POP VIRTUALIZATION
FROM CONCEPT TO REALITY

HOT TELECOM
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Metaswitch Networks

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INTRODUCTION

Change is perhaps the only thing that *doesn't* change in the international carrier world! This is especially true with wholesale voice. Over the years, the industry has absorbed, with varied levels of success, a number of assaults or waves of evolution. First came the decline of the bilateral world, followed by the rise of Voice over IP, which brought new breeds of competitors and then enabled the rise of communications apps such as Skype and WhatsApp. Add to this the constantly falling termination prices. Is there no end to the threats to this industry?

Now comes another seismic change over the horizon: the rise of virtualization. Most wholesale carriers are aware of the growth of cloud computing and the impact of that on IT operations in particular. However, the impact of those same technologies on their networks and systems has not yet had much consideration.

Wholesale carriers are now under constant pressure to reduce cost and improve quality, flexibility, efficiency and global reach, all this while increasing speed of innovation. Not a small order. Virtualization and automation are two of the tools that are now available to carriers to enable a complete shift in their network deployment and operation, which should enable them to better compete with the new breed of telecom service providers.

This white paper provides the background on those technology and business changes and offers insight into why wholesale carriers need to be reacting now to this latest opportunity before it becomes a threat to their livelihood.

Steve Heap
CTO, HOT TELECOM

KEY MESSAGES

- ✓ Operators are crippled when it comes to reacting to today's rapidly evolving customers' needs
- ✓ Network Functions Virtualization (NFV) will be a key enabler for wholesalers to meet the new business challenges of quality, global reach, efficiency, nimbleness and cost control
- ✓ The clear drive in NFV with SDN is to first separate the control and data layers, automate operational functions and massively reduce the cost of operation
- ✓ SBCs are becoming a dominant element in wholesalers' networks
- ✓ Some key vendors have been leaders in the virtualization of SBC functions, enabling it to operate on a cloud-based computer environment
- ✓ The first thing that wholesale carriers should do is ask themselves at what point they should retire their existing TDM equipment
- ✓ Starting on the virtualization path now, with achievable projects, is the way to ensure a successful future

DRIVERS FOR VIRTUALIZATION

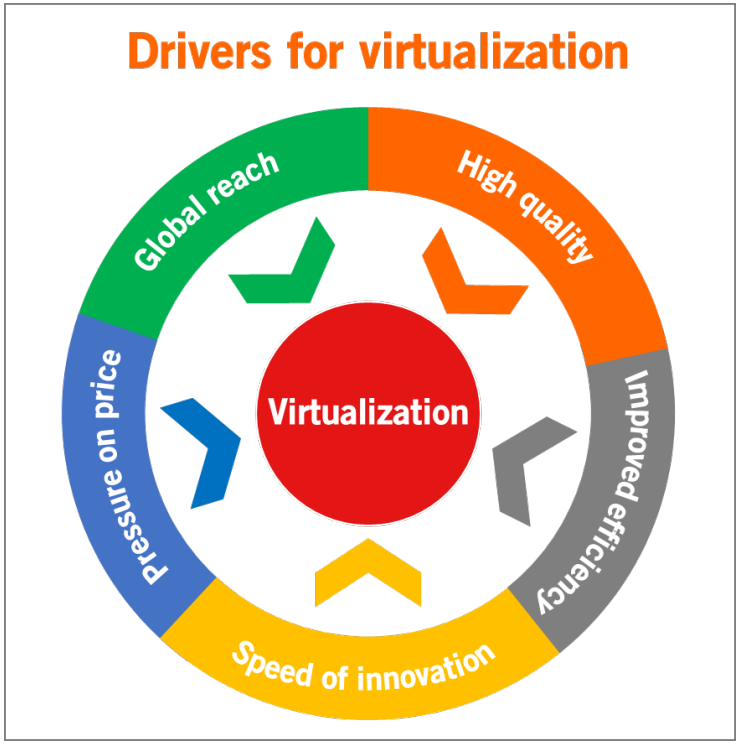
The wholesale carrier world continues to evolve, but an underlying need is always for a more efficient, flexible and nimble type of network deployment to support the five key strands of the business.

Quality

Until recently, much of the focus for international carriers and wholesalers has been on how to achieve the lowest price possible, while offering an acceptable quality. Low price has been a must-have, while quality has been a good-to-have, and traffic routing strategies used by international carriers are therefore geared to achieving this.

On the technical side, voice quality (audio in particular) has been severely restricted by the design of handsets and the limitations of the range of frequencies that the networks can support. But the move to IP across retail service provider networks and the launch of LTE, followed by Voice over LTE, is finally freeing the industry from these old, lower quality standards.

Inherently, a VoLTE-enabled smartphone can provide a much richer audio experience, putting quality back on the center stage. As a result, whereas customers expected international calls just to "work" in the past, they will increasingly expect them to work to the high quality standards they experience at home for local calls.



However, by its nature, much of today's international wholesale environment makes use of routing strategies that tend to reduce voice quality to the lowest common denominator. To achieve the high-quality, end-to-end, clear IP path needed to support the required quality, carriers will therefore need to evolve their strategy to ultimately be able to route calls using direct, high-quality interconnects with the end destination, all while minimizing network cost.

Global reach

Direct interconnect, taken to its extreme, would require each service provider to be able to reach every other service provider without using international carriers or wholesalers, which is obviously impractical. On the contrary, what we are seeing is that service providers are continuing to use international wholesalers and IPX providers to terminate their international calls – but they are expecting more from them.

They expect their wholesaler of choice to not only be able to support the quality required to terminate VoLTE traffic, but also to be able to do so for most destinations. Everything now is about simplification and efficiency. Consequently, the days of interconnecting with a large number of wholesalers to terminate international traffic is soon to be a thing of the past.

Service providers are now looking to interconnect with only a handful of wholesalers that can terminate their traffic to the world.

Having a high-quality network with global reach that is highly scalable will therefore become the prerequisite for any successful wholesaler going forward.

Efficiency

Now, only a small number of international carriers and wholesalers are in a position to meet the new prerequisites of direct connectivity, quality, global reach and scalability. Deploying such a global, highly scalable network is not in just anyone's reach.

Achieving global reach by deploying a growing number of traditional access PoPs around the globe, which can be scaled and support the complex, high-quality voice services that the industry is on the verge of offering, will require not only significant capital investments and knowledge, but also time. These three things are increasingly scarce in a highly commoditized industry such as international wholesale.

Increased pressure on price

In addition, the pressure on price is continuing, with constant regulatory pressure on termination and roaming rates. As termination fees continue to drop, the selling price of an international minute will be more closely aligned with the internal costs of transport and operation – so companies will be competing far more on their cost efficiency than in the past. As a result, companies that meet the criteria of many direct connections with a very low cost of network and associated operations will be the winners.

The obvious risk is not whether one of your existing competitors will make the cost reductions before you do, but that creating an international voice wholesale business in an IP world (with no TDM interconnects) using virtualized network components is not actually that hard. Hence the "Black Swan" event is more likely to be the rise of a very agile, low-cost competitor that was not really on the radar last year.

Speed of innovation

There is no running away from it: The treadmill of technological innovation is speeding up, and carriers have to find a way to keep up with it if they want to survive and thrive. The introduction of IP from handset to handset has created a paradigm shift, not only in terms of how networks are deployed and operated, but also in the way services are offered and which business models are used.

Service providers and carriers alike therefore need to completely review the way they approach their business to be able to compete on a more equal footing with new nimble and innovative telecom providers. This means becoming more lean and mean and instilling a culture and structure that enables them to rapidly adjust and launch new technologies, services and business models without having to go through a highly rigid process.

We strongly believe that Network Functions Virtualization (NFV) will be a key enabler for wholesalers to meet the new business challenges of quality, global reach, efficiency, nimbleness and cost control, if approached properly and quickly.

VIRTUALIZATION
WHAT, WHY, HOW

What is the virtualization hype all about?

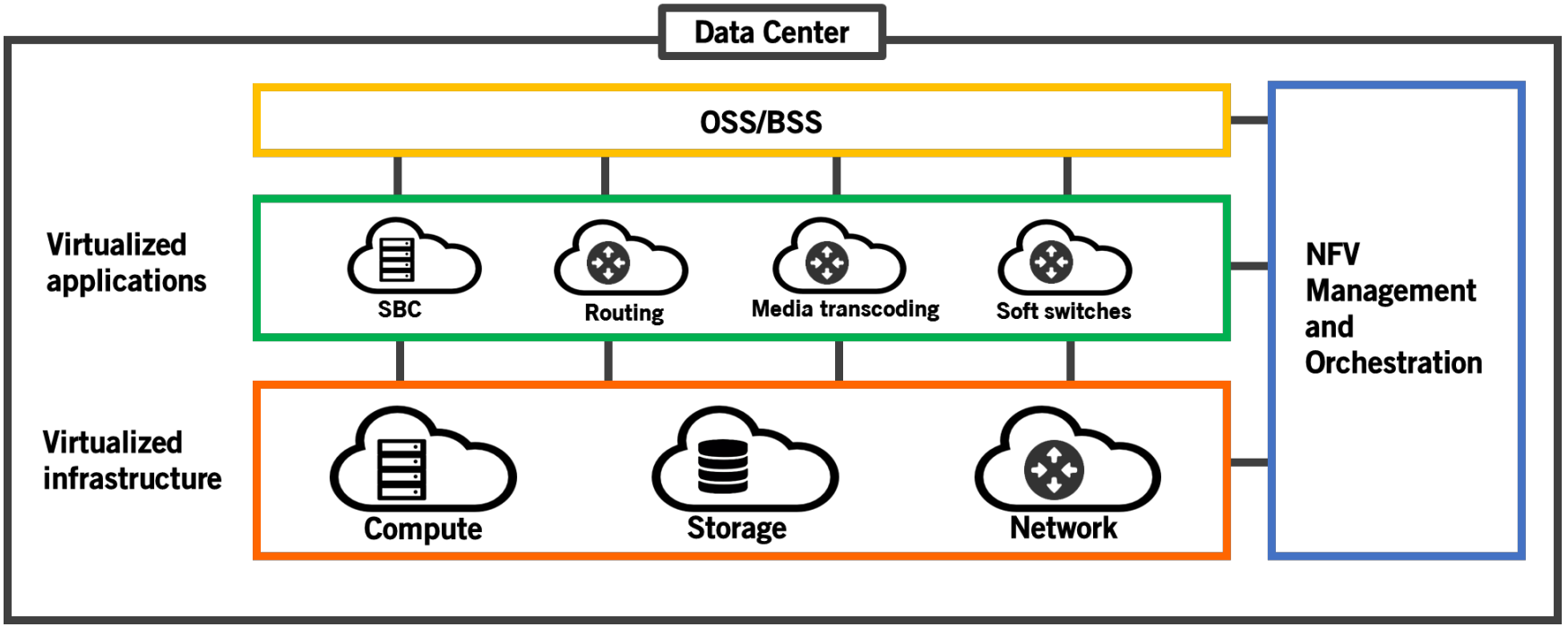
Read any technology website these days and the most frequent terms are cloud computing, Network Functions Virtualization (NFV), Software Defined Networking (SDN) and numerous related abbreviations. All these are collectively highlighting one of the biggest technology and business changes currently underway in the industry.

The IT industry has been fundamentally changed over the past years by the rise of large-scale data centers. These are packed with commodity, low-cost, off-the-shelf computer servers that are managed and orchestrated as one environment to provide the three essential components of a data center:

1. Compute
2. Storage
3. Network

In many cases, they are running very large Web-based applications (Amazon's e-commerce environment being a case in point) and capacity is allocated to various applications as they need it.

Network Virtualization Approach



What are the implications for telecom operators?

In the telecom world, some early work by a group of operators, under the auspices of the European Telecommunications Standards Institute (ETSI), resulted in a white paper outlining the benefits of a similar approach and named it Network Functions Virtualization. This paper identified a major issue developing in the telecom world: Operators are crippled when it comes to reacting to today's rapidly evolving customers' needs.

Today's telecom services are heavily dependent on boxes deployed in networks, with the result that the cost, redundancy, space, power, upgrade cycles and overarching design (where a new service often needs a new box) prevent telecom operators from achieving the flexibility required in today's "everything in real-time" environment.

Recognizing that commercial off-the-shelf (COTS) servers are both high powered and inexpensive (and improve on both aspects year-by-year), the ETSI white paper outlined a network design based on two key tenets:

- Complex telecom functions can be virtualized by creating them purely in software, thus opening up the market to many agile solution providers.
- The software providing those functions can then be flexibly consolidated employing standard IT virtualization technology on high-volume servers and storage.

'Complex telecom functions can be virtualized by creating them purely in software, thus opening up the market to many agile solution providers'

Why is there such hype?

Cost savings

To take a simple example, backbone routers have traditionally been purpose designed with custom hardware and chips to provide line-speed packet forwarding. These designs are proprietary and expensive, and, in many cases, the hardware is several years old before they are deployed in networks.

With virtualization, rewriting the router software to make use of compute, storage and network resources created from as many COTS servers as are needed, benefits from the much lower cost of the commodity hardware. It also allows the "router" to scale year-by-year, as more powerful servers replace the ones that were "leading edge" just 12 months earlier. With no custom hardware components, router software from alternative vendors can also be deployed, further reducing the cost of operation.

Efficiency and elasticity

Separating the network functions into software, away from tightly integrated hardware, provides elasticity in terms of scaling the available resources to meet the demand.

The underlying compute platform now assigns capacity on demand to the applications it is supporting, and so running multiple network function applications on the one virtualized platform can provide even greater efficiencies.

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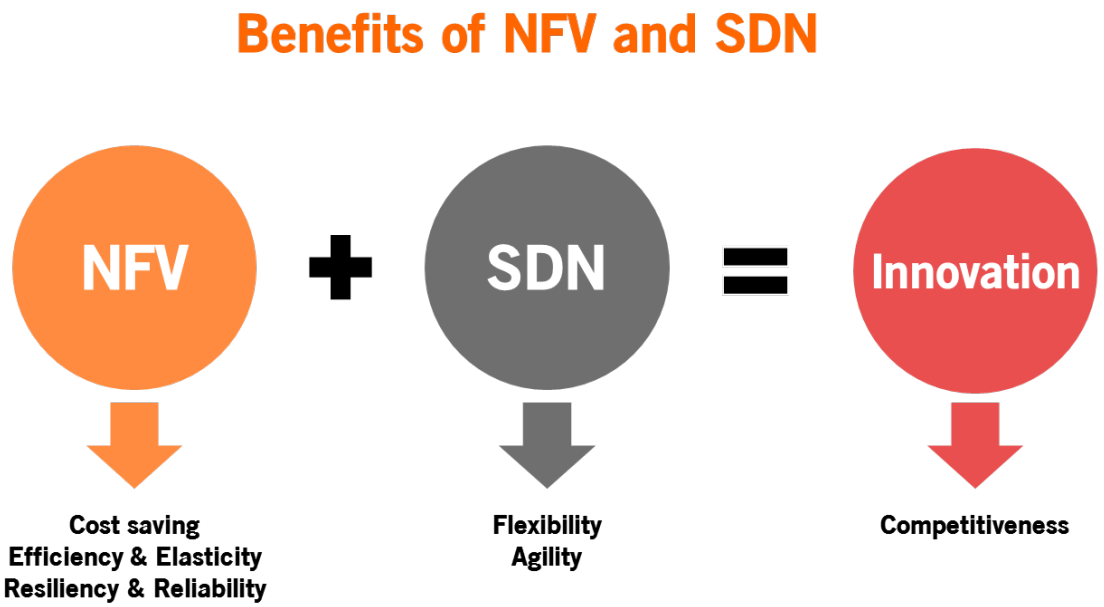
Forecasting growth of services is always complex, especially new, innovative ones, but many services that ebb and flow according to their own cycles can efficiently share one flexible platform. If one application needs more resources, the controllers assign more from the "cloud" of servers. If the overall cloud needs more resources, more COTS servers are added to the data center or, alternatively, some of the telecom functions are transparently migrated to an alternative data center.

Resilience and reliability

Taking one more logical step, software-based applications are now fully mobile, in the sense that they can run anywhere on any available platform. Resilience and reliability are key requirements in telecom and have been tackled in the past by providing "worker-standby" solutions (i.e., duplication of these expensive stand-alone boxes with one designed to take over if the live system runs into problems). Now, when a new feature is rolled out, we need to upgrade both the live and the standby environments.

In comparison, in a virtualized world, we run the software in two separate data centers. And we handle everything from simple server hardware failure (by turning that server off) to a full-scale data center failure by spinning up more capacity in the second data center to take the load off the applications.

The ETSI work – which is continuing as they address detailed implementation, security and quality questions – concluded that all IP-based communications services could be virtualized in this way. In addition, if coupled with a redesign of Operational Support and Business Support Systems (OSS/BSS) to fully take advantage of the automation opportunities of this new approach, carriers of the future would have a much lower capital and operational cost of ownership and would flexibly be able to launch new services. Beta trial environments to full blown global deployments in timeframes that truly meet customer expectations are all enabled by this approach.



Software Defined Networking

But we could not talk about NFV without mentioning its natural fit with Software Defined Networking. SDN is an architectural approach, which arose in the IT world to separate the control layer or plane (which is mainly signaling) from the user or data plane (which is where the information or media is processed and moved).

Traditionally, using the router example, the router was a fully integrated device where the router code managed both the logic of where a flow of packets had to go in the network and the movement of all the packets in that flow. Testing a new signaling protocol, for instance, required updating the software in each router in the network.

SDN separates that control element (the decision on the destination for the flow) from the lower-level processes of moving the packets. In the voice world, a similar example would be separating routing decisions into a query server separate from each of the switches or session border controllers.

> 'SDN and NFV are complementary'

SDN and NFV are complementary in that a function written in this way can easily be deployed and operated in an NFV environment.

What are the implications for wholesale voice carriers?

The underlying principle behind much of the technology evolution now underway can perhaps be explained by the analogy of pets and cattle.

For the past century, telecom networks have been carefully designed, with complex software fully integrated with equally complex hardware, often custom designed for its function and very carefully watered and tended. Skilled technicians monitor each heartbeat, and any indications of a problem are immediately resolved with on-site spares and complex repair processes. Our equipment is cared for as we would treat our pets: Nothing is too good for it.

Picture now a cloud computing environment where tens of thousands of cheap commodity servers are assigned in real-time to the processing task. If one of those servers develops a hard drive issue, the automated management systems recognize that and remove the server from operation. It is simply parked in the rack as a dead piece of equipment and will be replaced when the rack is upgraded with the next generation of servers (probably 2 to 3 years down the line). Hardware has become like cattle on a large industrial-scale farm: A cow is useful only when it is fulfilling its function and is sent to the market when it is past its best!

The clear drive in NFV with SDN is to first separate the control and data layers, automate operational functions and massively reduce the cost of operation by separating the software functions from the commodity hardware platform.

Although this is not necessarily easy, it is happening now with many major telcos around the world. The opportunity for a wholesaler is that the way is clear to make some major reductions in the cost of operations. The risk, in this highly competitive industry, is that someone else will do that first – they will be able to offer more cost-effective services at a lower cost, and perhaps at a higher margin, and will scoop up the business.

In the next sections, we will look at how a wholesaler can make use of these approaches in a concrete way.

POP VIRTUALIZATION

Network deployment – Now

International wholesale voice networks normally comprise two core sets of equipment needed to handle customer interconnections:

1. Voice switches with TDM interfaces to handle the remaining interconnects with carriers yet to migrate to IP
2. Session Border Controllers (SBCs) able to interconnect, in a secure way, service providers ready for VoIP

Supporting those key elements are all the ancillary pieces of equipment supporting C7 signaling, transcoding, conversion between TDM and VoIP, routing control, plus all the operations and maintenance systems required to manage the network.

Today, each piece of kit requires its own controlled environment, which forces wholesale carriers to often have a relatively static and cumbersome hierarchical network structure. Equipment is replicated at most of the PoPs in the network hierarchy as follows:

Core: A network backbone formed of core PoPs and providing interconnects to most of their carrier partners

Access: Regional or local PoPs connecting to customers and suppliers in different parts of the world.

All of this comes at a significant cost, both for initial capital and ongoing operations. It also makes it very difficult to reduce costs, as each component has a logical reason for being in place and many of the costs appear to be inescapable without seriously threatening the reliability of the services.

To compound these issues, even if there is a clear drive in the industry toward a more flexible VoIP interconnect model, all the remaining TDM components in today's networks remain very inelastic in terms of their operational cost. A TDM switch requires full power, space, technical support and spares – regardless of the traffic it is supporting. And the final customer on that switch will therefore be massively unprofitable as a result.

The early deployments of Voice over IP interfaces followed a traditional approach, with vendors proposing to add VoIP interface cards to those complex switches.

'SBCs are playing a growing role in interconnection and are becoming a dominant element in wholesalers' networks'

Nonetheless, as more and more traffic migrates to the IP technology, SBCs, which can efficiently switch VoIP calls at the IP level, are playing a growing role in interconnection and are therefore becoming a dominant element in wholesalers' networks.

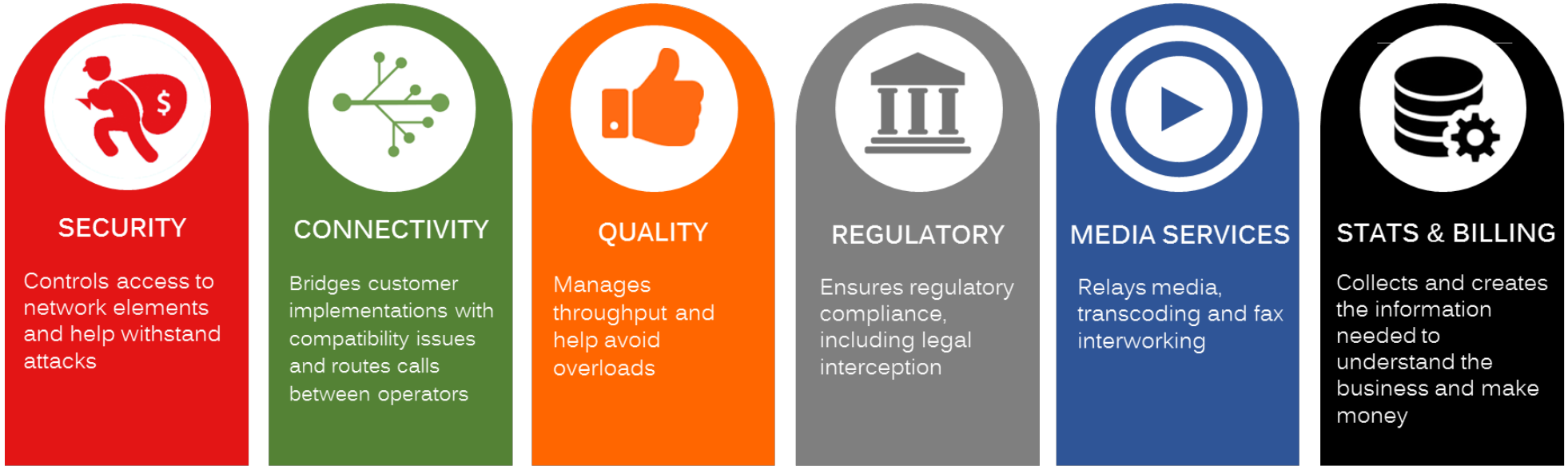
Some of the key functions now supported by an SBC can be found in the diagram on the following page.

However, even with SBCs, the initial designs implemented key functions such as transcoding in hardware. Consequently, many network deployments have had to use custom designed, hardware-based SBCs to interconnect their customers at the edge of their networks, reproducing much of the fixed cost base we were trying to avoid.

But the world is changing, and some SBC vendors have been leaders in the virtualization of these functions, enabling the SBC to operate on a cloud-based virtualized computer environment and resolving some of the cost and flexibility issues that carriers are contending with.

This virtualization of key network functions opens up the potential for the use of virtualized PoPs to bring in a significantly different approach to network deployment – one that directly ties much lower costs to the changing usage patterns.

But before we dig deeper into virtualized PoPs, it is important to review the options for providing that underlying computing infrastructure.



Key functions supported by an SBC

Cloud environments

There's a number of ways the cloud environment[1] can be created and utilized in the telecom world:

1. Shared public cloud
2. Dedicated public cloud
3. Private cloud
4. Federation cloud

Shared public clouds

Led by Amazon, Microsoft and Google in particular, but with significant installations from more telecom-oriented players such as Softbank, Rackspace and Verizon/Terremark, public clouds have been created by companies whose lifeblood is massive-scale global computing. The expertise gained in operating their own businesses has been applied to establishing equally massive computing and storage platforms that can be used, on demand, by any enterprise or company.

The principle is that the public cloud computing environment provides a managed computing platform, with high-capacity data transport access, both to the cloud and among the cloud data centers. Carriers can use that as "bare metal" on which an operating system and application can be hosted.

Using this Infrastructure as a Service (IaaS), the cloud provider assigns as much compute, storage and network resources as the application needs and scales that up and down as conditions require. Rather than paying for the server hardware and all the support that it needs (in space, power and cooling), the application owner pays for the resources being consumed on demand. With the massive buying power and scale (coupled with the competitive desire to gain market traction), public clouds provide a global computing platform at a cost base that would be almost impossible to reproduce. However, by their nature, they are not distributed very widely around the world and tend to be only deployed in major centers.

Dedicated public clouds

Dedicated public clouds are perhaps a mid-ground between the public and the private clouds. Put in place by many of the major cloud providers, they assign sections of the cloud infrastructure for one specific carrier and hence can ease some of the concerns of operating high-reliability services in a computing environment shared with many other users. A dedicated public cloud still benefits from the scale of purchase of its owners but will not have the lowest potential ongoing opex.

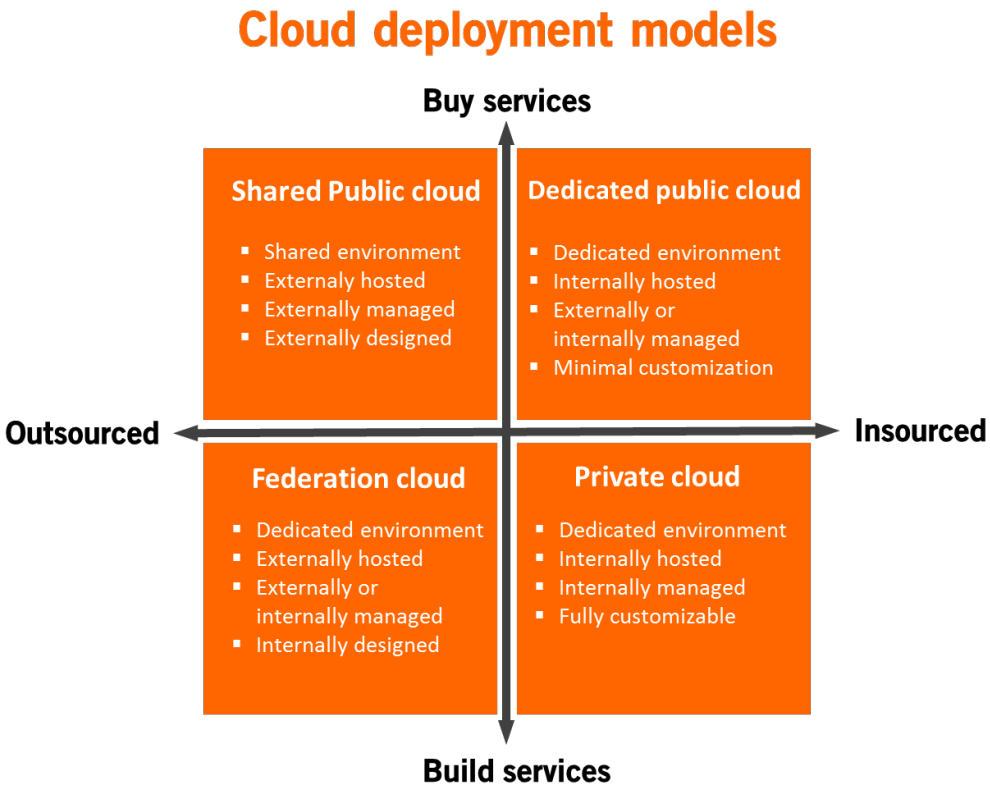
Private clouds

Public clouds, with their low and flexible cost base, could seem an obvious answer for operating the telecom networks of the future. However, telecom operators, which traditionally like to control all aspects of their services, have significant concerns about that approach. Many large operators, in their trials and initial implementations of NFV, are creating their own cloud environments, which are platforms built and operated by the telecom carrier itself in its data centers or major network hubs.

[1] A cloud environment is defined as a flexible managed computing platform built from thousands of servers with the controllers necessary to allow applications to be loaded, operated and scaled up and down as needed.

They follow the same underlying design and approach as a public cloud, but obviously are not necessarily built to the same scale. Open-source designs of some of the key software components underpinning the virtualized data center keep licensing costs low, and the environment is managed purely by the network operator. They are unlikely to have the ultimate cost base of the public clouds, but nevertheless, they provide that often necessary confidence about security, quality and long-term stability that carriers see as key to their services.

A private cloud has one major disadvantage in comparison with public clouds: lower scale and efficiency. Public clouds get their massive efficiencies by sharing the server farm among hundreds or thousands of concurrent applications that all have their own usage patterns. Taken overall, this can give high levels of utilization.



A private cloud established by a carrier generally runs the applications of that operator, and most usage follows the behavior of its customers in that region. A domestic telecom operator can achieve more concurrent operations as more and more telco functions are virtualized. A voice wholesaler, however, could establish private cloud environments for its core PoPs – but it is unlikely to be able to cost-effectively justify a private cloud environment for each of its regional and local access PoPs.

Federation clouds

A federation cloud is an approach where two or more large carriers agree to share their private cloud environments in a collaborative way. This is perhaps mainly of interest among larger service providers with a significant domestic presence. But it could also work between large international carriers, each with its strong sphere of operation. With the ability to run applications on any virtualized platform, the two (or more) carriers could offer very attractive terms to each other, especially if they are offering capacity that would otherwise be unused.

Network deployment – In the virtualization era

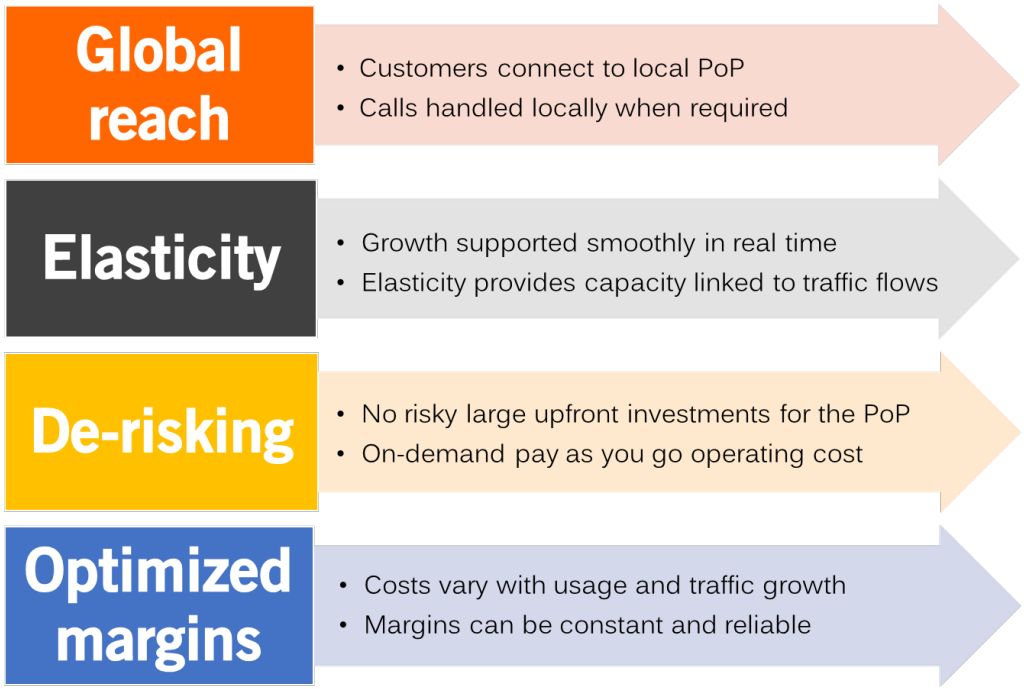
Service providers increasingly expect to connect to wholesalers in their own countries if possible, but at a minimum within a region. This is partly driven by the cost of bandwidth, especially if a private IP connection is used for that interconnect circuit, but it is also driven by quality concerns.

While it is technically possible to build a network with one massive global PoP and switch all calls via that node to achieve the maximum cost efficiencies, this rarely works in practice, as it seriously hinders voice call quality. To bring the audio back to a central point, and then route it via the chosen partner carrier on to the destination, adds significant latency to every packet carrying the conversation, making that call difficult to understand and almost ensuring low end-user satisfaction. Often this results in a much shorter call duration than expected, which has a direct impact on revenue. So this theoretically inexpensive network deployment of a single global PoP ultimately results in much less business for the carrier.

Alternately, building PoPs closer to the customer keeps calls within their originating and terminating region, resulting in lower latency and better quality of experience. However, the downside of such a network strategy is soaring deployment and operation costs. Scaling such small, remote PoPs becomes problematic as well. This often involves over-provisioning of the expensive components to prevent spending time and money to send technical personnel on-site every time additional capacity is needed. Of course, if the demand fails to meet the forecasts, there is no easy way to reduce the cost of that PoP. This is where virtualization can really pay dividends.

Carriers able to deploy the SBC functions in software placed in virtualized edge environments would benefit from a network deployment model much better suited for an industry aiming for more flexibility, agility, lower cost and limited risk.

Key benefits of such virtualized PoPs are outlined in the diagram below:



On the other hand, there will always be risks associated with any virtualized PoP deployment.

One of the first risks is that virtualization is still relatively new in the telecom world and therefore represents a number of unknowns, although the underlying approach is well proven in IT deployments.

Virtualization also means that wholesalers are putting their services in the hands of "sub-contractors," which is often difficult to accept for them. Nevertheless, careful design, where the SBC application and its sessions can automatically be migrated to other cloud environments in the event of an outage or poor quality, can help alleviate this risk.

In fact, an approach where SBC applications and interconnects can be seamlessly provided by different cloud providers in different cities in the region would provide far more resilience than a traditional deployment could achieve. This mixing and matching of a commodity computing platform is therefore a major benefit of virtualization.

Even with the risks that PoP virtualization entails, the time is now for wholesale carriers to initiate the analysis and planning phase of their virtualized network access architecture – to enable them to be the first to take advantage of the multiple benefits virtualization can bring.

The technology to build such virtualized PoPs is already available from a small range of vendors. They have successfully abstracted the functions of a carrier-grade, leading-edge SBC and delivered it in software ready to deploy in a cloud computing environment. Metaswitch is one of them, offering a virtualized SBC under the brand name "Perimeta."

PoP Virtualization – Implementation strategies

Wholesale carriers generally choose to implement access PoPs, as we have discussed, mainly to be closer to the customer and often to give themselves deeper interconnects in a specific region to reduce their termination costs. Therefore, new PoP locations would be based on traffic and revenue growth opportunities, as well as potential cost reduction. So the relatively high cost of building PoPs in the traditional world (usually using carrier hotels and leasing racks and/or installing dedicated equipment) needs to be rapidly counter-balanced by the additional revenue or margins that they can generate. Not a simple business case to build if you are not convinced that a rapid return on investment is there.

In a virtualization environment, the decision process to define if and where a virtualized PoP should be implemented to achieve greater reach and network capillarity is much different. For example, a positive business case to implement a virtualized PoP using a public cloud in a destination where you do not have any customers at present, but where you believe an interesting opportunity exists, is much easier to define. It is then easier to test the market for innovative opportunities, customer segments or applications with minimal investment and risk. But in real life, each carrier, depending on its capabilities, objectives and long-term goals, will evolve its virtualized PoP strategy in its own unique way.

New entrants

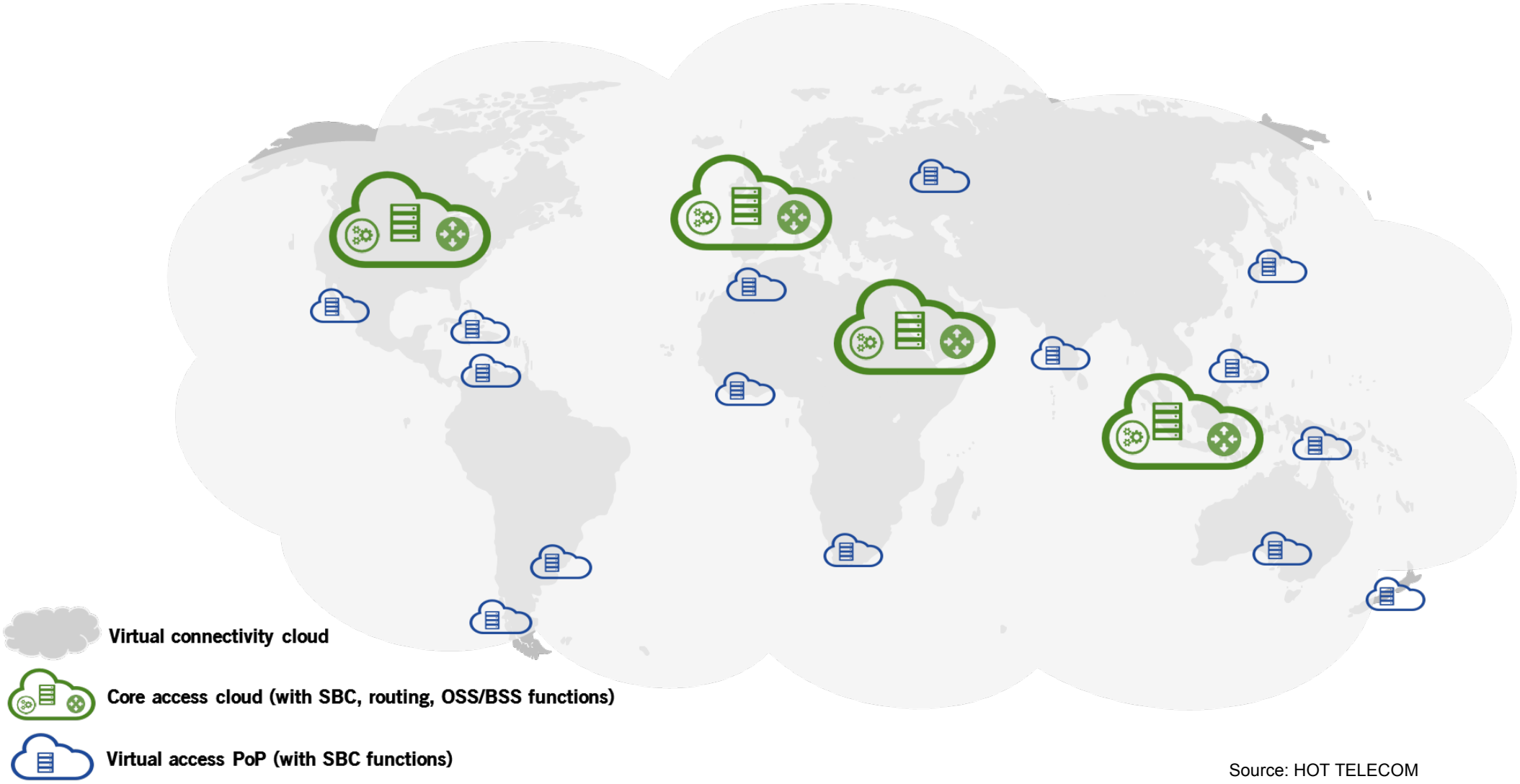
A new entrant for example, starting with a blank sheet when it comes to its network deployment strategy, could use virtualization to rapidly gain traction in international voice and set the competitive benchmark that incumbent players should aspire to.

A startup in the wholesale voice world could therefore easily construct a leading-edge global network very cost effectively using the vast resources made available by public cloud computing vendors in the US and Europe. It could also easily establish its core network functions as virtualized appliances running in multiple cloud environments in strategic locations. Centrally based SBCs; routing query servers; OSS and BSS environments creating the routing plans and managing the collection, rating and settlement of call detail records – all such functions could be operated on a pay-as-you-go virtualized platform.

Key wholesale carriers could then be interconnected using VoIP over the public Internet or via private interconnects to carrier hotels obtained from the network partners of the cloud provider. With those core components in place, the new carrier could be up and running within a matter of months.

To broaden their reach and capture more market share, these new wholesale carriers could then implement a number of virtualized access PoPs. Such a PoP would potentially be no more than a virtualized SBC operating in a smaller public cloud environment – enabling rapid, low-cost and low-risk expansion in key regions of the world, extending the reach out as close to the customers as possible. Gaining customer traction is never easy, but this completely virtualized environment, with its very low and flexible cost base, would enable pricing that would be very difficult to beat. Using this new model, formidable competitors could rapidly be created, and if they then acquire an existing wholesaler to benefit from their customer relationships, they could jump-start their growth very quickly.

Network virtualization architecture example



Source: HOT TELECOM

Incumbents

With this potential threat in mind, existing carriers need to be looking at their own network designs now to take advantage of these benefits before their competitors do. Some of the key activities they need to put in motion include...

Retirement of their TDM equipment

The first thing that incumbent wholesale carriers should do is to ask themselves at what point their TDM equipment should be retired, even if there are still customers depending on it. It is hard to leave customers behind, but the new competitor will not be burdened by those costs, and it is unlikely those remaining TDM customers will pay the true cost of their support.

'The first thing that incumbent wholesale carriers should do is to ask themselves at what point their TDM equipment should be retired'

Virtualization of their network edge

In the short term, wholesale carriers have many challenges, and the wide scale virtualization of their core network PoPs may be down the priority stack. However, virtualization of the smaller and less complex regional and access PoPs are the low-hanging fruits of modernization.

Those access PoPs are expensive to create and operate, and the technology underpinning virtualized access PoPs is available, as we have discussed, from leading-edge SBC vendors. As a result, the main question to be addressed is where to obtain the underlying computing platform.

As we've seen, private cloud environments need both scale and multiple concurrent applications to achieve their benefits, and that is rarely going to happen with access PoPs. Indeed, having to obtain large amounts of floor space to create such an environment (unless it is part of a cloud environment to be sold to enterprises in the region) is counterproductive.

That leaves the option of public clouds or the potential of federation with another carrier. Public clouds have the major advantage of being in place in most key regions of the world – Amazon, for instance, has sites in Singapore, Sydney, Tokyo and Beijing in Asia Pacific. Such sites are also key meeting points for major Internet, transmission and submarine cable systems. Establishing a virtualized access PoP in one of those centers could enable the closing of a current physical PoP, with the resultant cost savings, or the extension of the network to reach new customers more easily.

Pros and cons of different cloud environments

Cloud environments	Pros	Cons	Cost benefits
Shared public cloud	▪ Available in major business centers ▪ Highly automated processes ▪ Rapid modernization assured	▪ Interconnects to their sites could be expensive	▪ Very low opex base ▪ Flexible, on-demand pricing ▪ No upfront costs
Dedicated public cloud	▪ Dedicated environment ▪ Located in major interconnect centers ▪ Perceived by customers as more resilient	▪ Cost base will be higher than shared public cloud ▪ Fewer applications sharing available capacity	▪ Similar to shared public clouds ▪ Cost base higher than shared public because of lower scale
Private cloud	▪ Established in existing key PoPs ▪ Seen as secure and “carrier-grade”	▪ Multiple concurrent applications may not exist ▪ Global expansion difficult	▪ Expensive to establish ▪ Higher opex ▪ Unlikely to make sense unless it is constructed for enterprise use and a network PoP shares the environment
Federation cloud	▪ Seen as more secure ▪ Telco focused ▪ Carrier grade	▪ Competitive challenges ▪ Partnership agreement may be complex	▪ Cost may be very reasonable if done on a “bilateral swap” basis with unused capacity in the carrier’s own facility elsewhere

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FROM CONCEPT
TO REALITY

Metaswitch's virtualized SBC – Perimeta

It is clear from this paper's discussion that virtualizing the SBC is a critical factor in the march toward NFV and in helping operators evolve into being true software telcos. Metaswitch's Perimeta is one of the first virtualized SBCs built, not only to secure carriers' services in new cloud environments, but also to enable real-time service scaling while providing a level of end-to-end visibility never seen before by telecom operators.

The world's first carrier-class virtualized SBC

While other vendors are only just now forming their virtualization plans, Perimeta has years of field-hardening. Metaswitch has therefore already identified and overcome many of the thorniest virtualization problems for SBC deployments. Perimeta has already been deployed as a Virtualized Network Function (VNF) in several announced top-tier carrier network operators around the world (for example, BT and Tiscali) carrying live production traffic.

More recently, AT&T selected Metaswitch as one of four companies to work on its vision for its network of the future (User-Defined Network Cloud), supported by AT&T's Domain 2.0 supplier initiative. The User-Defined Network Cloud leverages NFV and SDN to simplify and scale its network by separating hardware and software functionality, separating network control plane and forwarding planes, and improving management of functionality in the software layer.

For those service providers like AT&T that demand full flexibility, Perimeta operates today in all NFVI (Network Function Virtualization Infrastructure) environments.

A world of difference

At its heart, Perimeta running on virtualized platforms is the same Perimeta software that runs inside Metaswitch's ATCA appliances and on COTS servers. It therefore provides a number of benefits that cannot be found in other virtualized solutions:

Phased virtualization: Perimeta enables a step-by-step transition from initially using COTS server platforms, up to going to full-blown cloud architecture with MANO.

Security: Perimeta provides complete protection against all common attack vectors – for example, volumetric, protocol and authentication, among many others.

Analysis: Perimeta is fully integrated with powerful analytics, diagnostic, troubleshooting and network planning tools, with rapid access to full protocol decoders.

Interworking: Perimeta enables multiple types of networks, protocols and devices to work together seamlessly, making it faster and easier for carriers to expand networks and deploy innovative new applications while retaining existing services and investments.

Transcoding: Perimeta's comprehensive media transcoding function simplifies communication between different networks and endpoints.

Support of RCS and RCS-e: Perimeta supports the Message Session Relay Protocol (MSRP) to fully enable RCS/RCS-e, including IM in session mode, file transfers, and photo and video sharing.

CONCLUSIONS

Network Functions Virtualization and Software Defined Networks have been terms that strategists have thrown around, but they are increasingly real for the telecom world. The massive success of cloud-based computing environments for many major enterprises has shown just how flexible and low-cost those environments can be.

The telecom industry has long built its capabilities on "carrier-grade" custom designed equipment, which is increasingly unfit for purpose in the highly flexible world in which competitors of all types freely use the latest technology and approaches to give customers what they want.

So will NFV and SDN work? The answer is a resounding YES. They work and can be deployed now.

However this gives wholesale carriers both a challenge and an opportunity. Just as Internet-based communications apps have taken a major share of voice and messaging revenues, a new entrant using a virtualized network could have a flexible and very low-cost base that would be difficult to even approach.

If the network and operational costs were a small part of the overall cost of doing business, this may not have mattered. But with termination prices falling rapidly and regularly, the cost of doing business will be the difference between profit and loss in future.

Wholesale carriers therefore need to react now to start to bring their cost bases in line with what is now possible. The best way to start is to look for the low-hanging fruit of virtualizing their smaller PoPs around the world.

Leading Session Border Control vendors, Metaswitch among them, are separating the complex functions performed by an SBC from the hardware and are making it easy and highly cost effective to operate on a large-scale cloud computing environment.

'Starting on the virtualization path now, with achievable projects, is the way to ensure a successful future'

With flexible licensing arrangements, this allows a wholesaler to deploy a PoP with zero capital, short timeframes and operating costs that are directly tied to usage and revenue. This means that growth can be handled smoothly with elastic computing platforms, and new features and services may be added with just a remotely installed software update.

Making changes to network infrastructure is never easy, but ignoring the opportunities of this new technology approach is very risky.

Consequently, starting on the virtualization path now, with achievable projects, is the way to ensure a successful future.

ABOUT US

The authors - HOT TELECOM

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Isabelle has the customer's experience at heart. She has spent the last 20 years working with more than 100 Tier-1 and Tier-2 operators and wholesalers on all continents, looking at how to improve and launch innovative services. She has written many reports, white papers and articles on the subject and has spent time looking at how telecom services are evolving, and what the future holds for the increasingly customer-centric society.

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Steve has a lifetime of experience in designing, engineering and operating networks, both domestic and international. With leadership experience in small technology startups through to global service providers, he has deep experience in a wide range of products, technologies and geographies. He has the rare skill of being able to explain complex technical issues in easily understood concepts and uses that extensively in his consulting work with Hot Telecom.

The sponsor - Metaswitch

Metaswitch is powering the transition of communication networks into a cloud-based, software-centric, all-IP future. As the world's leading network software provider, we design, develop, deliver and support commercial and open-source software solutions for network operators. Our high-performance software runs on commercial, off-the-shelf hardware, as appliances or in the cloud. We package this software into solutions that are redefining consumer and business communications and enabling the interconnection between diverse network services and technologies. We also apply our software development expertise to removing network virtualization complexities in the data center, with a solution that easily scales and secures workload interconnection in support of mission-critical IT and real-time communication applications.

For more information, please visit: http://www.metaswitch.com.

HOT TELECOM

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