Can CSPs monetise beyond infrastructure?
The conversation about telco cloud has continued for more than a decade and communications service providers (CSPs) are showing greater willingness than ever before to run even critical systems from the cloud. Increased familiarity with cloud offerings has grown CSPs' appetites for cloud as the operational benefits feed through and concerns about ongoing control and security have been allayed. However, telco cloud is moving on as a concept to encompass modern multi-cloud operational environments. CSPs are no longer looking at these only to improve their own operations, they’re also looking to generate new revenues from becoming cloud service providers themselves, writes VanillaPlus managing editor, George Malim

Everyone understands that private cloud, enterprise cloud, public cloud and edge cloud all exist and form the IT foundation of various services, many of which can and are provided by CSPs. However, different clouds traditionally have been viewed in isolation. For many applications and services, this separation can’t continue as edge clouds feed data to private clouds to enable everything from IoT to digital workspaces.
This new multi-cloud platform brings together clouds of all types and CSPs can participate, create, monetise and assure enterprise and consumer services ranging from hybrid workspaces to network capacity on-demand. The prize for CSPs if they get this right is that they insert themselves alongside the cloud hyperscalers — Alibaba, AWS, Google and Microsoft — as the providers of cloud services, not simply cloud infrastructure in the form of their networks. This truly is an opportunity to take share in the next trillion dollar market as opposed to gaining incremental revenues from the traditional CSP business of selling wholesale infrastructure to the hyperscalers. The trillion dollar market is realistic. According to a recent whole cloud forecast from IDC, total worldwide spending on cloud services, the hardware and software components underpinning cloud services, and the professional and managed services opportunities around cloud services will surpass US$1.0 trillion in 2024 while sustaining a double-digit compound annual growth rate (CAGR) of 15.7%.

However, the trend for off-premise IT is towards the hyperscalers as Figure 1 illustrates. Data from research firm, Omdia, shows hyperscalers inexorably winning share from both CSPs and tier two cloud providers as their offerings become more widely available and more widely trusted.

Figure 1, because of the timespan covered, refers more to the single cloud era than the emerging multi-cloud era which may have more opportunities for CSPs. The software-oriented, virtualised new landscape means this isn’t necessarily a head-to-head battle. Just as hyperscalers use CSP infrastructure to enable their business, CSPs can use hyperscalers’ resources to support their customers and service offerings. They’ll pay to use that infrastructure in the same way as hyperscalers pay to use theirs but they will retain the opportunity to generate revenues from enterprise customers directly for the cloud services they provide.

Encouragingly, Figure 2, suggests that the multi-cloud, hybrid cloud message has got through with 93% of respondents to a Flexera survey of enterprises with more than 1,000 employees stating their strategy is multi-cloud. This is demonstrative of a willingness to operate multiple clouds and to accept that these are provided from different types of providers, whether hyperscalers, tier two cloud providers or CSPs in future.

CSPs are preparing the ground with telco cloud revenue set to grow to US$29.3bn by 2025, according to ABI Research. The company projects revenues will grow from US$8.7bn in 2020 at a CAGR of 27% with growth led by cloud infrastructure investments in virtual network functions (VNFs),
managed and network orchestration (MANO) and cloud native functions (CNFs). This level of cloud infrastructure investment is suggestive of CSPs’ commitments to not only become cloud infrastructure providers but also to harness growing capability in 5G network slicing and multi-access edge computing (MEC). All three of these technologies demand vast capital expenditure but sit neatly together as the enabling infrastructure for a cloud service provider.

ABI Research expects 5G network slicing to create US$8.9 billion by 2026 at a CAGR of 76% but points out that while this is only a small percentage of CSP revenues it is symptomatic of a growing market poised for further growth. The important question is to what extent CSPs will be able to achieve the goal of becoming cloud service providers. Ability to do so among CSPs will vary widely according to how advanced they are in their digitalisation efforts and the extent to which they roll-out 5G core networks and adopt cloud-native principles.

A further challenge is that CSPs don’t have a clear field in which to establish their cloud service presence. The hyperscalers are also positioning themselves with telco-specific offerings such as AWS Wavelength and Microsoft Azure Edge Zones. Therefore, while it appears the battle lines are being drawn for CSPs to come from the network to fight the hyperscalers while the hyperscalers travel in the opposing direction, the reality is that both types of organisation will continue to collaborate using each other’s infrastructure where most efficient. The difference for CSPs is they may avoid being confined to the role of infrastructure providers.

The trillion dollar market is for the future. Today, a lot more development needs to happen as enterprises continue to move from on-premise IT to cloud environments. For many, multi-cloud is conceptually a step too far, although that will change as familiarity increases.

This is borne out by an April 2020 survey of 50 CIOs by consulting firm Deloitte which found that respondents expected to see the proportion of total workload done on-premise drop from 59% in 2019 to 38% in 2021, a reduction of 41%. Respondents also expected public cloud’s proportion of total workload to grow from 23% to 35% in the same timeframe, with private and hybrid cloud reaching 20% and 7% of workload, respectively. This shift in workload is reflected in IT expenditure as detailed in Figure 3.
The five largest hyperscale public cloud providers that disclose segmented revenues saw their combined revenues grow by 31% in 2019 to US$94bn, Deloitte reports. Revenues for 2020 are likely to be more than US$125 billion, increasing to more than US$160bn in 2021, the firm projects. As of mid-2020, there were 541 hyperscale data centres globally, with 26 added in the first half of 2020 and another 176 are planned over the next few years. All of these data centres need chips. Though chip spending and cloud revenues are not perfectly correlated, they are connected in the long run, with growth in chip revenues usually being a leading indicator: The chips need to be bought and installed in the data centres before the cloud revenues start flowing. On this basis, the buoyant chip market is indicative of strong cloud growth.

Hyperscale isn’t hyped
The five largest hyperscale public cloud providers that disclose segmented revenues saw their combined revenues grow by 31% in 2019 to US$94bn, Deloitte reports. Revenues for 2020 are likely to be more than US$125 billion, increasing to more than US$160bn in 2021, the firm projects. As of mid-2020, there were 541 hyperscale data centres globally, with 26 added in the first half of 2020 and another 176 are planned over the next few years. All of these data centres need chips. Though chip spending and cloud revenues are not perfectly correlated, they are connected in the long run, with growth in chip revenues usually being a leading indicator: The chips need to be bought and installed in the data centres before the cloud revenues start flowing. On this basis, the buoyant chip market is indicative of strong cloud growth.

Who does what?
The essential elements of a multi-cloud service are illustrated in Figure 4, which sets out the service chain from the connectivity to the end user. This illustration explores the role of the CSP as an infrastructure or service provider but CSPs can go and occupy application delivery and business functions further to the right of the depiction to provide a complete or end-to-end offering.

These functional areas illustrate how CSPs have been building their connectivity expertise, adding data and cloud capabilities over the preceding decades to get to the stage they’re at now. An important stimulus for CSPs in this operation is the emergence of MEC and the edge cloud. CSPs are well placed here because their networks extend to the edge whether to gateways or facilities near to the edge. These put them in a natural position to provide support to edge devices and facilitate processing, analysis and communication of data at the edge. Further integration of CSPs with applications adds completeness to their offerings and, crucially, puts them in that higher revenue service portfolio they long to offer.

The GSMA describes scenarios where the CSP is an infrastructure provider and as such offers the edge connectivity, computing and storage infrastructure. An edge service provider – often a CSP’s customer – may use this edge infrastructure and provide aggregated edge platform services to...
CSPs as service providers deliver edge connectivity, infrastructure and edge platform services directly to the market.

the market and could also provide a marketplace of applications to enterprises. CSPs have an opportunity to become a sales channel of the edge service provider’s services, selling solutions directly to enterprises. However, this confines them to the role of a reseller, missing high value parts of the service offering.

CSPs as service providers deliver edge connectivity, infrastructure and edge platform services directly to the market. They may interconnect with other CSPs and edge service providers to provide access to edge services beyond their own infrastructure and network footprint. CSPs that act together can offer a federated edge cloud service direct to enterprises and potentially to other service providers.

In this scenario, CSPs have control of more of the edge cloud value chain and can derive more of the new revenues from it. Similarly across the entire multi-cloud environment, CSPs can co-operate with hyperscalers or compete with them according to the assets they have and the capabilities they have to address market needs.

An important consideration here is that in the short term at least, hyperscalers are not in a battle to the death for market supremacy with CSPs. They certainly want to address and control the higher value aspects of the service chain as much as possible. However, in many cases, CSPs are well-positioned and have market advantages. In those cases, hyperscalers will partner with or be customers of CSPs. The challenge to CSPs in relation to that is they lose the potential to have direct cloud relationships with enterprise customers and, ultimately, hyperscalers may construct the assets and network infrastructure they need to compete with CSPs. The battle ahead is multi-faceted, reflecting the nature of multi-cloud utilisation and deployments.

The relative novelty of this market means several different types of organisations are looking to participate in the multi-cloud market. As Figure 5, which covers the Asia-Pacific excluding Japan (APEJ) market, illustrates there are nine significant types of service provider targeting multi-cloud implementations in addition to organisations that are doing it themselves. Among these, IDC reports CSPs are being looked to by around 12% of organisations, hyperscalers by 28%, cloud specialists by 25% and managed service providers/hosters by 25%. This shows hyperscalers are being more widely considered while CSPs are less on organisations’ radars. This will be a challenge for CSPs to overcome as they build their multi-cloud capabilities and bring more offerings to market.
The simultaneous competition and collaboration between different providers is at an early stage and future tables of this type are likely to include fewer market participants. Some CSPs are aiming to take a greater role in the multi-cloud landscape, starting from their position of networking strength. IDC defines the multi-cloud telecoms environment as an external digital lever for CSPs to provide enterprises with required key performance indicators, such as latency, bandwidth or jitter via a public cloud or cloudified internal systems, to enable scalability, faster go to market and improved customer experience. The provision of this multi-cloud ecosystem with end-to-end orchestration, seamless lifecycle services and secured and automated billing systems meets enterprise requirements and positions CSPs as ubiquitous cloud network providers alongside hyperscalers.

For CSPs looking to provide services across the multi-cloud environment, as opposed to those looking to provide networks and cloud support infrastructure, this is an opportunity to redefine the business of telecoms and provide high-value services directly to customers. For the infrastructure providers, this is another opportunity to participate in a large-scale, capital intensive sector in which revenues will commoditise over time.
How to become a digital service provider unicorn

The telecoms industry has been targeting digital services for many years, looking to serve new and existing customers with additional digital offerings. However, until recently the digital service provider has been a unicorn. Now, though, the situation has changed and VMware Telco Cloud explains here how it is turning myth into reality.

For communication service providers (CSPs) contemplating network transformation over the next few years, the question isn’t so much ‘What should we do?’ but ‘Where should we start?’

New 5G and edge innovations offer no shortage of options. With the ability to bring advanced edge intelligence close to users and tune network slices for the applications running on them, CSPs can do amazing innovative things. A world of new consumer and enterprise services – ultra-low latency applications, industrial automation, dynamic augmented and virtual reality (AR/VR) experiences, and many others – become possible.

At VMware, we know that no two transformation journeys will look the same. It’s why we designed our Telco Cloud portfolio from the ground up for versatility. We bring cloud-native flexibility, cloud-based service delivery, and end-to-end automation together in a single platform to support the full range of emerging 5G and edge use cases.

In reality, most CSPs will pick one or two areas to focus on, at least initially. But reality is boring. Let’s try something different: What if a service provider did everything? What would their network and services look like? What would they be able to do?

Let’s take a deep dive into this hypothetical unicorn service provider and see how they can use VMware Telco Cloud to reimagine their business. Note that while the CSP described here is purely imaginary, the solutions and outcomes detailed are anything but. All come from real-world experiences of CSPs working with VMware right now.

The challenge

Unicorn Services is a regional telco providing mobile, fixed-line, and broadband internet services for consumer and enterprise customers. The CSP leads its market, but company leaders are ready to take the next step in transforming their business and can feel new competitors nipping at their heels. As they plan out their investments for the next five years, they have some ambitious goals:

- **Converge siloed operations:** Unicorn Services offers a full range of voice and data services, but it relies on multiple siloed networks to do it. As it prepares to update the voice network for 5G, it finds itself at a crossroads. Should it double down on legacy IP multimedia subsystem (IMS) or adopt a more forward-looking approach?
- **Enable consistent cloud-based service delivery:** Unicorn has been using third-party cloud services for years, both internally and as part of various enterprise offerings. Within the last year though, the company’s cloud portfolio had grown highly complex, with a dozen different public, private and hybrid clouds in use. It wants to consolidate everything – core, edge, radio access network (RAN) and public clouds – onto a converged multi-cloud platform, so a centralised team can control all resources and clouds with a single operational model.
Let’s see how Unicorn Services can work with VMware to accomplish all of these goals.

**Unify the network**
As the first step in its journey, Unicorn needed to lay the foundation for converging voice and data services. The goal: a single, unified services platform that extends from core to cloud to customer, with a single, consistent operational model.

Unicorn’s network vendors offered to help it define an IMS evolution strategy, but it looked a lot like the old one: a siloed platform with integrated software. If Unicorn went that route, it would still need dedicated tools and processes for voice services. The company would also be at the mercy of its vendors for new features and pricing. If Unicorn intends to stand out in the coming years, it will need the freedom to continually bring new converged capabilities to customers – in its own way, on its own schedule.

**Telco Cloud Platform**
Working with VMware, Unicorn designed a unified platform for converging all services and management across multiple layers and clouds in their distributed network. The first step: virtualising and consolidating network functions (NFs) from multiple vendors. VMware made it easy with the VMware Telco Cloud Platform.

VMware Telco Cloud helps CSPs deploy virtualised and containerised network functions (VNFs/CNFs) across their networks from core to edge, enabling simpler, more consistent operations. With a single, flexible cloud-based platform, Unicorn Services gained:

- **Performance**: Telco Cloud solutions help Unicorn optimise application throughput and response times across the multi-vendor architecture.
- **Scalability**: The network can now dynamically allocate capacity to respond to spikes in demand. Soon after launch, for example, a popular sporting event aired that suddenly increased demand by 30%. Unicorn was able to spin up new resources in seconds.
- **Resiliency**: With consistent operations for all services, Unicorn customers can now benefit from advanced resource guarantees, unified monitoring, and closed-loop remediation.
- **Agility**: The converged platform provides a versatile foundation for Unicorn to develop new products and quickly bring them to market. The CSP has already cut roll-out times in half for new services.
Working with VMware, Unicorn designed a new edge architecture to enable remote distribution, management, and operation of IT resources from devices and networks to the cloud.

Enable consistent multi-cloud management with centralised control
Unicorn leaders knew that cloud would play a central role in their transformation, but few vendors could deliver the multi-cloud platform they had in mind. Some offered solutions that would lock them into siloed proprietary ecosystems and roadmaps. Others offered clunky solutions based on open source software that would be difficult to integrate and expensive to maintain. Only VMware offered a mature Telco Cloud platform that could unify all networks and operations across multiple vendors and clouds.

Telco Cloud Solution
VMware Telco Cloud solutions provide a versatile digital foundation to help Unicorn build, run, manage, connect, and protect multi-cloud services. In addition, VMware’s pioneering leadership in virtualisation made it the perfect partner to disaggregate the previously monolithic, hardware-based network.

Today, Unicorn can treat all infrastructure and services as cloud-based software – delivering any application, to any device, across any cloud. It has implemented a single, vendor-agnostic platform for new and existing applications, with a consistent operating model across engineering, operations and service assurance. Unicorn has also standardised on a common catalogue of network services that can be provisioned in the same way across all markets, regardless of where workloads are deployed.

With this unified multi-cloud platform, Unicorn can:

- Improve scalability by scaling network resources up and down, in and out, as needed to meet changing demand
- Drive down costs and complexity by centralising network operations, automating manual processes, and breaking free from vendor lock-in
- Increase agility with a consistent, cloud-connected platform to create new services on the fly and rapidly bring them to customers

Capitalise on the intelligent edge
Unicorn leaders believe that smart cities are the future of public safety, and they plan to use new edge capabilities to bring innovative IoT solutions to public sector customers. They envision an expanding portfolio of applications that use next-generation sensors, ultra-high-definition cameras, and private 5G networks to protect citizens and optimise emergency response. These applications – especially video analytics – will require advanced edge processing unlike anything customers have needed before.

Unicorn wants to be an early market entrant in delivering these new capabilities. At the same time, its edge ambitions go well beyond smart cities. To support other opportunities in the future – industrial automation, healthcare, autonomous vehicles, and others – it wants an open, flexible edge.

Telco Cloud Distributed Edge
Working with VMware, Unicorn designed a new edge architecture to enable remote distribution, management, and operation of IT resources from devices and networks to the cloud. Now, Unicorn is using the Telco Cloud Platform to host local hyperconverged infrastructure, IoT gateways, and predictive analytics for smart city applications. Unicorn will deploy innovative micro data centres close to sensors around a city. These sites will perform predictive and diagnostic analytics at the edge, sending data back to the core data centre only when needed to minimise transport volumes and round-trip times.

With these capabilities, Unicorn can orchestrate complex connectivity and compute for diverse smart city applications. And it can do it under strict service-level agreements (SLAs) – such as delivering advanced video surveillance and analytics with guaranteed quality, coverage and delay. Most importantly, Unicorn can use the same capabilities to support an ever-expanding portfolio of edge use cases in the future, delivering a wide range of applications under diverse SLAs.

Modernise the RAN
Unicorn’s ambitious vision for the future will require new levels of capacity, density and performance from the network. To get there, they need to modernise and open up the RAN. As the company evaluated the options though, it found few vendors that could deliver on what it had in mind. Traditional telco suppliers pitched tightly coupled hardware/software solutions that would leave Unicorn locked into its vendors’ roadmaps and pricing. Hyperscale cloud providers offered their own solutions, but these would similarly lock Unicorn’s customers into one public cloud ecosystem. Only VMware offered a universal platform that could accommodate any vendor’s RAN technology and any public, private, or hybrid cloud.

Telco Cloud Solution
Unicorn implemented a powerful Telco Cloud platform for a cloud-native, software-defined 5G network. And, by bringing together multi-vendor innovations across the distributed cloud, edge and RAN, it retained the freedom to use the best-of-breed solutions it chose, without ceding control to a vendor or cloud provider. Through VMware’s Ready for Telco Cloud programme, Unicorn can choose from dozens of cloud-native 5G NFs from leading RAN vendors that have been pre-tested and validated for the Telco Cloud Platform.
Unicorn has already updated the RAN at thousands of sites, taking advantage of the cloud-native architecture to deploy the network much more quickly and inexpensively. In all, Unicorn expects to save more than US$50 million in deployment costs over the next four years compared to legacy solutions, and several hundred million in capital infrastructure savings. The open platform also facilitates extensive telemetry – and AI-driven automation to drive down implementation and operating costs. And, thanks to this software-led approach, Unicorn can support all types of customers in every market – enterprise, small business, and consumer – along with a diverse ecosystem of application partners.

Delivering superior customer experiences
Unicorn’s network operations team had solid customer satisfaction scores, but the task was getting harder every day. As the network and services grew more complex, they were bombarded with hundreds of thousands of network events and alerts from thousands of customer sites daily. Just separating the real problems from the noise – much less responding to them – was a constant challenge. Worse, there was no easy way to map issues in the underlying network to specific customers and SLAs affected.

Adding to the challenge, Unicorn was constantly updating its network software and topology to meet changing customer needs. Every time there was a change, operations personnel had to manually update the network management system (NMS), wasting valuable time and resources.

Telco Cloud Solution
To set the operations team up for success with the new network, Unicorn deployed VMware Telco Cloud Operations. The solution combines holistic visibility with built-in intelligence to correlate network events, determine root causes, and quickly surface issues that require intervention. Unicorn’s Ops team can triage problems much more quickly, without having to sift through thousands of extraneous alarms. When Telco Cloud Operations detects a problem, it immediately identifies the tenant networks impacted – for example, showing the enterprise software-defined wide area network (SD-WAN) customers affected by a failure in the underlying infrastructure. It can even prioritise alerts according to business-level factors, such as SLAs. The solution also continuously discovers and updates the topology relationships between devices, protocols, and services running on them – so operations personnel don’t have to.

With these proactive capabilities, Unicorn’s operations team can now:

- Identify over 99% of alarms in real-time
- Isolate incidents 11 minutes faster, on average, per event
- Save thousands of hours annually that it used to spend manually updating the NMS

Take the next step on your transformation journey
Clearly, for a CSP embarking on transformation, VMware Telco Cloud can bring huge benefits to practically every part of the network and operations. As you reviewed the real-world performance our hypothetically stitched together service provider transformation, you might have noticed a common theme: versatility.

The days of designing an entire infrastructure and operational model to do one thing are over. Now, you can use one network, one operations, one consistent multcloud/multivendor platform to support everything you do. As far as what you build on that platform? The sky’s the limit.

- **For consumers:** Use pervasive connectivity and ultra-low latency to deliver customised media like ‘choose-your-view’ experiences in stadiums. Bring expanded AR/VR capabilities and holographic protection to gaming, learning, and events. Support home wireless broadband, in-car entertainment, and autonomous vehicles.
- **For enterprises:** Use advanced edge and slicing capabilities to deliver new applications under more rigorous – and lucrative – SLAs. Support private 5G networks, smart manufacturing, connected mining, remote medicine, inventory management, connected agriculture, smart cities, and much more over the same network.

That’s a lot of exciting possibilities for your Telco Cloud. And the best part? You don’t have to be a unicorn to do any of them.
The conversation about telco cloud has continued for more than a decade and communications service providers (CSPs) are showing greater willingness than ever before to run critical systems from the cloud. Increased familiarity with cloud offerings has grown CSPs’ appetites for cloud as the operational benefits feed through and concerns about ongoing control and security have been allayed. Moreover, telco cloud is moving on as a concept to encompass modern multi-cloud operational environments and CSPs can be leaders here, rather than just partners in the multi-cloud value chain.

This new environment brings together clouds of all types so CSPs can participate, create, monetise and assure enterprise and consumer services ranging from hybrid workspaces to network capacity on-demand, Shekar Ayyar, the executive vice president and general manager of Telco and Edge Cloud at VMware, and Kaniz Mahdi, the vice president of advanced technologies, Telco and Edge Cloud at VMware, tell George Malim

George Malim: How is the telecoms industry changing in relation to cloud utilisation?

Shekar Ayyar: Fundamentally, I look at it as an evolution. Communications service providers (CSPs), two decades ago, were the critical infrastructure and nobody could do anything without them. Communications was the fabric that everyone wanted to make sure was up and running but the last decade and a half has been fully consumed by clouds, and specifically the hyperscale clouds. The focus has been much more about how to get some combination of storage, compute and network from a remote location, and frankly the operator’s role has been reduced to a vanilla network with diminishing average revenue per user (ARPU).

Why is this? You have your mobile phone, and it’s become a big part of what you do, but you never think too much about the infrastructure that makes it work – it’s become a more passive relationship. You likely have a much more engaged relationship with cloud providers and content providers than you do with your CSP. This has a lot to do with the fact that CSPs have missed the first cloud opportunity.

Now CSPs have a second chance – they are at a point in time where they can make a difference. Betting their partnership on a singular cloud provider is risky. Instead of just partnering up with a hyperscaler and staying satisfied with some network revenue on the back end – essentially concreting their role as commodity – CSPs should take a more aggressive approach to becoming a next generation cloud leader, so they don’t miss another boat.

Fortunately, 5G and edge provide that disruptive opportunity. With a multi-cloud approach, CSPs have the flexibility, agility and resiliency they’ll need to not only create new services but deploy them in the most efficient manner possible. Merging carrier and cloud domains is another opportunity for CSPs to take advantage of cloud-like technologies. We anticipate a subset of CSPs will emerge as victors at the other end of this transformation and we, at VMware, are singularly focused on equipping them to be able to do that.
GM: Has the concept of telco cloud developed to encompass modern, multi-cloud operational environments?

SA: Yes, undoubtedly, but this is invariably going to be a partnered environment. The fundamental notion of multi-cloud is that there are cloud providers that have spent a lot of capital building up their data centres which provides value as long as you access the right one for the right purpose. I think the smart CSPs will take advantage of what is there, but to do it in a way that allows them to maintain their control point. This will require a multi-cloud strategy.
At VMware we provide the ability to enable a single environment that allows you to consume capacity from wherever you want – from the core, edge, radio access network (RAN) and public clouds. This ability comes without having to build all of the infrastructure yourself while providing the visibility and control so you can decide how much capacity and from where you want it.

It’s pretty easy to see how creating a single multi-cloud platform like the one we provide will allow CSPs to efficiently create value with a horizontal framework – from simplifying service creation and deployment to greatly increasing operational efficiencies. While they do that, CSPs can make use of the extension into multiple public clouds – and their partnerships and service portfolios by extension – without losing their shirt.

GM: Are telcos enabling multi-cloud environments or is the environment still fragmented with different types of cloud viewed in isolation?

SA: The answer is ‘both’, depending on size, scope and timing. A small operator that just wants to get started and deploy something in a specific geography could afford to be somewhat isolated. In some cases, maybe that’s okay, in that they never intend to be multi-geography. In most cases though, and particularly in the larger tier of service providers that we deal with, that’s not okay. For these multi-geography CSPs, they need to have the ability to extend and have connectivity to a broader cloud landscape. This multi-cloud capability provides flexibility to consume resources from the right cloud or edge at the right time.

The right approach therefore is to understand how to be a citizen of a multi-cloud world and to figure out how you’re going to hold control while you make use of that multi-cloud infrastructure. The wrong answer is to decide to be a siloed architecture in the corner and assume you don’t need to interact with anything else. If we’ve all agreed on one thing throughout this decade of transformation, it’s that silos won’t work for the digital era.

GM: Has the arrival of higher bandwidth, software-oriented 5G plus new techniques, such as network slicing and multi-access edge computing (MEC), transformed telecoms IT? Is the current status indicative of a preparation phase for the 6G, multi-cloud environment of multiple integrated clouds?

Kaniz Mahdi: Network slicing is an interesting feature of 5G that allows you to do many things that were not possible before, but there are many other interesting elements of 5G, which are industry firsts. The pervasive nature of 5G means that for the first time in history, I am able to confidently assume that there will be connectivity wherever I go. Imagine the user landscape that emerges just because of the fact that your connectivity is a default assumption. It’s a utility for you.

The automation and cloudification that is already baked into 5G is also going to help us in the multi-cloud journey. For that, we need densification of 5G on top of LTE networks to continue. Although the initial roll-outs have been based on the existing LTE networks with 5G new radio (NR) subtended off of LTE, we are starting to see deployments with 5G standalone (SA) networks which have based on cloud-native solutions.

That’s tremendous progress in comparison to the communications industry back in the LTE days. The leap that we have taken from 4G to 5G just in mere migration from cloud monolithic physical brown boxes to containerised software that can run on any cloud is immense. The current deployments as of today are mainly private networks and private clouds maintained by the CSP. Of course, VMware supports these private clouds, but we are even more excited about the
multi-cloud landscape that’s emerging as other hyperscale cloud providers come into the mix.

Here we see cooperation as well as competition that is rising around the edge market. It's yet to be seen as to who will win the battle for the edge, but VMware sits in a sweet spot since we take multiple cloud infrastructures and run various levels of abstraction that sit inside a single platform. Essentially, we enable many infrastructure and cloud providers to become the providers of containers which will seamlessly host a myriad of supplier applications. The resulting construct is a perfect substrate for what comes next in the 5G evolution – moving beyond simply improving the human experience of mobile broadband.

Back in the early days of 5G inception, the stated ambition of 5G was to enable real-time collaboration among smart things anticipated in the 2020s. These smart things would be humans, machines, cyber physical systems or any combination of the above. Fast forward to 2020, and we did indeed experience a massive behavioural transformation, COVID being the forcing function. COVID will continue to dominate the scene through the better part of 2021, but behavioural transformations led by COVID are here to stay, resulting in the demand for expedited 5G evolution with time sensitive communications, programmability and automation underpinning real-time distributed collaboration among humans and machines.

This next step of 5G evolution to enable highly interactive, distributed collaborative experiences with time sensitive communications, programmability and automation will set the stage for 6G. It will make connectivity pervasive, and it will make cloudification pervasive, to an extent that both compute and networking will be in the hands of the user. Compliment this with ongoing advances in robotics and machine learning and the evolution of the web with spatial computing, we’ll be all set for highly immersive experiences of the 2030s and beyond.

**GM: What does this environment look like and what is VMware’s role?**

**KM:** VMware has a unique vantage point where the wireless, networking and cloud industries fuse together. Before 5G, the wireless, cloud and networking industries were driving economic benefits for each other, but they were growing independently of each other. Now, with the new user landscape that is being shaped with this fusion, it’s impossible to see cloud evolving in one direction and automation evolving in a second direction and wireless telecoms in yet another third direction. VMware has our DNA in virtualisation and cloud, and we’ve been sowing deep seeds in the communications industry for many years now. I therefore see us in a very strategic spot where we will be able to unify these three industries together; we can jointly shape the 6G roadmap in a way that gives all of us benefits to reap.

**SA:** Part of what VMware does is inherently making the infrastructure secure. Our thesis has always been that security shouldn’t be a bolt-on that you think about after the fact. We’re extending that into the next generation infrastructure, and this provides us the ability to make and create policies that can be translated for security right through the software layer. If you think about it as an abstraction that overlays all of the underlying infrastructure, then doing things like data privacy, or manage access and ingress, egress all become policies that just get defined at that software layer.

All in all, security included, VMware provides a holistic platform for CSPs. We approach the CSP transformation as an opportunity to help them create new digital life experiences and revenue streams by enabling them to bridge their existing and new infrastructures and creating agile foundations for their growth.

https://telco.vmware.com