NFV: Insight from a systems integrator

SYNOPSIS

The fundamental architectural changes introduced by Network Functions Virtualization (NFV) essentially propose the meshing of the telecom and IT functions and a welcome move away from bespoke hardware. Although this development will have a world-changing effect on the telecoms ecosystem and the way network equipment is bought and sold, this effect is secondary to the economic and operational benefits NFV is set to bring.

NFV is capable of reducing operating costs by delivering a simpler, centralised infrastructure and service management capabilities as well as enabling a faster time to market for new, revenue-generating services.

With the non-proprietary ethos at its core, network equipment providers are becoming less and less central to, or even capable of, its deployment. But with many elements still in development and software specialisation at the fore, the migration to NFV is a journey service providers will need to seek help for as a fully virtualized environment is a sizeable task although one that will deliver sizeable rewards.

INTRODUCTION

There have been many bold claims made about the benefits of Network Functions Virtualization (NFV), so many in fact that the initialism has become something of a buzzword over the past 18 months. But at its root, the October 2012 white paper that brought the topic into the open, highlighted some much needed and fundamental changes. Moreover, these were changes being driven by the operator community. As the opening lines of the 2012 white paper put it: "This is a non-proprietary white paper authored by network operators."

The term "non-proprietary" is the real nucleus of the movement. The proposed fundamental architectural changes would see the meshing of the telecom and IT functions and the move away from bespoke hardware, something that would have a world-changing effect on the vendor landscape. But this effect is secondary to the economic and operational benefits NFV is set to bring.

Operators are feeling the pressure from several quarters: Revenues from mobile and fixed line services are continuing to decline; traditional applications such as SMS are suffering erosion from innovative IP-based rivals; and the traffic across the network footprint is growing exponentially, with customers calling for higher performance and interconnectedness of experience. According to Ericsson's most recent Mobility Report, total data traffic in the first quarter of 2014 exceeded that for the whole of 2011, with 65% growth between the first quarter of 2013 and the first quarter of 2014.

The same report identified that video is the largest and fastest growing segment of mobile data traffic. It is expected to grow around 13 times by 2019, putting more pressure on the network. Social networking constitutes more than 10% of total mobile data traffic today and is predicted to grow ten times between 2013 and 2019.

NFV is capable of reducing operating costs by delivering a simpler, centralised infrastructure and service management capabilities as well as enabling a faster time to market for new, revenue-generating services. But the implementation of NFV is complex and involved - an endeavour cautious operators will want to seek specialist help for. Moreover, with the non-proprietary ethos at its core, network equipment providers are becoming less and less central to, or even capable of, its deployment.
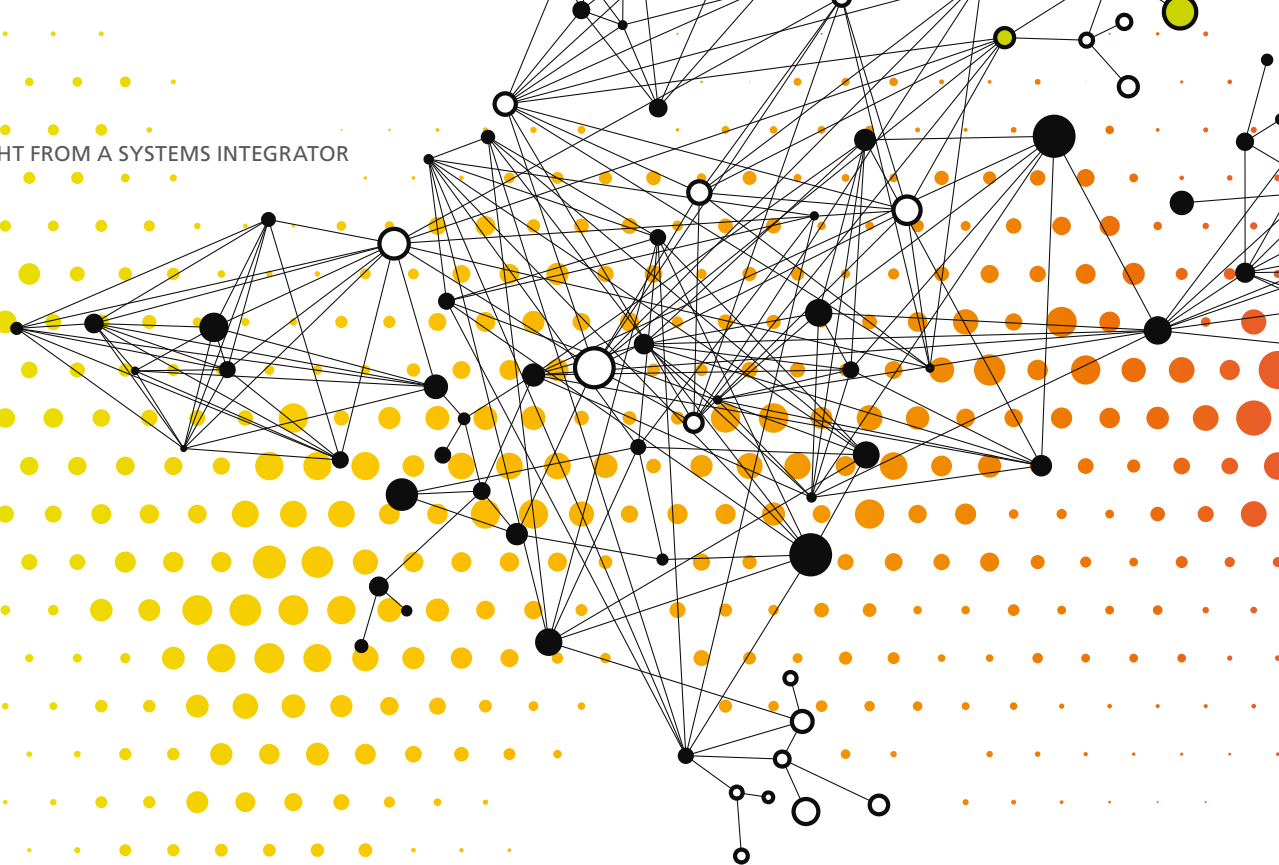
A HOLISTIC APPROACH

Each operator will have its own specifications for an NFV deployment and one is unlikely to be on the same baseline as any other. Openness and the adoption of non-proprietary, open source tools are essential and as a result it is difficult for network equipment vendors to ship and support each other.

It's possible that an operator could deploy a full virtual solution to compete faster in the market and then scale that up as needed without touching the legacy network. But the operator could also deploy NFV on their existing network infrastructure to maximise the value of their previous technology investments. However, this type of deployment is very complex and benefits greatly from the deep integration capabilities that are needed to make all the technologies work together.

Research has shown there is little appetite among operators to perform their own complex integrations, instead relying on systems integrators to provide best of breed solutions and a specialist skill set.

Earlier this year Telecoms.com Intelligence surveyed 100 network operators on their BSS purchases, finding that the majority of respondents (35%) use BSS from a mixture of network equipment providers and specialist companies, while a similar amount (29%), get their BSS directly from their network equipment provider alone. Although just less than 10% buy from specialist providers exclusively, 28% say they will actively move towards a more specialist approach in the future.

Although OSS/BSS virtualization is not directly related to NFV architecture, which mainly focuses on pure telco applications, it contributes to further improve the CAPEX and OPEX of the overall solution as it too will run on standard hardware. But it serves as an example of the easier integration and making the best usage of the overall infrastructure brought about by NFV in general.

The survey showed a clear understanding of the benefits of virtualization based on its openess. A total of 73% of respondents believe virtualization gives operators the ability to trial new services and business models with minimal disruption. And 61% expect virtualization will allow operators to eradicate fragmentation in their software and infrastructure portfolio. While 70% either Agree or Strongly Agree that virtualization has made it easier for new entrants – both specialist vendors on the supply side and startup operators on the service provisioning side – to enter the market, because hardware and integration issues are reduced and the barriers to entry are much lower.

THE NEED FOR SKILLED INTEGRATORS

European operators Telefónica and Deutsche Telekom have recently set out detailed and aggressive NFV plans. The German carrier last year said it was re-engineering its network because: "The biggest pain for us is that there is so much legacy technology in networks that it is difficult to bring new services to the market. We need to be able to program new services without rearchitecting the network."

Meanwhile Telefónica is "reaching the limits" of the performance it can drive from proprietary vendor platforms and the mechanism through which the operator can exert the greatest change is virtualization. According to Enrique Blanco, global CTO, Telefónica: "Today we don't see a clear differentiation between network and IT."

But embracing such a radical architectural overhaul is extremely challenging and it is hardly unusual for the sheer size of a project to deter operators from embarking upon it, hence the growing demand for skilled

systems integrators experienced with end to end NFV integration and its constraints.

The idea is to take a network appliance and run it as software on servers, storage and switches. Of course, it's easier to deploy software images than it is to deploy hard boxes, but operators can also apply resilience concepts that do not even exist in hardware today, as well as it making testing and service assurance easier.

OpenStack works as the foundation here, and an open source virtualization solution better fits the requirements for telecom, with faster development times and sustainability, as well as deep integration into the Linux OS to further leverage development. OpenStack aims to deliver solutions for all types of clouds by being massively scalable and feature rich.

But that's not to say implementation of OpenStack is straightforward or a task for the faint of heart. As eBay's Chief Engineer in charge of the OpenStack private cloud, Subbu Allamaraju, has publicly stated: "OpenStack gives some very key ingredients to build a cloud, but it is not cloud in a box." The additional resources required to implement the solution consume a significant amount of time and effort that may be better addressed by a company with technical expertise.

Moreover, each vendor has their own proprietary implementation and according to Alessandro Perilli, Research Director at Gartner, these distributions now run into the dozens and over three years into the project the code is still complex to install. So without proper integration it's possible to finish up with a setup where each OpenStack application requires its own cloud, ironically leading to back to the very siloed approach that NFV is trying to avoid.

In tandem, SDN (Software Defined Networking) and NFV provide unprecedented capabilities based on virtualization and orchestration of

NFV is capable of reducing operating costs by delivering a simpler, centralised infrastructure and service management capabilities as well as enabling a faster time to market for new, revenue-generating services

Virtualized VoLTE: A proof of concept

Kapsch CarrierCom is currently working on a vIMS & vEPC proof of concept for VoLTE, under which the roadmap expects the company to make its first VoLTE call over a distributed, virtualized network by September 2014.

The company has worked with equipment vendors to compare an existing bare metal solution to vEPC and perform a smooth migration from one to the other.

The biggest impact of these innovations will be the high level of automation and the consolidation, or even removal, of teams that previously looked after different elements of the infrastructure.

The move to SDN and NFV will also stimulate evolution of the vendor landscape, with new specialist players emerging to offer services in fields such as orchestration, reducing hardware constraints and vendor lock-in and allowing ISVs to build more agile, competitive solutions and drive new revenue channels.
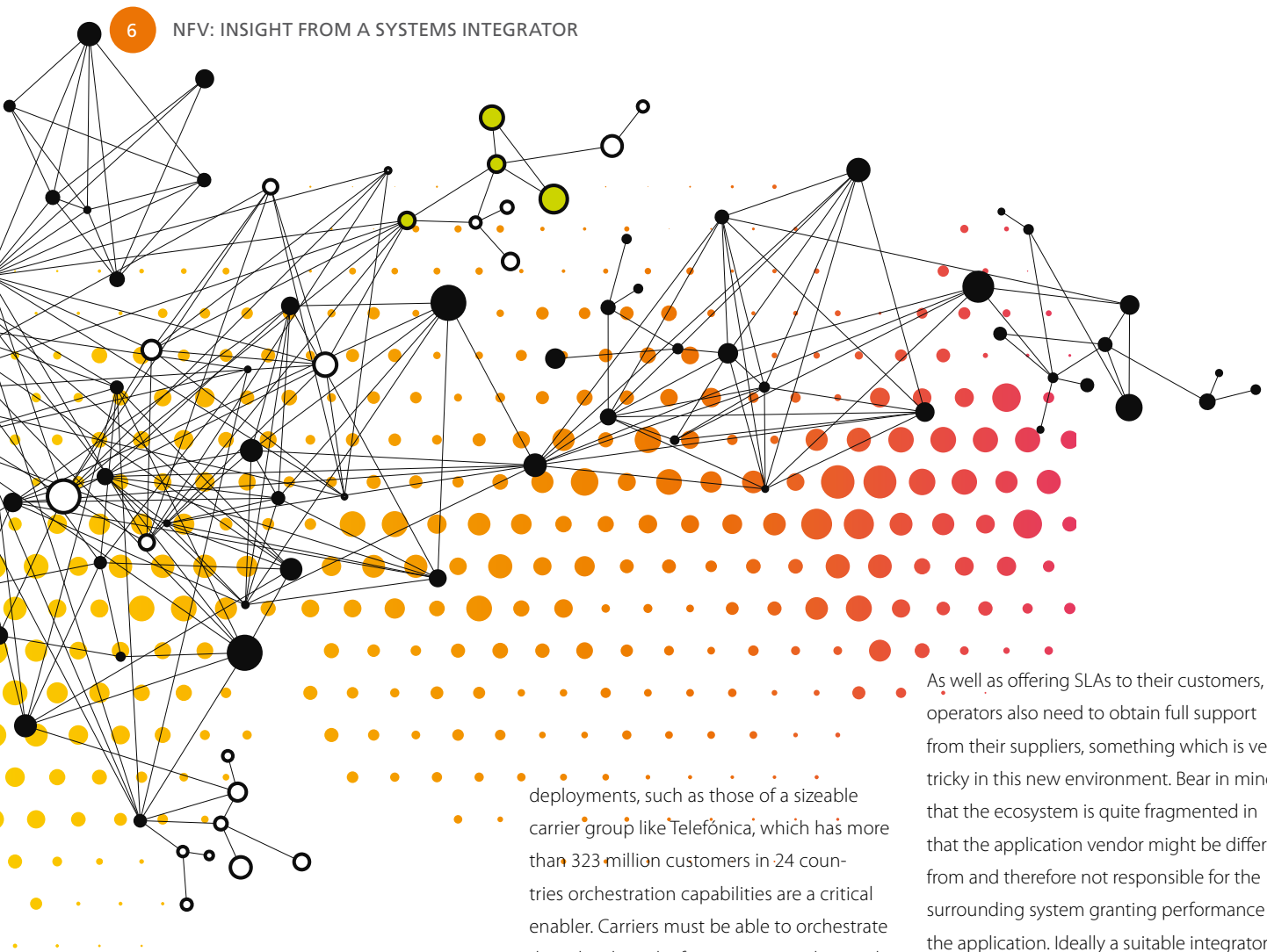
distributed network resources. A rapidly maturing technology, SDN provides the network automation required to deliver services on distributed infrastructure. This makes it a key enabler for NFV to support larger deployments that maximise the cost and efficiency benefits on offer.

ORCHESTRATION

Orchestration is even less mature than NFV itself. But its role is to manage the applications and Virtual Machines, while OpenStack manages the underlying hardware resources.

The orchestrator is a key element. It is a bridge located between the hardware, the applications and the virtual machine for resources management. Whereas the applications, such as EPC and IMS run in Virtual Machines. To support much larger

deployments, such as those of a sizeable carrier group like Telefónica, which has more than 323 million customers in 24 countries orchestration capabilities are a critical enabler. Carriers must be able to orchestrate their distributed infrastructures end-to-end and provide super-fast connectivity between locations, including data centres.

Orchestration 'chaining' looks at what resources the Virtual Machines need and unifies demand, combining the logics of all the Virtual Machines as required. By way of an example, a virtualized EPC is 14 Virtual Machines running together and orchestration makes them aware of each other and keeps new Virtual Machines consistent.

Beyond this, there must also be tools and teams capable of supporting customers who access services on the distributed architecture, and technologies for measuring performance metrics and compliance with customer SLAs. Indeed, the nature of the SLA is changing and operators need to consider how they might go about offering end to end SLAs in this new environment.

As well as offering SLAs to their customers, operators also need to obtain full support from their suppliers, something which is very tricky in this new environment. Bear in mind that the ecosystem is quite fragmented in that the application vendor might be different from and therefore not responsible for the surrounding system granting performance to the application. Ideally a suitable integrator will have its own labs and skilled engineers capable of providing end to end support for such a complex infrastructure. There are several key challenges an operator must overcome when moving to an NFV environment, bearing in mind it may not have the skill sets in house. For business processes, methods and procedures must adapt to virtual environments; there will be inconsistencies on the underlying multivendor hardware but normalised operations and administration management will be required; there will be visibility blind spots where traffic between virtual machines within physical hosts is not visible; complex service chains mean granular application and service awareness is required; and finally, virtual machine instantiation could introduce performance penalties.
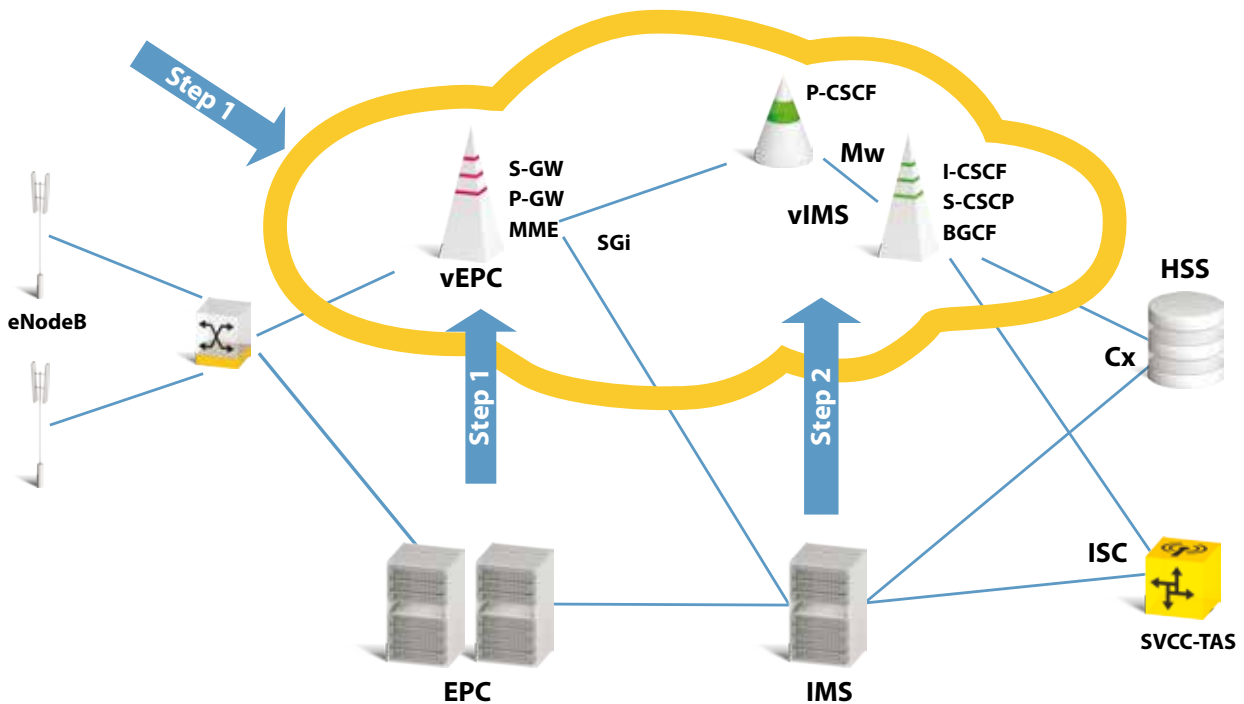
FROM LAB TO LIVE - A MIGRATION SCENARIO

Step 1: Deploy NFV architecture with orchestrator
Step 2: Migrate Bare metal EPC to vEPC
Step 3: Migrate IMS to vIMS

CONCLUSION

The migration to NFV is a journey for all service providers and given the breadth of the scope of the task, they will need to seek help for the migration because it is very complex. Many operators have begun experimenting with the virtualization of simple applications. According to the Telecoms.com Intelligence survey, 9% of respondents have already begun commercial operation of virtualized BSS and 23% of respondents have begun trials of virtualized BSS environments with a further 7% are expecting to dip their toe into the water this year and 28% within the next two years.

But going beyond this, to a fully virtualized environment is a sizeable task although one that will deliver sizeable rewards. Properly done, operators will remove the threat of vendor lock-in, being able to swap out the OSS, EPC or orchestrator as required. Moreover, elasticity will allow them to add and remove resources as required and reduce CAPEX; boost scalability by growing load with peaks and scaling down when necessary; the ability to quickly replicate busy components and migrate less busy ones through load balancing; meet SLA performance guarantees through automatic provisioning; and increase availability by providing geographical diversity.

NFV: Insight from a systems integrator
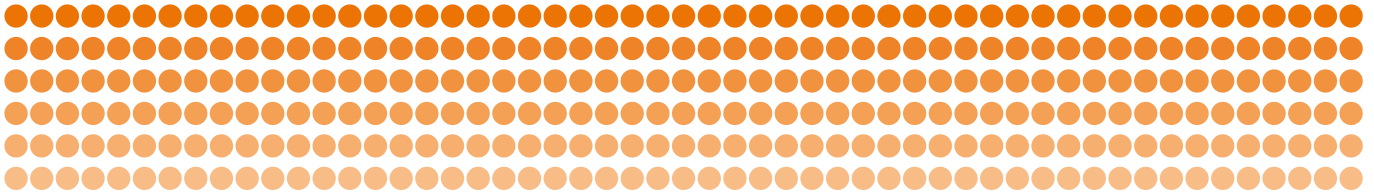
telecoms INTELLIGENCE
Getting the industry thinking

ABOUT TELECOMS.COM INTELLIGENCE

Telecoms.com Intelligence is the industry research offering from the leading news and analysis portal for the global telecoms industry.

With over 80,000 unique monthly visitors and more than 70,000 registrations to our webinar platform, Telecoms.com has access to executive opinion of unrivalled breadth and depth. That opinion needs context and our editorial team excels at transforming raw data into insight and analysis. And with a variety of print and digital channels, including Mobile Communications International magazine, we can drive unbeatable awareness of our findings.

kapsch >>>

ABOUT KAPSCH

Kapsch CarrierCom is a market leading global system integrator, manufacturer and supplier of end-to-end telecommunications solutions. The company provides innovative mission- and business-critical solutions for carrier networks, railway and urban public transport operators as well as for companies seeking real-time machine network communications. Kapsch CarrierCom is a trusted partner for a broad range of clients who benefit from the support of a complete set of professional services and support capabilities. Strategic partnerships and a strong focus on innovation in nine R&D centers in Europe and Asia, put Kapsch CarrierCom at the forefront of the global telecommunications market. Kapsch CarrierCom is part of the Kapsch Group and has its headquarters in Vienna.

With a "from lab-to-live" approach, following three completely different introduction scenarios, our certified experts are using our nine labs to support complex best of breed NFV solutions. They are tackling a proof of concept in a multivendor environment together with Kapsch CarrierCom's partner ecosystem. At Kapsch CarrierCom, we understand each of our carrier clients' telecom requirements and are able to translate them into "NFV" requirements. This profound understanding together with our end-to-end delivery capability makes us a unique integrator in the telco world.

Contact:
E-Mail: kcc.carriers@kapsch.net
Website: www.kapschcarrier.com