

Software-defined networking - Moving beyond the hype

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In the current economic climate agility is perhaps the greatest key to business success. The ability to adapt quickly to changing business circumstances is of paramount importance.

Virtualisation and cloud computing have emerged to accelerate deployment of the services an organisation needs, when they're required. But the need for agility goes beyond virtualised software applications and servers. Businesses are quickly growing beyond the network "box", or the limitations of the physical network infrastructure.

To overcome the rigidity of the traditional data centre network, software-defined networking (SDN) has emerged as a popular solution. Indeed, some have said whilst still in its early stages of deployment, SDN is already one of the most hyped concepts in IT or networking.

As an industry, the IT sector thrives on new trends and "game changing" technologies that drive innovation and improvement in business process. In the wake of cloud computing and big data, SDN shows all the signs of being the next global trend to capture the imagination of CIOs and IT directors. But can it deliver the necessary efficiency gains and productivity benefits that network managers need? More so, what can be done now to begin realising these benefits?

Separated functions

Traditional network equipment bundles the decision-making logic (the "control plane") and the data-routing mechanism (the "forwarding plane") into a single box. In SDN, these functions are separated. Boxes still move data, but the decisions are made by software running on general-purpose computers. SDN provides the fundamentals for effective network virtualisation.

Administrators are already familiar with the benefits of server virtualisation, which has streamlined workload management in organisations of all sizes. By deploying right-sized application-specific logical servers over a farm of inexpensive general-purpose physical server hardware, resource utilisation is increased and provisioning can be accomplished much more quickly.

As server virtualisation became more commonplace, desktops soon followed. Rather than provision each machine and piece of software individually, IT soon discovered the advantages of centralising these processes and delivering them either through local servers, over the WAN, or even over the internet.

SDN relies on well-defined application programming interfaces (APIs), which allow an organisation to develop specialised

software that extends functionality beyond what is available out of the box. Load balancing, for example, no longer requires an expensive specialised appliance in an SDN environment, but can be handled with software and provisioned in a "service chain" along with other networking services, such as firewalls. These services run on commodity hardware that is sized (and can be resized) as appropriate. The underlying physical network is simplified and redundant tools can be eliminated because resources can be moved around as needed.

Adjustments to the network can be made in real time through software applications, rather than having frequently to replace or reconfigure physical devices in the data centre. And SDN delivers the same benefits as other virtualisation initiatives, such as the ability to house logically separate entities on a single device, even if they have conflicting requirements that would ordinarily cause compatibility issues.

Network virtualisation isn't new

To varying degrees, network virtualisation isn't new. Virtual LANs (VLANs) create logical local network segments across distinct physical network segments. Virtual switches manage the traffic between virtual machines, on either the same or separate physical hosts. But neither of these techniques can be considered full network virtualisation.

Administrators are beginning to consider whether it would be beneficial to bring full virtualisation to the network and, if so, how. For years this has been considered a legitimate possibility, but there have been concerns. Managing state changes, access control lists, and counters in logical networks with thousands of virtual nodes can be a real challenge. It turns out that SDN is very good at solving these particular challenges, and with SDN it becomes possible to build fully virtualised networks completely decoupled from the underlying hardware.

The software-defined data centre

Data centres have enjoyed the benefits of compute and storage virtualisation for many years. SDN brings effective virtualisation to the network. The logical culmination of all these, then, is the software-defined data centre (SDDC).

The SDDC is characterised by broad programmability across all elements: compute, storage, and networking. Consumable services are decoupled from hardware and implemented as abstractions that, for all practical purposes, behave just like their old-fashioned physical counterparts. But they're free from old-fashioned physical constraints: they can be relocated as necessary, scaled according to demand, and billed according to usage. Applications will require no fundamental reconfiguration to keep processes running normally.

The software-defined data centre delivers benefits in several important areas:

1. Today's applications are utilising more complex infrastructure requirements that can be a challenge to meet in order to ensure proper quality of service. The delicate balance of meeting each requirement without harming another process is improved by the level of abstraction made possible by the SDDC;
2. Because resources are provisioned on demand, developers are free to focus on the business functionality of applications without undue concern about whether the network can respond - the network in an SDDC automatically reacts to changing application requirements;
3. Combining a more consolidated and centralised control framework on top of commodity hardware means there are fewer specialised physical components that can break down and inhibit operations. In addition, centralised control brings improved visibility, which makes it more difficult for attackers to hide and conduct malicious actions; and
4. With a reduced need for specialised network equipment, organisations employing an SDDC will likely see reduced capital and operational expenditures. With IT budgets frequently first on the chopping block in businesses, the SDDC is an ideal way to ensure continued operations at a lower cost.

A fully software-defined data centre will be a game changer for those organisations that successfully execute the vision. But it will require effective planning to execute and it may still be several steps in the future for many companies. But even

without being an early adopter, businesses today can look ahead and begin to make preparations, such as conducting test implementations of SDN and increasing their experience with virtualisation.

Just as cloud and big data have reached maturity and widespread deployment as part of an IT strategy, the SDDC is likely to define the corporate network in the years to come. Organisations should overlook the growing pains of the technology and plan how and when to make the transition now.

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