

Approaches to SD-WAN service provision: a framework for assessment

June 2019

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The SD-WAN market is increasingly complex, with service launches from traditional network operators competing against those solutions offered by new market entrants such as Aryaka, Netrolix, X by Orange and Equinix. Operators need a clear methodology for categorising the different approaches to SD-WAN service provision in order to evaluate their suitability for meeting their own strategic requirements. In this article, we outline the SD-WAN deployment models currently in use and suggest a possible framework for categorising them. The issue of how operators might best respond to the competing models of new entrants is discussed in more detail in our report [SDN-enabled disruptors to business connectivity revenue: operator responses](#).

We propose five categories of SD-WAN deployment models

Around 60 SD-WAN vendors are active in the market, offering a wide range of solutions. Operators, managed service providers (MSPs) and systems integrators (SIs) are all deploying these solutions in different ways, which is creating a complex market for SD-WAN services, and which makes the task of evaluating these services more challenging for vendors, service providers and enterprise customers. In May 2019, MEF (a major industry forum working to develop a shared vision of SD-WAN and other services) released the final draft of its SD-WAN standards. This is an important step towards developing a common understanding of SD-WAN, but only forms a part of what is needed to grasp the evolving market dynamics.

We propose five categories of SD-WAN deployment model (see Figure 1), which encapsulate the offers of new market entrants and those of more-traditional network operators. Within these categories, we consider the approaches to connectivity in both the local access network and core network, and distinguish between the Underlay Connectivity Service¹ and the SD-WAN service overlay (which applies application-specific policies to optimise transport of IP packets over multiple underlay networks). We also identify whether the solution delivers virtualised features such as firewall and WAN optimisation and whether it is integrated with private or virtual-private cloud connectivity services.

¹ MEF defines this as a service providing connectivity between two or more of the subscriber's locations, over which an SD-WAN service is provided; for example, an IP Service or a Carrier Ethernet service.

Figure 1: Five approaches to SD-WAN deployment

Category	Underlay connectivity service	SD-WAN service	Virtualised features	Cloud connectivity
Network integrated SD-WAN	Access network: on-net provision as much as possible. Some challenger operators' offer managed third-party networks or 'bring you own network' as a supplementary option. Core network: typically using operator's private backbone network.	Usually appliance-based initially. Cloud-hosted depending on vendor.	Some solutions provide these.	Most operators offer some form of private access for large clouds/ enterprises.
Over-the-top SD-WAN	Local access network typically procured separately by the enterprise. Some may offer third-party managed access. Core network is internet-based.	Usually appliance-based initially. Cloud-hosted depending on vendor.	Some solutions provide these.	Typically, internet-based.
Over-the-top SD-WAN with managed core	Local access network typically procured separately by the enterprise. Some may offer third-party managed access. Core network is either a private backbone network or managed connectivity over the internet.	Usually appliance-based initially. Cloud-hosted depending on vendor.	Some solutions provide these.	Most providers offer some form of private access to major clouds for large enterprises.
Data-centre-oriented SD-WAN	Access network: Procured separately by the enterprise. Core network: private managed network.	Typically cloud-hosted.	Typically provided.	Significant focus on the extent of private cloud connectivity.
Application-oriented SDN²	Access network is typically internet-based and procured separately by the enterprise. Core network is managed connectivity over the internet.	Cloud-hosted for ease of integration by application developers working in public clouds.	Embedded in applications.	N/a

Source: Analysys Mason, 2019

Some of the emergent models have significant potential to disrupt enterprises' legacy relationships with connectivity providers

Network integrated SD-WAN. This is the most-common approach taken by traditional network operators. Typically, operators partner with one or more vendors to deploy an appliance-based SD-WAN solution. It is marketed as an end-to-end managed solution with the Underlay Connectivity Service supplied by the operator. In some cases, the SD-WAN service overlay is cloud-hosted, with virtualised features available from launch; in

² This falls outside MEF's definition of SD-WAN but has the potential to deliver many of the benefits of SD-WAN on an application-by-application basis. For example, NetFoundry's Application Specific Networking (ASN) platform can be embedded in IBM Watson Voice and Azure Virtual WAN.

other cases, these options are planned for future upgrades. This approach suits enterprises that wish to procure a complete network solution from a single supplier.

Over-the-top SD-WAN. This solution is deployed by some operators that have more-limited network assets. X by Orange is a good example of this. These solutions rely either on enterprises separately procuring their own access network, or service providers delivering managed third-party access; these solutions also rely on internet connectivity for the core network. This approach is often (but not always) marketed as a low-cost option for enterprise WAN using internet-based connectivity. It may also be provided as an off-net supplement to **network integrated SD-WAN**.

The three remaining approaches to SD-WAN outlined above are those associated with new market entrants. Aryaka, for example, offers **over-the-top SD-WAN with managed core**. Equinix is the latest data centre player to enter the backbone connectivity market with its **data-centre-oriented SD-WAN** ‘Network Edge’ solution; Megaport already offers something similar. The **application-oriented SDN** category includes some independent players as well as those that have been incubated by traditional operators, such as Tata Communications’ NetFoundry.

Enterprises are often cautious about adopting new solutions for fixed connectivity. However, some of the new entrant SD-WAN solutions have significant potential to disrupt legacy relationships with connectivity providers. Network operators and existing SD-WAN vendors may also invest in – and launch – alternative approaches themselves. We explore these issues further in our report [SDN-enabled disruptors to business connectivity revenue: operator responses](#).