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Forging towards a virtual future

Carriers are turning their minds ever more to automation and virtualisation as the market moves forward. This trend is being sped along by the age of the cloud, the internet of things and big data, as well as the drive towards 5G services

New types of technological development are set to drive a fundamental overhaul of the way that carriers think about and operate their networks, with a growing demand among enterprise customers for more choice and more flexible ways of provisioning their key services.

And some carriers are apparently taking this on board. AT&T, which has sought to move early in adopting the new wave of technologies such as software-defined networking (SDN) and network functions virtualisation (NFV), previously outlined aggressive plans to head towards virtualising 30% of its network in 2016 and 75% by 2020.

Not all carriers are so bold with their plans, and it is still early days for these technologies. But many in the industry believe that operators must think seriously about how they are going to move ahead with automation – something that looks set to be a key consideration in 2017.

AT&T, for example, has said that technologies such as NFV and SDN are key elements of its move towards 5G, helping not only to improve speed for adding capacity and other capabilities, but also to reduce costs – saying that lowering the cost to deliver a megabyte of data was one reason why it could bring back an "unlimited data" offer for wireless customers in 2016.

And in a proof of concept for "virtualised, multi-vendor, on-demand" network functions last year, Orange also highlighted how NFV and SDN could simplify network infrastructure and operations, make it quicker to deploy services and cut costs.

"The environment is heading towards a total digital transformation," says Sanjeev Mervana, senior director of product marketing for the service provider business unit at Cisco. "Operators are looking at different means to see how they can be not just the connectivity provider, but participate in helping customers move on their digital journey."

As a reflection of the direction in which the industry is heading, Sunil Khandekar, CEO and founder of Nokia's SDN-focused venture Nuage Networks, predicts

that in 2017 software-defined data centres enabled by SDN will go "from beachheads to mainstream". He says this follows the market reaching a point at which customers have carried out deployments in smaller environments and set-ups, showing that "when done correctly, this delivers a very highly automated connectivity model".

Another trend that Khandekar predicts is that software-defined wide-area networking (SD-WAN) will start to take off. "We will see that go from window-dressing announcements to real deployments," he says.

DYNAMIC NETWORKS

And BT for one sees SD-WAN as one driver of its vision for what it terms "dynamic network services." These are a range of services that it plans to put in place to help transform how it runs its network in the digital age and move towards a "cloud of clouds", based on technologies that also include NFV, SDN and SD-WAN.

Last November, BT announced that it had selected Nuage Networks to help power its Agile Connect service using SD-WAN. The service, which will enable organisations to automate and control network connectivity from their business locations to applications hosted in private or public clouds, is rostered for launch within the next few months and BT plans to add new functions as the year unfolds.

Keith Langridge, vice president of the BT Connect portfolio, says a key reason for the company's choice of provider, apart from the fact that its product scales well and can be easily integrated into BT's existing systems, is that Nuage Networks is committed to open, flexible systems designed to prevent vendor lock-in. This gives much greater scope for future orchestration between many different systems and capabilities in the way BT wants to organise its network, he says.

"Some vendors' solutions are highly integrated, so when you take their hardware, you must take their orchestration system and their applications catalogue," explains Langridge. "Once you've deployed that in the network, that's it – there's no point in listening to customers about what they want as a roadmap because the only roadmap you can deliver is what that vendor has."

This is important when considering that greater choice is something that BT wants to offer its enterprise customers and when customers all want to do things at a varying pace, using different methods and different technologies. "The speed at which they're going is quite different, and what we're all about is getting flexibility so that the service they choose isn't 'one-size-fits-all'," says Langridge.

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This is also why BT is seeking to use a variety of automation and virtualisation options in the future, with the SD-WAN service with Nuage Networks just a single prong of its digital transformation strategy. Among these, the company already offers another SD-WAN service, with Cisco, and plans to expand the number of cloud service nodes it currently has around the world from 18 to 50, further integrating NFV into them and adding functions as it goes.

Having such a combination of services will allow BT to provide enterprise customers with much wider choice and bring refreshed impetus to networks, ultimately allowing itself and partners to run unique and agile business models in the future, says Langridge.

Another company that recently struck a deal with Nuage Networks was NTT Data Intellilink, a subsidiary of IT services provider NTT Data, for an overlay network-virtualisation service covering data-centre cloud and interconnect, as well as WAN, in a single SDN platform. The move is aimed at boosting the full roll-out of more automated cloud-based services across cloud and large-scale data-centre environments.

This initiative appears to follow a similar ethos to that of other NTT Group companies, such as NTT Communications, to provide highly automated services across their infrastructure. Shawn Morris, director of IP development for NTT Com's global IP network, describes how the company is moving towards a more end-to-end SDN service in the core of the network, aided by the in-house SDN system it started developing in the late 1990s.

"I would say we've crossed the biggest hurdle, which is, running the network via SDN and automation – so we're now in the mode of fine-tuning, revising and making it better," says Morris.

TIME FOR A RETHINK

But while some are heavily integrating technologies such as SDN and have made progress, over a long period, not all operators are at the same stage. Also, there are some key challenges ahead in rethinking how networks are run – particularly for carriers that plan to move into this in a big way and add NFV and other virtualised functions.

And technology is not always the barrier, says Cisco's Mervana. "As you can well imagine, there are a lot of other aspects, such as cultural ones, within organisations, and organisational boundaries within their skill-set requirements to move towards this. Those things define their journey and their path – just how quickly they can adapt and move forward."

Jeffrey Sanderson, senior director of market development at software company Citrix, adds: "One of the challenges I do see in a telco is trying to get a consistent approach across what technologies they are employing in data centres and all the learnings they've had from their early forays into it, and how that might apply in the network. It's a daunting but not insurmountable challenge."

In a similar vein, orchestration between services poses a big challenge for carriers regarding coordinating the new wave of systems and ensuring they work effectively in conjunction with long-standing legacy ones that may lack the ability to support on-demand services promptly. This is particularly the case if thousands of virtualised network elements need to act in concert with each other.

Travis Ewert, SVP of global network software development at Level 3, says that orchestration has been a big focus over some years for his company, which took the main body of this work in-house to help create a bridge between traditional OSS/BSS systems.

For others in the industry that threw

themselves more into the controller side of the equation, he says, it has been a "wake-up call" in terms of the need for more focus and investment in that area.

Ewert also emphasises that Level 3 has focused on both the greenfield and brownfield side of things, taking into account both existing customers and new deployments. This is important, he says, because brownfield sites may sit on network elements that were not necessarily made for dynamic automation. "There's still enough volume in the legacy network that you can't ignore it," he says.

Industry body the MEF, which has a corporate membership of over 200, including 130 service providers, says one step that a growing number of carriers are taking is to embrace the development of so-called lifecycle service orchestration (LSO). This term refers to a set of MEF-defined specifications that provide an umbrella framework for orchestrating services within and between all major service providers.

Some pace-setters have made strong progress with on-demand connectivity and NFV-based services, says Stan Hubbard, director of communications and research at the MEF, "but this has involved non-standardised orchestration over a single provider network".

Without a standards-based approach, he says, such innovative services will not be properly scalable.

"The creation of standardised open LSO APIs will help streamline and automate the entire network service lifecycle in a sustainable fashion," he says.

OPENING UP

Another factor that could help spur the industry on is more widespread use of open-source approaches to the market, with such initiatives gaining traction as operators look for flexible ways to run their services and avoid vendor lock-in. AT&T, for example, has stated that open source is a key element in its network transformation, and in mid-2015 joined the OpenDaylight Project, an open-source platform backed by the Linux Foundation that seeks to promote SDN and NFV.

Lisa Caywood, director of ecosystems at OpenDaylight, says the platform is an increasingly integral part of the wider virtualisation environment and that when a major provider such as AT&T is getting involved and taking big steps to understand these new technologies, that helps move things forward.

Caywood adds that away from the traditional big Western markets, Chinese providers such as China Mobile – which joined OpenDaylight last September and has just announced that it is undertaking a commercial public cloud project based on SDN with Nuage Networks – are getting profoundly involved in the new phase of technologies such as NFV.

As well as reflecting the massive opportunity in a country with a population of 1.4 billion, this is representative of China's drive towards a digital economy and investment in public-private partnerships, as well as the fact that its operators have less legacy infrastructure to hold them back than some other markets.

And carriers from that part of the world are also key players in another Linux-backed initiative that brings the concepts of open source and orchestration together, the OPEN-Orchestrator Project (OPEN-O), with China Mobile, China Telecom and Hong Kong Telekom alongside still more other members that include vendors such as Ericsson, Huawei and ZTE.

The project, which wants to bring more carriers and vendors on board, has just unveiled Release 1.0, which focuses on virtualised customer premises equipment (vCPE) for residential and enterprise applications. This release, says the company, helps to bridge the gap between SDN and NFV, ushering in "a new era of open orchestration".

Release 2.0, which is planned for this April or May, will aim to refine functions that enable orchestration of a set of virtualised network functions and connectivity services for limited end-to-end service delivery.

Marc Cohn, executive director of the project, says that open-source methods in general have "started to move from the lab into reality" and become more of a factor in carriers' plans. In 2017, says Cohn, he expects to see "broader trials that will embrace open source like never before", but different industry projects will also need to be able to interact and work effectively together.

Carriers and vendors are increasingly forming partnerships and initiatives to get things off the ground, and this looks set to continue.

But Cohn says that in line with carriers creating these far more open, flexible models on their networks, a similar approach may be needed in the way standards are applied – with perhaps much more flexible frameworks to allow providers the leeway to follow their own paths. "I think that we're rethinking the way standards are going to be applied in telecommunications," he says.

Some operators are looking to help define models for open-source and standardisation, with AT&T and Orange last year signing an agreement to collaborate on initiatives in these areas to aid the drive towards SDN and NFV. Common, open and interoperable standards, they believe, will help faster service deployment and full customisation of their infrastructures, making it much easier and quicker to innovate.

FRESH MINDSETS

And Cohn says that in the overall push towards virtualisation, he is seeing a marked shift in operator attitudes. "They're now starting to come out and be a lot more proactive in this community. It's no longer just the vendors driving the technology adoption lifecycle, but operators are jumping on board as well and taking the reins."

What is clear is that carriers have a lot to think about in 2017 – and a lot of work to do – as they pave the way forward for their digital transformation.

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Not least among these concerns is security. As Khandekar points out, "if we are going to automate everything regarding virtualising the network, with complete automation from users to the cloud, you can't leave security behind".

This new, highly automated, virtualised, on-demand environment is not, however, something that is going to fall into place overnight, even though the market is paving a way forward. "It's a long process that will take many years," says Hubbard. "But we are seeing significant steps being taken within and between service providers to automate networks and make them more agile like the cloud."