



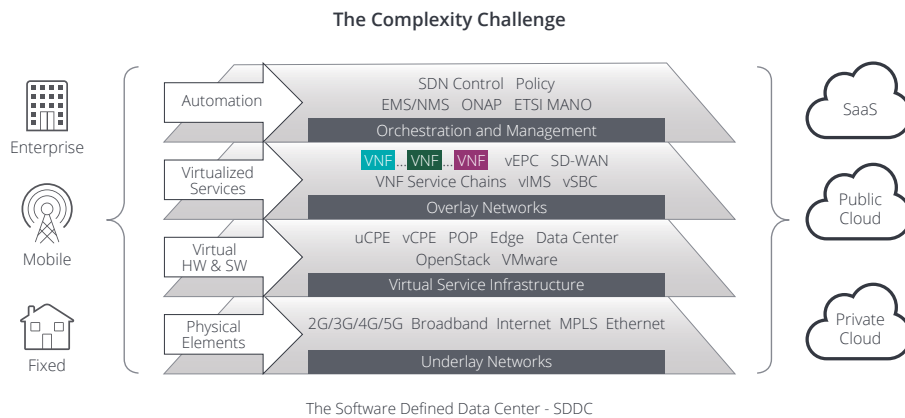
5G Makes Virtualization Vital, Not Optional

Bruce Kelley, Chief Technology Officer (CTO), NETSCOUT



Although the telecom industry has set a course towards virtualization of infrastructure enabled by network functions virtualization (NFV) and software defined networks (SDN), this disruptive strategy is not rolled out comprehensively, writes Bruce Kelley, the Chief Technology Officer (CTO) of NETSCOUT. Leading service providers have embraced the concept of virtualization technologies but still only run relatively low volumes of their total network traffic over their virtual infrastructure.

The reason for this is that immense complexity is involved in the management – or orchestration – of virtualized infrastructure along with interoperation of the underlying traditional network infrastructure. There is enormous fragmentation in these infrastructure with proprietary software and tools being put forward by different vendor systems. In addition, even the open source orchestration landscape has competing options for service providers to select from, adding to the challenges.



How do you Assue End-to-End, Multi-layer, Multi-Domain Services

The stall in progress of employing virtualization is set to end with the arrival of 5G mobile networks. These projects will provide a stimulus for NFV because the only affordable way to operate 5G networks is to virtualize, change network design, and increasingly manage the network and services from the edge.

The affordability challenge is compounded by a shortage of clear use cases for 5G. There's a generalized acceptance that the low latency, high bandwidth of 5G will be of immense use and value in the digitally transforming world but, for service providers faced with multi-billion dollars investments in new network equipment, better-defined business cases are required.

This is not a trivial issue. World Economic Forum/Accenture analysis, based on data from S&P Capital IQ, estimates that the value of network investments needed to keep pace with demand over the next decade is \$2T. Service providers will therefore need to endure substantially increased investment even though 5G profitability is not guaranteed from the use cases that are currently known.

There are, however, a growing number of use cases that can be monetized. Many of these will rely on high levels of service assurance to ensure maximized availability, uptime, and quality. Managing these attributes puts further burden on service providers and comes at a cost. Therefore, increased automation of operations will be required in service management as well as network management.

With consumer 5G devices not expected to come to market until at least 2019, use cases today are related to the core 5G network and include mobile broadband – or fixed wireless access – to deliver 1G connectivity to enterprises. However, depending on the markets they operate in, and the coverage they already have in place utilizing other network technologies, service providers are looking at a spread of different services to provide a return on 5G investments.

Some service providers are looking at massive machine-to-machine (M2M) communication, which will see vast volumes of endpoints requiring connections, although not necessarily all of these will require the performance of 5G. Use cases involving big video such as 4k streaming and use cases that relate to critical or reliable communications that require very high levels of resilience or are reliant on achieving key performance indicators (KPIs), are also being considered. The variety of use cases reinforces the fragmentation of market opportunities and underscores the complexity service providers will need to accommodate in supporting these services over 5G capacity that is also blended with previous generations of mobile and fixed network technologies.

In contrast and more importantly to previous mobile generations, 5G won't be rolled out as a standalone technology and service providers will rely on 4G legacy capacity to support many of the services customers want. The move towards 5G is therefore likely to be a phased migration with areas of population density prioritized. This phased approach adds further management complexity because services will be delivered over a blend of different radio network technologies. Control plane challenges will be heightened by the emergence of network slicing and the complexities of the wider 5G service portfolio.

The 5G new network needs to be flexible and agile with the ability to configure itself to support the demands being placed on it at a given time. In the evening, that might mean ultra-high definition video is supported for users' gaming and video viewing but, during the daytime, this capacity might be focused on enabling collaborative working via unified communications applications. The new virtualized network is expected to spin capacity up and down according to demand.

The new 5G virtualized infrastructure must be automated because the costs of attempting to do this manually would be impossible to sustain within a telecoms business case and there would be no increase in service velocity. This is a key driver for increased uptake of NFV and SDN.

McKinsey has estimated that the newest technologies in NFV and SDN would let operators lower their capital expenditures by up to 40% thereby reducing these costs down to less than 10% of revenues – and their network operating expenses by a similar amount. This illustrates that virtualization technologies are increasingly seen as a savior of a service provider's business, but these insights remain projections and, even though the leading service providers are rolling out the technologies, only a small percentage of traffic is run over virtualized capacity – so far.

In addition, there is some caution as to the extent that virtualization will bring costs down. Last year's Mobile World Live Annual Survey found that 45.2% of respondents think virtualization will bring costs down to a sustainable level but 42.9% are not sure this will happen. There is still more work to be done in communicating the cost benefits of virtualization and, for some, seeing these will be the point at which they believe the promise of NFV and SDN. Until then, virtualization looks to be a difficult and expensive technology to deploy for these organizations.

This is the reason why 5G can be a catalyst for NFV and SDN deployment. With use cases for new technologies such as augmented and virtual reality (AR and VR) unclear, service providers are looking to 5G networks to provide enhanced mobile broadband and enable services such as software defined wide area networking (SD-WAN) to justify investment in 5G.

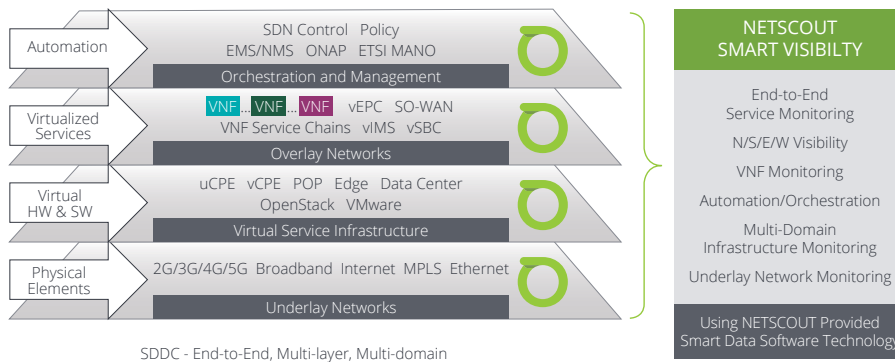
SD-WAN can help service providers generate new revenues because of its ability to instantiate new services flexibly, enabling service providers to provide enterprise services that are further up the value chain than their traditional commoditized connectivity offerings. This is exactly what service providers are targeting because they want to transform their businesses away from providing low value services and provide higher margin, premium services that run on top of their connectivity.

The stakes are high – the digitalization of telecoms could unlock \$2T of value for the telecoms industry and wider society over the next decade according to the World Economic Forum. Coincidentally, that figure matches the Forum's projection that service providers need to invest US\$2tn over the next decade in their networks mentioned earlier.

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With virtualization of the evolved packet core (EPC) and session border controllers (SBC), service chaining, and orchestration plus the move to cloud platforms, the landscape for service providers has become extremely complicated. In addition, it is a new landscape that has moved on from the traditional demands of managing physical infrastructure. Ultimately this new network will be a simpler, highly automated, self-aware network but the challenges of migrating from the traditional environment of physical hardware, manual management, and function specific configuration are substantial.

The Solution



What service providers need is smart visibility into this disrupted architecture. This end-to-end, multi-layer, multi-domain coverage can only be provided by software solutions. Traditional tools such as hardware probes are cost prohibitive because they would need to be deployed at every device. However, with virtual probes that produce smart data supported by intelligent tools, service providers can design embedded visibility in to their new networks and succeed in the new telecoms arena.

Virtual probes (with smart data technology) and smart data tools that are “always on” can be relied upon not to miss key data points and deliver actionable insights. These tools incorporate advanced data analytics capabilities and have built-in intelligence to ensure only relevant data – rather than all data – being analyzed. This automated capability is vital because of the costs associated with processing vast volumes of irrelevant information.

Fast reacting, accurate unify smart data tools that are aware of the context in which they are operating provide the foundation for service failures to be fixed in near real-time. For organizations that are deploying 5G, for example, there will be added advantages because the technology extends a service provider’s ability to understand what’s going on in the network and by extension have insight into the performance characteristics of any given service. That might be an enterprise SD-WAN service in the early phase of 5G deployment, but it could be a highly monetized consumer service such as ultra-high definition gaming in the near future.

It is business cases like these that will contribute to telecoms and associated industries generating an additional \$2T over the next decade. However, to access these revenues in a cost-effective and sustainable way, service providers will need to accelerate their use of virtualized infrastructure to make deployment and operation of enabling technologies – and 5G in particular – viable. 5G needs virtualization to ensure it can be rolled out profitably but virtualization needs 5G too because 5G provides the first opportunity to showcase the advantages of a fully virtualized operational environment.



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