualized environments like VMware straightforward. The right part of Figure 2 depicts the virtualized version of the Vidyo server application that now runs in a virtual machine on top of the VMware hypervisor (ESX/ESXi).

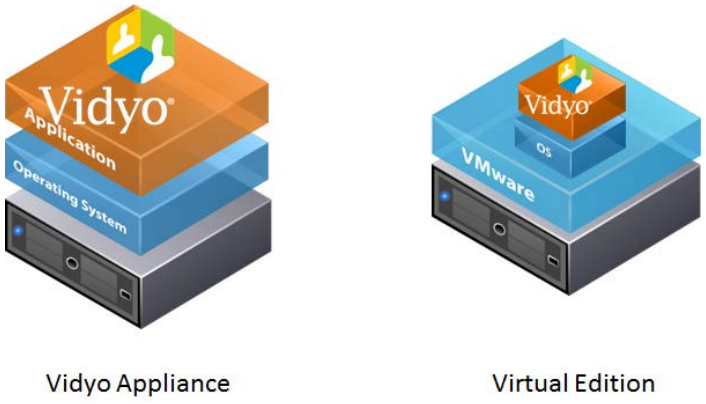

Figure 2: Virtualizing VidyoConferencing with VMware

Due to its software based routing (non-transcoding) architecture, Vidyo is uniquely positioned to benefit from virtualization. The VidyoRouter is designed to run on general purpose x86 computer hardware and on the Linux OS, both of which are widely supported by virtualization platforms. In comparison, other vendors in the video conferencing space rely heavily on transcoding – a two-step process in which the original data is decoded to an intermediate uncompressed format, which is then encoded into the target format – that requires several magnitudes higher performance, proprietary DSP-based hardware, and an embedded real-time OS. In short, transcoding architectures cannot be efficiently virtualized.

Virtualization Market

This paper focuses on the enterprise server virtualization; other virtualization technologies such as desktop virtualization and storage virtualization are not covered. Today, VMware is the undisputed leader in the enterprise server virtualization market which Gartner[2] estimated to be 58 Million VMs in 2012. VMware vSphere's market share in 2012 is 65%, followed by Microsoft Hyper-V (27%), Citrix Xen (6%), and Red Hat KVM (2%). In comparison, the enterprise server virtualization market was just 10.8 million VMs in 2009 with VMware holding 84% of the market, Microsoft – 11%, and Citrix – 4%. Figure 3 summarizes the market size and shares.

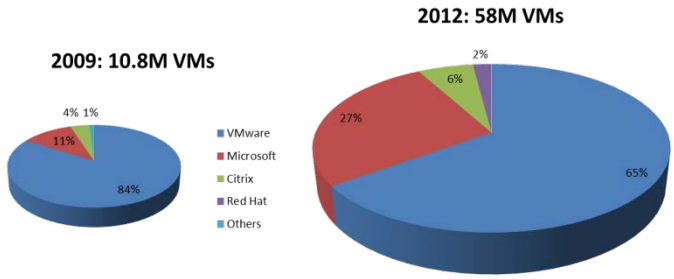

Figure 3: Enterprise server virtualization market

Note that KVM is supported by the Open Virtualization Alliance (OVA)[3] that has seen tremendous growth since its start in 2011 and now has more than 250 members, most prominently IBM, HP, and Intel.

Enterprise Investment in Virtualization

Virtualization has been gradually gaining importance in the enterprise market for many years but only recently – around 2009 – did enterprises make virtualization a top priority in their IT strategies, and Gartner's 2009 CIO survey declared virtualization was the #1 technology trend. By 2012, virtualization slipped to #5 in the CIO survey – mostly due to the emergence of more challenging problems like analytics and business intelligence (#1), mobile technologies (#2), cloud computing (#3), and collaboration technologies (#4). However, virtualization is a key component of cloud computing, while VidyoConferencing addresses both mobile technologies and collaboration; therefore, the combination of VidyoConferencing and virtualization makes a compelling technology story for enterprise CIOs and IT managers today. Many customers in the large enterprise segment will not even consider applications that do not fit into their virtualization strategy.

[2] http://blog.sciencelogic.com/server-virtualization-management-and-more-at-gartner-summit/06/2010

[3] http://www.openvirtualizationalliance.org/members

To estimate the percentage of enterprises that are investing in server virtualization, we surveyed the audience (194 enterprise decision makers) of a recent Vidyo online event about their plans to deploy virtualization. See Figure 4.

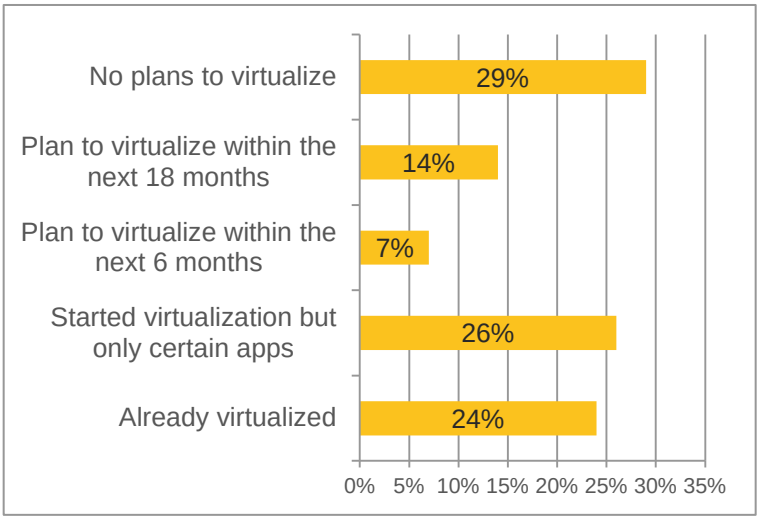

Figure 4: Survey results "What is your organization's plan / strategy for virtualizing your data center?"
(June 2012, 194 responses)

Virtualization projects are usually coupled with hardware upgrades and data center moves or major changes, so each enterprise has a different timeline for virtualization. Not surprisingly, 50% of the Vidyo event audience was already involved in virtualization projects – with 24% of the respondents representing companies that have already fully virtualized their data centers, and an additional 26% of the respondents representing companies that have started virtualizing certain applications. Only 29% of the participants responded that their companies did not have any plans for virtualization.

Virtualization and Service Providers

In the service provider community, cloud service providers are obviously most vested in virtualization technology. Figure 5 provides examples for cloud services based on the top 4 leading virtualization technologies today.

Company	VMware[4]	Microsoft[5]	Citrix[6]	Red Hat[7]
Technology	ESX/vSphere	Hyper-V	XenServer	KVM
Cloud service examples	VMware vCloud Express, AT&T Synaptic Compute as a Service, TELUS AgilIT, Belgacom vContainer, Colt Enterprise vCloud Service, Softbank Telecom WHITE CLOUD	Windows Azure, NetBenefit Ultra-V, Bull Cloud Maker	Citrix CloudPlatform, Amazon EC2, 1&1 Dynamic Cloud Server, Instance Cloud Computing, Tata Communications InstaCompute	Google Compute Engine, Amazon EC2, IBM Smart Cloud, NTT Seamless Cloud, Swisscom Dynamic Computing Services, Telstra Cloud Services

Figure 5: Virtualization vendors, technologies, and cloud service provider examples

In the collaboration space, Videoconferencing Managed Service Providers (VCMSPs) have also recognized the benefits of virtualization; however, the licensing model for enterprise-grade virtualization does not work well for these SPs, and they are looking for cost efficient, open-source solutions, such as KVM.

Instead of building their own virtualized environment, some VCMSPs run their video service on a cloud service, such as the ones listed in Figure 5. The benefit of this approach is that VCMSPs do not need create their own virtualization environment but can still benefit from a) the economies of scale driving the cost down and b) the continuous advancement of server technology that provides more resources/performance for the money.

[4] http://vcloud.vmware.com/vcloud-ecosystem#view=full

[5] http://www.microsoft.com/hosting/en/us/catalogs/cloud-providers.aspx?country=

[6] http://www.citrix.com/solutions/turnkey-iaas-cloud-platform/overview.html?ntref=sol_top

[7] http://www.redhat.com/solutions/cloud-computing/red-hat-cloud/find-public-cloud.html

Benefits of Virtualization

Virtualization Changes the Rules

Virtualization changed the data center's economics by decoupling the software (OS and application) from the hardware (servers in the data center). The immediate business benefits are consolidation of hardware resources, higher server utilization, and enormous cost savings. Thanks to virtualization, companies can reclaim floor space, power, and cooling capacity in their data centers, thus postponing costly expansions.

Virtualization allows the data center operator to standardize on certain hardware which leads to economies of scale when purchasing new hardware. There are also operational efficiencies, for example, the hardware maintenance contracts can be streamlined and additional servers can be kept as spares – for rapid deployment when performance demand increases.

The introduction of virtual machines in itself increases operational efficiency because VMs are much easier to manage than physical servers. For example, automated management tools can allocate server capacity (vCPU, vRAM) to each VM on the fly allowing the VM (and the application in it) to scale up and down. Advanced features such VMware VMotion™ allow for moving virtual machines from server to server with no downtime – this simplifies common operations like taking a server down for maintenance and taking it back into operation. *For Vidyo, this is an elegant way to provide continuous operation of critical VC resources such as the VidyoRouter without a performance impact.*

Virtualization speeds up server and application deployment, makes configurations more consistent, and simplifies the staging of applications across test and development. Technically, all of that is based on a simple capability: the entire operating system and application environment of a VM is stored in a single file on a virtual disk that can easily be duplicated to create new VMs. In the "dark" pre-virtualization ages, if the data center admin needed to create another instance of an application, he/she had to order a similar server as the one running the first instance of the app, configure the hardware, install the same OS as the one used by the first instance, configure the OS and tools, configure the network, then install the application, and throughout the process make sure that all settings /configurations are identical. As a result, provisioning of new servers took hours of work and required weeks of lead time. With virtualization, the admin only has to duplicate the VM, that is, copy a file, and power up a new virtual machine. Virtualization cuts the provisioning time to minutes. Moreover, the new VM is a replica of the old one, that is, it has the same configuration. New applications can be easily tested on VMs in the test environment and, once the test is successfully completed, seamlessly moved to the production environment. *For Vidyo, this is an efficient way for duplicating VidyoRouters to increase VC capacity. The cost of creating a new VidyoRouter becomes negligible, and Vidyo's licensing structure allows taking the additional VidyoRouters into operation immediately.*

Virtualization platforms provide mechanisms for higher service resilience and fast recovery from hardware failures that reduce downtime. For example, VMware's High Availability (HA) feature detects an unplanned hardware failure, and restarts all affected VMs on another host in a VMware cluster. *If the application is a VidyoRouter, virtual meetings would be*

disconnected but the VidyoRouter would be operational again as soon as the VM is restarted on a new host.

Finally, virtualization allows for flexible deployment models. Some companies deploy virtualization in their own data centers, others develop cloud services for internal use (private clouds), still others create cloud services for external use (public clouds), that is, provide services to other organizations. Since the hardware in data centers has already been certified and installed, application vendors like Vidyo's channel partners do not need to deal with electrical and safety certifications of an appliance, with import and export restrictions, shipping, and insurance.

Virtualizing Video Conferencing

At a recent Vidyo virtual event, we asked participants "What are the key motivating factors for your organization to virtualize your video conferencing infrastructure?" allowing them to select all answers that apply. The results are in Figure 6.

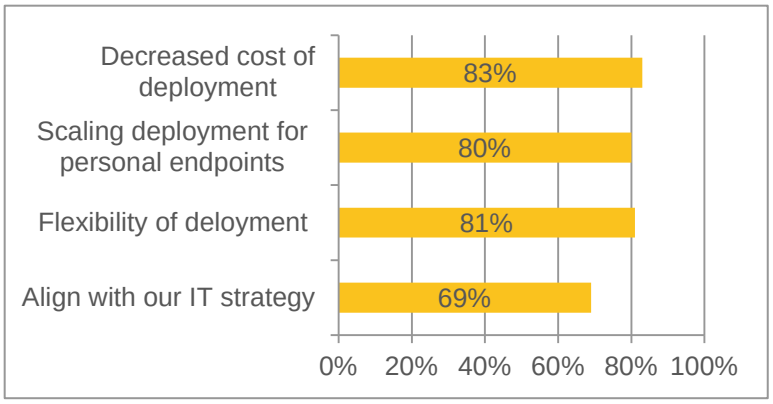

Figure 6: Survey results "What are the key motivating factors for your organization to virtualize your video conferencing infrastructure?" (June 2012, 194 responses)

Not surprisingly, decreased cost and flexibility of deployment are seen as major benefits of virtualization of video infrastructure. With regards to video conferencing, 80% thought that virtualization of the video conferencing application would enable the scale of deployments of personal endpoints. Desktop video can easily push the scalability of traditional video infrastructure to its limits, and virtualization is seen as key to meeting desktop video scalability demands.

Virtualization Benefits in Numbers

To quantify the benefits of virtualization, let's look at a new data center for 130 applications. In the traditional deployment model, this will require 130 standard data center servers, for example, Dell Power Edge C2100[8], a standard 2U rack-mountable chassis. A standard data center rack is 42U high but putting 21x 2U servers is not possible because such density leads to hot spots (areas in the data center with extremely high temperatures).

[8] http://www.dell.com/us/enterprise/p/poweredge-c2100/pd

Using the more pragmatic 60% load capacity yields 13 physical servers per rack, that is, 10 racks for 130 servers. A single rack takes about 30 square feet of floor space in the data center – this includes aisle ways, door swing space, etc. – and 10 racks require 300 square feet of floor space.

To calculate the total cost saving from virtualization we have to look at:

- The cost of server hardware: Virtualization allows server consolidation at rates as high as 15:1 though a more typical rate is 10:1, so the expected reduction of the number of servers is from 130 to 13. In this example, we use Dell PowerEdge C2100 rack servers that costs about $4,000 each.
- The cost of floor space: Data centers usually cost around $1000/square foot to build. That number includes physical construction costs, refrigeration equipment, racks, and maybe network infrastructure but no servers. The cost is depreciated over 39 years, and the annual cost is $26 per square foot. As calculated above, we will need 300 square feet for our 130 servers (at the cost of $7,800/year) but only 30 square feet for the 13 servers (at the cost of $780/year) after the virtualization.
- The cost of power and cooling (just the energy, not the equipment used): A typical server costs $200/month to power and cool; this is $2,400 per server per year.
- The cost for equipment maintenance: Industry average is 15% of the cost of the equipment.
- The cost of server administration: The ratio of servers to administrators is about 30:1, so we need 4 administrators for our 130 servers but only 0.5 administrators for the 13 servers after virtualization. That is a saving of 3.5 administrators at $80k/year salary[9].

[9] This number is just a conservative assumption for illustration purposes.

The total cost saving in Figure 7 – a whopping $1.1M in the first year – has to be compared to the cost of virtualization licenses. For example, VMware offers 4 types of licenses – Standard, Standard with Operations Management, Enterprise, and Enterprise Plus – each including the same basic features but different advanced features. With the new licensing model introduced with vSphere 5 (the version used for the VidyoRouter certification), VMware customers pay for physical CPUs in virtualized hosts without limitation on the number of VMs, cores, or amount of physical RAM[10]. In this example, the Dell server has 2 physical CPUs; therefore, 13 servers require 26 VMware Enterprise licenses at $2,875 each[11], or $74,750. The license cost is negligible in comparison to the enormous cost savings from virtualizing the data center.

The cost calculation in this example assumes that all servers are at a single location. The business case can be expanded further to account for fast disaster recovery and business continuity with multiple data center locations.

Item	Unit cost	Before virtualization	After virtualization	Savings
Number of servers		130	13	
Server hardware	$4000/server	$520,000	$52,000	$468,000
Floor space	$26/sq.f./year	$7,800	$780	$7,020
Power and cooling	$2400/server/year	$312,000	$31,200	$280,800
Equipment maintenance	$600/server/year	$78,000	$7,800	$70,200
Administration	$80000/admin/year	$320,000	$40,000	$280,000
			Year 1 Savings	**$1,106,020**

Figure 7: Calculation of cost savings through virtualization

[10] http://www.vmware.com/files/pdf/vsphere_pricing.pdf

[11] http://www.vmware.com/products/datacenter-virtualization/vsphere/pricing.html

The Vidyo Difference

Virtualization Project Scope

An increasing number of Vidyo customers are asking for video conferencing to be integrated in their virtualization environment. For enterprises today, the most popular platform is VMware; therefore, Vidyo has placed initial focus on virtualization and certification of all Vidyo infrastructure elements on VMware.

The VidyoRouter and VidyoPortal Virtual Editions (VE) make up the essential components of the Vidyo infrastructure. VidyoRouter (VE) provides SVC media services and is available as a 100 concurrent connection capacity license or a 25 concurrent connection capacity license. The VidyoPortal VE provides all of the management functions for the system. VidyoGateway VE and VidyoReplay VE are optional system components. VidyoGateway VE provides media services for interoperability with systems using non-SVC video codecs or other signaling standards. VidyoReplay VE provides recording and webcasting services for few-to-many asynchronous and real-time video communications.

As the first video vendor to certify video infrastructure in the VMware environment, Vidyo is collaborating closely with VMware to run all test cases and document all results.[12] The exhaustive test measures virtual machine resource utilization (CPU in percent and memory in Megabytes), disk I/O speed (in seconds), network load (in packets per second), and video quality (in VMOS). Advanced features such as vMotion and High Availability mentioned above have also been tested.

Vidyo's Flexible Licensing Model Meshes Well with Virtualization

Both VidyoConferencing and virtualization are based on the concept of releasing unused resources in order to increase system efficiency. Vidyo's concurrent perpetual licensing model is unique in the video conferencing industry, and frankly, vastly misunderstood by folks who are used to counting physical ports or resources. The licensing model allows customers to deploy only the amount of capacity they need rather than forcing them into pre-set port configurations. For example, if the customer has 100 licenses (VidyoLines[13]), and 5 users are on a Vidyo call, the remaining 95 licenses are available to other users. When the 5-party conference ends, the 5 licenses are returned to the license pool and the full 100 licenses are available to other users.

Virtualization reduces the cost of VidyoRouter because customers only pay for a license[14] and not for a complete appliance. Assuming that the customer already has sufficient number of VMware licenses, the low cost of the VidyoRouter VE allows for greater deployment flexibility. The network administrator can start any number of VidyoRouters VE in the network, for example in each geographic area with a high volume of desktop usage,

[12] For example, the VidyoRouter with VMware VSphere Deployment and Technical Considerations Guide includes the test results for VidyoRouter.

[13] VidyoLines are a perpetual software license for a single logical connection through the VidyoRouter.

[14] VidyoRouter VE (100 connections) license is $4,625; VidyoRouter VE (25 connections) license is $2,300.

to efficiently support local calls. Cascading allows connecting VidyoRouters to enable large geographically distributed conferences, while keeping local traffic off of the WAN.

Deployment Example: Virtualized VidyoConferencing

The following example illustrates the benefits of combining VidyoConferencing and virtualization. A company with 500 employees in North America, 300 in EMEA, and 400 in APAC – decides to save on travel, increase productivity and reduce time-to-market by providing desktop video conferencing to all of its employees. The CIO estimates based on communication patterns that no more than 20% of the employees in each theater will be on video calls at any time, and requires a network design that avoids intercontinental traffic loops which decrease video quality and require more IP network bandwidth in the WAN. The CIO has to select a vendor and a solution.

Going with one of the traditional video conference vendors (Cisco, LifeSize, Polycom) would mean installing a hardware-based MCU in each theater – a 100-port MCU in North America, a 60-port MCU in EMEA, and a 80-port MCU in APAC, a total of 240 MCU ports. With per-port prices in the $6,000 range, this is very expensive proposition for a company of that size.

In contrast, a network design based on Vidyo would require one VidyoRouter VE (100 connections) in each theater, as shown in Figure 8. Since users in different theaters are online at different times of the day, Vidyo's floating licensing allows for functions that are impossible with other vendors' systems. Not only can VidyoLines be shared across the entire network – which would allow the company in this example to purchase only around 150 VidyoLines licenses, sufficient to cover each of the theaters separately and account for some overlap – but even VidyoRoter VE licenses can be shared, that is, instead of purchasing three VidyoRouter VE (100) licenses, the customer can purchase only two. The VidyoPortal allows the network administrator to switch routers on and off, so that only two routers are online at the time.

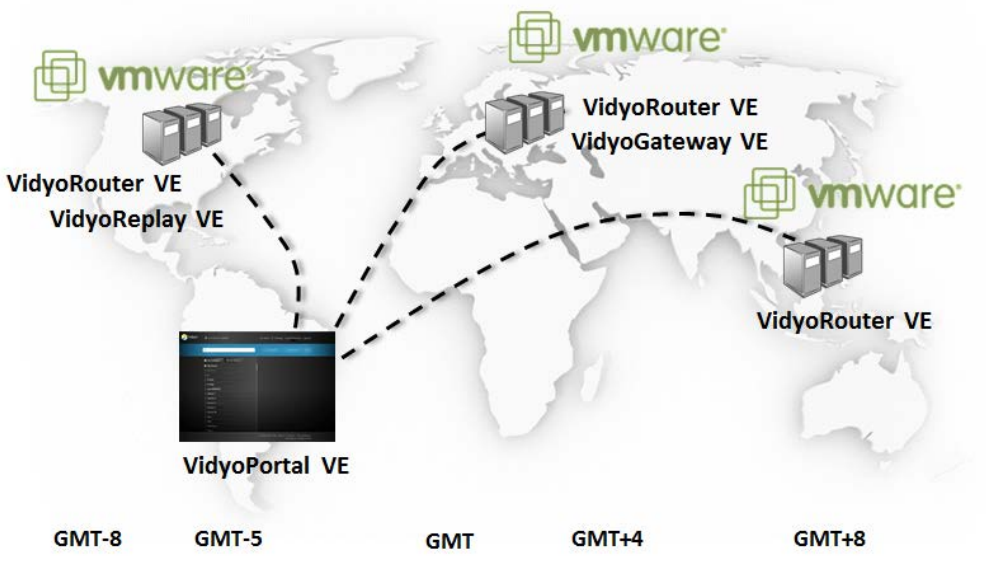

Figure 8: VidyoConferencing deployment example

Vidyo's approach to licensing allows customers to only purchase what they use and to leverage their assets globally 24 hours a day. The more complex and distributed the customer network, the more cost efficient the Vidyo solution. For example, introducing redundancy to the scenario – that is adding a backup multipoint conferencing capacity in each theater – would double the cost of a traditional hardware-based deployment. In contrast, Vidyo's licensing model allows customers to have an "always on" router instance in each theater with just one additional "floating" license for redundancy.
The bottom line is that virtualization amplifies the power of Vidyo's floating licensing model, and the combination of the two brings new levels of efficiency and cost savings for customers.

Note that if the customer uses a Vidyo appliance, switching off the appliance does not free any computing resource in the customer's data center. Switching off a Vidyo VE instance, however, means stopping the Virtual Machine that it is running on, and freeing resources (CPU and memory) in the data center that the customer can use for other applications. The next logical step is moving VMs running Vidyo applications from one data center to another following the sun, so that the hypervisor (and not the VidyoPortal) takes care of allocating the routing resources where they are needed.

Competitive Environment

As mentioned in the beginning of the paper, the VidyoRouter does not require purpose built hardware or transcoding to deliver SVC media services, making it an efficient and scalable app in the context of virtualization. The architectures of all direct competitors – Polycom, Cisco, and LifeSize – are based on purpose built DSP-based hardware and therefore not efficiently virtualizable.

Take for example the Polycom RMX 2000/4000 MCU. Its traditional transcoding architecture relies on dedicated video processing boards with 20 Texas Instruments (TI) Digital Signaling Processors (DSPs) TMS320C6455 each, that work at up to 1GHz frequency. The DSPs are optimized for complex mathematical operations such as Discrete Cosine Transformation (DCT) heavily used in video compression and decompression. The Polycom MPMx board for the RMX needs 20 TI DSPs, or 20GHz of computing power, to support 30 HD 720p calls. The first step to virtualization is making the application run on CPUs, rather than DSPs. On November 8, 2012, Polycom announced its RealPresence 800S server, which is the RMX MCU ported to a Dell server platform. Assuming the Dell platform has the highest performing Intel Xeon server with quad core and 4GHz CPU (4x4=16GHz) the 800S would be able to handle at most 16GHz/20GHz = 80% of the 30 calls supported by a single DSP board in the RMX, that is 24 HD 720p calls. To reach this number, the code in RMX has to be rewritten to match the efficiency of parallel processing supported in DSPs; otherwise the number of supported calls would be much lower.

Note that even in the best case scenario, the 800S would support only 40% of the RMX 2000 (2 MPMx boards) capacity and only 20% of the RMX 4000 (4 MPMx boards) capacity. In the process, Polycom also loses the redundancy and resilience features of the AdvancedTCA hardware architecture in RMX. The result is a transcoding MCU with severely limited scalability and unknown effect on video quality due to possible resource shortages.

Another example for an attempt to virtualize transcoding MCU architecture is the work done at LifeSize as part of LifeSize UVC Multipoint[15]. Its virtual machine requires 8 vCPUs for 8 x HD 720p calls (no mentioning of frames per second, so we can assume 30). In comparison, the VidyoRouter VE's non-transcoding architecture requires 8 vCPUs for 100 HD 720p60 connections. Vidyo's non-transcoding virtualized solution is therefore at least 12 times more efficient than LifeSize's and proves that Vidyo is uniquely positioned to meet the challenge of virtualizing video conferencing.

[15] http://www.lifesize.com/en/products/video-conferencing-infrastructure/multiparty-calling-optimized-for-mobile

Use Cases: Virtualized VidyoConferencing

Virtualization removes the logistical complexity around certifying, importing/exporting appliances, and makes deploying VidyoConferencing as easy as starting a virtual machine in a data center anywhere in the world. This opens the door to new deployment opportunities in both enterprise and service provider data centers as well as in cloud computing environments. Figure 9 illustrates the key use cases for VidyoConferencing in virtualized environments.

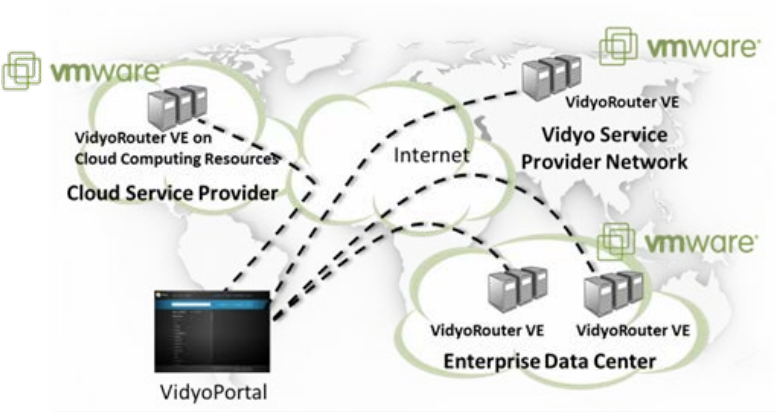

Figure 9. VidyoConferencing in virtualized environments

Enterprise Use Cases

Single Virtualized Data Center

In the simplest use case, an enterprise has a single data center and is going through the process of virtualizing it. For new VidyoConferencing customers, deployment of Vidyo infrastructure Virtual Edition components is the logical choice. If the customer already has infrastructure component appliances, replacing it with the VE version is straightforward: the licensing remains unchanged and the VidyoPortal keeps user configuration information, so that there is no need to reconfigure.

Distributed Global Network of Virtualized Data Centers (Private Cloud)

If the customer has a network of data centers distributed globally, the virtualization usually starts with one data center. VidyoConferencing provides the flexibility to mix and match virtualized applications and appliances, for example, VidyoRouter VE behaves exactly as the VidyoRouter appliance. If an enterprise customer decides to virtualize one of its data centers, the VidyoRouter appliance in that location can be replaced with the VE version, while all other (non-virtualized) locations can keep using the appliance version. Having multiple VidyoRouters in different locations allows for traffic localization that leads to lower latency, high voice and video quality, less firewall issues, and network bandwidth saving in the WAN. Vidyo's floating license model combined with the flexibility of virtualization allows customers to build well-designed networks at low cost. Distributed networks of data centers excel in cases of natural and human-caused disasters, when they provide rapid data and applications recovery to assure business continuity.

Hybrid Model

The hybrid model expands the previous model (private cloud) with public cloud resources. The decision to "go hybrid" can be driven by the need for increasing scalability while keeping the cost down. Instead of over-provisioning the private cloud, resources are requested from the public cloud if/when more capacity than usual is required. Another excellent reason to use the hybrid model is disaster recovery: if part of the private cloud fails in case of a natural or man-made disaster, the public cloud takes over the functionality to meet demand. As discussed earlier in the paper, virtualization combined with Vidyo's flexible licensing model allows cost-efficient implementations in such distributed environments. For example, VidyoConferencing resources in the private and public cloud can be turned on and off to minimize the number of required licenses and to release unused capacity.

Service Provider Use Cases

The ubiquity of IP networks allows service providers today to experiment with variety of business models in which one entity creates the infrastructure, another manages it, a third one designs and sells a service based on it, and additional entities repackage, rebrand, and resell the service under their own name. Additionally, virtualized infrastructure enables the service provider to run very low cost pilots in new geographic markets by leveraging regional cloud-compute services to turn up local infrastructure without the time and expense it would otherwise take to put boots on the ground to build out a new data center.

Data Center Hosting/Outsourcing

In the simplest SP business model, an enterprise outsources its entire data center to a hosted service provider that manages and operates the equipment according to specifications. SPs may deploy virtualization to reduce cost and increase reliability and flexibility but sharing data center resources with other organizations is generally prohibited. This model is perfect for financial, government, and healthcare organizations that are concerned about security.

The certification with VMware allows all Vidyo products to be deployed in hosted virtualized data centers, in effect making the hosting SP also a Video Conferencing Managed Service Providers (VCMSP). Enterprise customers must negotiate Service Level Agreements (SLAs) appropriate for real-time applications, including sufficient bandwidth to run video calls and low latency to assure interactivity. The deployment of virtualization and VidyoConferencing in this hosted use case is no different from the enterprise data center use case described above.

Video as a Service (VaaS)

In this model, a service provider offers video services such as multipoint video, audio, and collaboration to enterprises. The model is most beneficial to small and medium sized organizations that do not have the resources to run their own infrastructure. The VaaS model moves the expense from Capex to Opex and makes it predictable.

One variation of this business model is VaaS-t (Video as a Service-trade only) pioneered by Imago Group plc using Vidyo technology [16]. As a distributor, Imago decided to host Vidyo infrastructure and offer a service that Imago's reseller network can sell to end customers in a subscription model.

Another interesting business model, labeled "Virtual Video Network Operator (VVNO)", follows the MVNO model popular with mobile operators and allows SPs to offer the service without owning the infrastructure. For example, Arkadin is developing a video service for VVNO NTT (Japan) using Vidyo technology [17].

Virtualization greatly enhances the performance of video services and is therefore on the top of service providers' wish list. While some SPs have created their own virtualized environments, others rely on Cloud Service Providers (see Figure 9) for computing resources, that is, they buy cloud computing capacity (vCPU, vRAM) from the cloud service provider and run video applications in the cloud[18].

Vidyo's licensing model amplifies cost efficiencies in service providers that use the multi-tenancy feature to provide services to many customers (tenants). Since VidyoLines/ licenses are pooled among all tenants, the SP can shift licenses from one tenant to another to meet demand … without purchasing any additional licenses from Vidyo. This level of efficiency is impossible with other vendors' video solutions, and is a unique competitive differentiator for Vidyo.

[16] http://www.vidyo.com/2012/11/vidyo-and-imago-deliver-cloud-based-video-conferencing-service/

[17] http://www.vidyo.com/2012/10/ntt-communications-group-selects-vidyo-and-arkadin-for-breakthrough-infrastructure-less-video-conferencing/

[18] Vidyo's Deployment and Technical Considerations Guides outline the performance requirements for running Vidyo infrastructure VE in such environments.

Conclusion

Vidyo is uniquely positioned to deliver on the promise for low cost, scalable, resilient, and flexible video conferencing in virtualized environments.

The VidyoConferencing architecture – based on video routing, not transcoding – is designed from scratch to run on general purpose processors and is therefore efficiently virtualized. Competitors offering transcoding MCU solutions for multi-party conferencing, such as Polycom, Cisco, and LifeSize cannot overcome that design advantage, and their attempts to modify products and meet virtualization challenges will inevitably result in decreased performance and higher cost for customers.

Another major advantage is Vidyo's floating licensing model that fits perfectly with virtualization. In fact, virtualization magnifies the benefits of Vidyo's licensing model as both the concurrent connection licenses and infrastructure licenses can be utilized at higher rates in geographically dispersed deployments than land locked hardware-based solutions.

www.vidyo.com

Vidyo, Inc. (Corporate Headquarters)
433 Hackensack Ave., Hackensack, NJ 07601, USA
Tel: 201.289.8597 Toll-free: 866.998.4396
Email: vidyoinfo@vidyo.com

EMEA	APAC	INDIA
emea@vidyo.com	apac@vidyo.com	india@vidyo.com
+33 (0) 488 718 823	+852 3478 3870	+91 124 4111671

WP-Virtualization-012013a