

## SD-WAN: A Cornerstone of Network Transformation

### Executive Summary

While digital transformation ranks high on the corporate agenda these days, the role of the network often remains underexposed. Which is surprising when you consider that the success of digital transformation and the associated adoption of new technologies depend on a well-functioning network to connect them all together. At the same time, network requirements are driven to new heights on the back of this. Organisations increasingly find themselves struggling to adapt their WAN to the new reality.

To successfully transform into a digital-native enterprise, organisations will need a digital-native network — an application-centric network that supports the right end-user experience through improved flexibility, manageability, scalability, cost-effectiveness, and security. Network virtualisation, hybrid architectures, cloud connectivity, next-generation access, intelligence and automation will be the key building blocks of these networks.

SD-WAN builds on all key elements of this digital-native network and addresses the functional disconnect between private WAN infrastructure characteristics and the evolving needs of branch-office connectivity in the cloud era. Demand for SD-WAN is accelerating, driven by a wide range of use cases and benefits, including flexibility, intelligent path selection, WAN optimisation, reduced complexity and cost-effectiveness.

The network should be positioned as a critical enabler of digital transformation, and the business case for network transformation should be built on that basis. SD-WAN will be a cornerstone of that network transformation. Organisations should explore what benefits SD-WAN can bring to them. This should be part of a broader assessment of the readiness of the WAN for future requirements, including connectivity and additional network functions.

Security plays a critical role when it comes to enterprise networks and should be an integral part of the WAN design. Organisations should therefore scrutinise the security capabilities of solutions and providers in their selection process. Significant attention should also be given to the migration path. Daily business increasingly depends on the network, so migration needs to happen in the most seamless and risk-averse manner. IDC advises organisations to evaluate each potential SD-WAN provider in terms of portfolio, partner ecosystem, deployment model, sourcing strategy, and their track record, in order to find the partner that best suits *their* specific needs.

## Digital Transformation Puts the Network to the Test

When you are having a business conversation these days, chances are that the focus will quickly shift toward digital transformation. With an abundance of technologies at their disposal, most organisations now realise that they need to leverage them, not just to change a single process, but to fundamentally change the way they do business in order to stay relevant in an increasingly dynamic market place.

The rise of digital transformation builds on what IDC calls the 3rd Platform — a new phase of innovation and growth that is founded upon on four key pillars: cloud, big data and analytics, mobility, and social business. While these 3rd Platform technologies are now firmly established across the ICT landscape of many organisations, they are also enabling the emergence of "innovation accelerators" — technologies that leverage these four pillars including the Internet of Things, augmented and virtual reality, robotics, 3D printing, artificial intelligence and next-generation security.

Digital transformation has risen rapidly in importance on the corporate agenda, with the focus now increasingly shifting from developing a strategy to delivering on that strategy. IDC's DX Executive Sentiment Survey 2018 showed that 70% of UK CEOs are now under significant pressure to deliver a successful strategy that transforms their company into a digital-native enterprise that can innovate at pace, empowers the workforce to make customer-centric decisions very quickly, and takes an ecosystem approach to running the business. IDC expects that 75% of European organisations will have transformed into digital-native enterprises by 2027.

While DX strategies and the associated adoption of new technologies and applications get increasing executive-level attention, the role of the network often remains underexposed. Which is surprising when you consider that the success of digital transformation and the adoption of the 3rd Platform and innovator accelerator technologies depend on a well-functioning network to connect them all together. At the same time, network requirements are driven to new heights on the back of this. Figure 1 shows that UK organisations are particularly wary of security and cost as well as flexibility and agility when it comes to network requirements.

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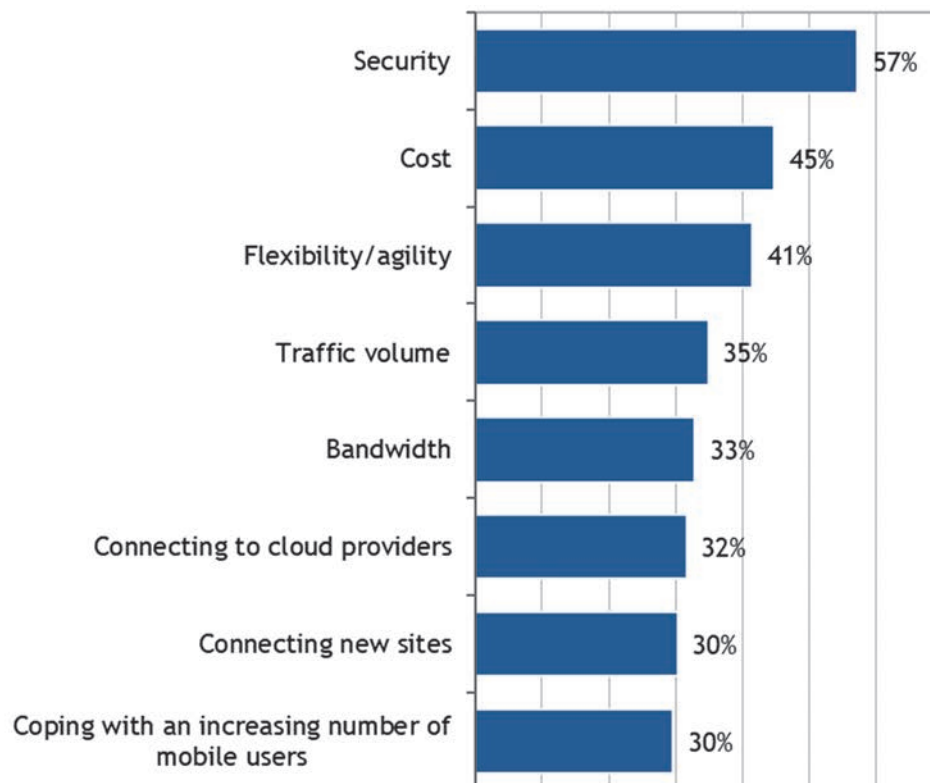
*The success of digital transformation depends on a well-functioning network*

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Figure 1

## Key factors driving network requirements

Q. What key factors will drive your network requirements over the next 2 years?



Source: IDC European Enterprise Communications Survey, 2018 (UK organisations, n = 152)

Cloud is typically at the heart of digital transformation journeys, and organisations are increasingly embracing cloud-first, hybrid cloud and multicloud strategies. However, many of today's enterprise networks, and wide area networks in particular, have not been architected for a cloud-centric world, but rather for applications residing in the datacentre. Organisations increasingly find themselves struggling to force fit this traditional architecture onto the new reality. Complexity is also becoming a bigger issue, as organisations often have to deal with multiple networks and multiple providers, and the deployment of new services, features or sites can take weeks or even months to deliver. At a time when the IT organisation is typically becoming more agile and developing faster, the network team has its hands tied by its architecture. The cost of connectivity is another area of concern, as traffic volumes and bandwidth requirements are growing dramatically. At the same time, many organisations also pay for a backup line that is inactive most of the time. Finally, the approach to security is often fragmented, as an organisation may apply different models to different sites and different types of connectivity, such as MPLS and internet.

In summary, the WAN has become a complicated web that brings together different types of locations, services, networks and access technologies, but lacks the automation and standardisation that is needed to cope with ever-growing network requirements.

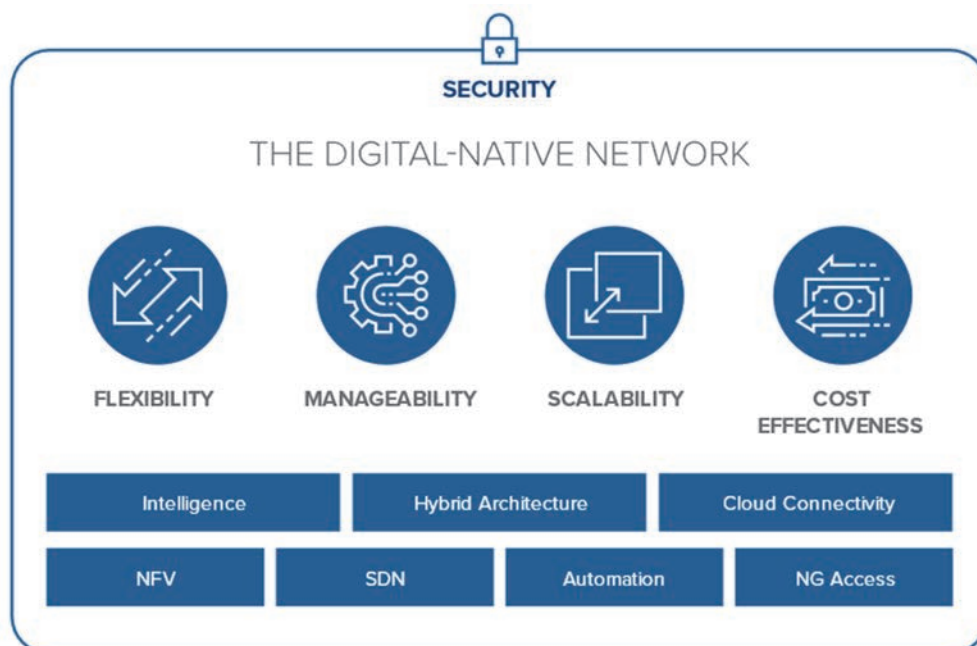
Most organisations recognise the need to change. Only 6% of UK organisations in the 2018 Enterprise Communications Survey did not foresee any major changes to the way their sites connect to the WAN in the next two years. At the same time, this change can be seen as a burden, as is underlined by the finding that 35% of UK organisations put network transformation among their biggest IT or network challenges, making it the third biggest challenge overall after security threats and modernising/automating IT management.

### A Digital-Native Enterprise Needs a Digital-Native Network

The road to becoming a digital-native enterprise will be paved with growing requirements and changing dynamics. In order to successfully transform the business, organisations will need to transform their network into one that is application-centric and supports the right end-user experience for each application. IDC dubs this "the Digital-Native Network". We have identified 5 key areas of improvement that such a network will need to bring, as shown in Figure 2:

- **Flexibility:** allowing organisations to respond faster to changing requirements, for example by turning capacity up and down, or switch services or features on and off in near real time.
- **Manageability:** making the network smarter, reducing complexity and providing increased visibility into network and application performance, and allowing end users to take direct action via self-service tools
- **Scalability:** allowing the network to cope with ever-growing requirements over time, accommodating ever faster speeds and increasing volumes of traffic, users and end points
- **Cost-effectiveness:** enabling a balance between rapidly growing requirements and much flatter budgets
- **Security:** creating a safer network by making security an integral component of network design and safeguarding data and applications from a growing range of threats and ensuring compliance

Figure 2  
The Digital-Native Network



Source: IDC 2019

IDC sees a number of key building blocks on which this network evolution will be based. Network virtualisation, leveraging technologies such as software-defined networking (SDN) and network function virtualisation (NFV) will play a pivotal role. SDN drives the automation, orchestration, and programmability of a network by decoupling the data and control planes. It has been used in the datacentre for a number of years, and use is now increasingly spreading to other parts of the network. NFV enables network functions that used to be provided as dedicated hardware appliances to be delivered as virtual ones, unlocking benefits such as simplified management, efficiency, easier upgrades and as-a-service models.

Connectivity will continue to evolve. Hybrid network architectures will play an increasingly critical role. By combining the ever-increasing capacity of different fixed and mobile access technologies (e.g., fibre, 5G), with different network types such as internet, private IP and Ethernet, organisations can optimise cost and performance for each of their locations, users, and applications.

Cloud connectivity plays a key role within this architecture. Organisations will not just access the cloud through the internet, but also via private connectivity to public cloud providers. Cloud connectivity becomes an increasingly important aspect as organisations look to balance the security and predictable performance of private networks with the ubiquity and cost-effectiveness of public internet as they move their more mission-critical applications to the cloud.

The use of more intelligence and automation tools will drive a reduction in complexity and the optimisation of network and application performance. Monitoring and visibility tools will play an increasingly important role in measuring whether expectations are met.

### SD-WAN Addresses Changing Requirements

SD-WAN has emerged as one of the hottest topics in the WAN space in the past couple of years. Building on all key elements of the digital-native network, it addresses the functional disconnect between private WAN infrastructure characteristics and the evolving needs of branch office connectivity in the cloud era. By decoupling the application from the underlying network transport, it provides the flexibility to run any application over any transport network or combination of transport networks. As such it builds on hybrid network architectures that have seen rising popularity for years, combining multiple technologies such as MPLS, internet, and 4G, but importantly adding centralised software-based intelligence that monitors, analyses, and controls the network.

The SD-WAN bandwagon has been picking up momentum in recent years. Many products and services have been launched by different types of providers and hype has been building. At the same time, interest among end users has also started to build. SD-WAN is now a common element in requests for information and proposals, as organisations want to learn what it can mean for them. In IDC's 2018 European Enterprise Communications Survey, 35% of respondents in the United Kingdom indicated that they were already using SD-WAN in some form (including pilots), while a further 18% of respondents indicated they were planning to start using SD-WAN within the next two years. This clearly underlines a strong interest in SD-WAN and suggests strong growth in the years to come as more organisations start using the technology, while many existing users are expected to grow their level of deployment.

Cost reduction has been at the heart of much of the discussion in the public domain about SD-WAN. In IDC's view, SD-WAN is not necessarily about cost reduction per se, but rather about cost-effectiveness. It is an equation where investment in SD-WAN technology, which typically is incremental, can enable an organisation to optimise the cost and performance of the underlying connectivity for every site by leveraging different types of networks. Whether this equation results in an actual reduction of total cost depends on a number of factors, including the current connectivity estate and the geographic location. For locations where connectivity has already been optimised, for example through the use of hybrid access, the implementation of SD-WAN may not lead to substantial cost savings on connectivity.

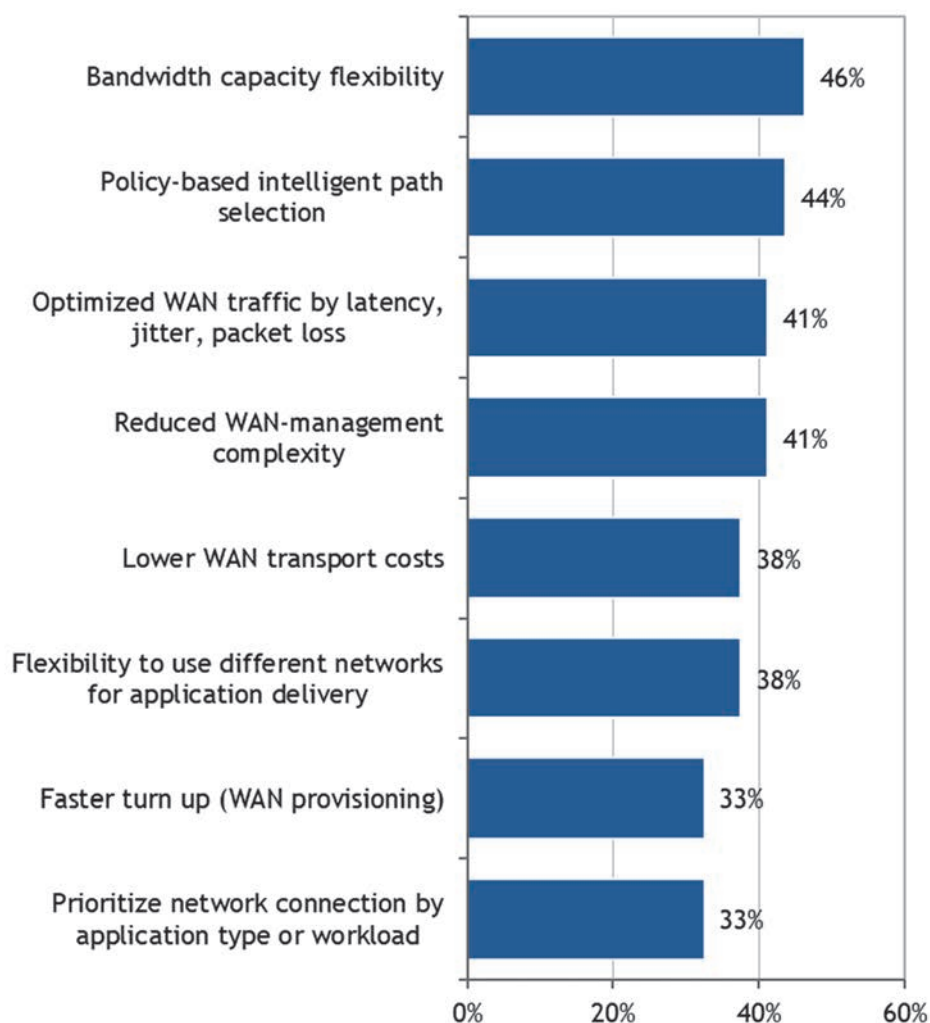
It is also important to consider the geographic location and the quality of Internet access. In many developed regions, the premium between private WAN services (e.g., MPLS) and uncontended business-grade public internet is relatively small. Consumer-grade internet access will likely be available at much lower price levels, though the question is whether the best effort service level ticks all the boxes on the performance side of the equation.

Organisations recognise that there is more to SD-WAN than cost reduction

Despite the public debate, organisations recognise that there is more to SD-WAN than cost reduction. The survey results in Figure 3 show that cost comes out only in the middle of the pack of reasons for deploying an SD-WAN solution. Flexibility, intelligent path selection, WAN optimisation and reduced complexity are the key reasons, ahead of cost, while faster turn up and prioritisation are still considered important by many. This indicates that the wide appeal of SD-WAN is not just tied to cost reduction, or any single benefit or use case, but rather the fact that it can enable a range of them.

Figure 3  
Reasons to Use SD-WAN

Q. What are the most important reasons to use or plan to use a SD-WAN service/solution?



Source: IDC European Enterprise Communications Survey, 2018 (UK organisations using/planning SD-WAN, n = 80)

Given this substantial list of benefits, it is not surprising that there is not one single use case for SD-WAN. In the past couple of years many have emerged. Below are some of the most common use cases that IDC has identified:

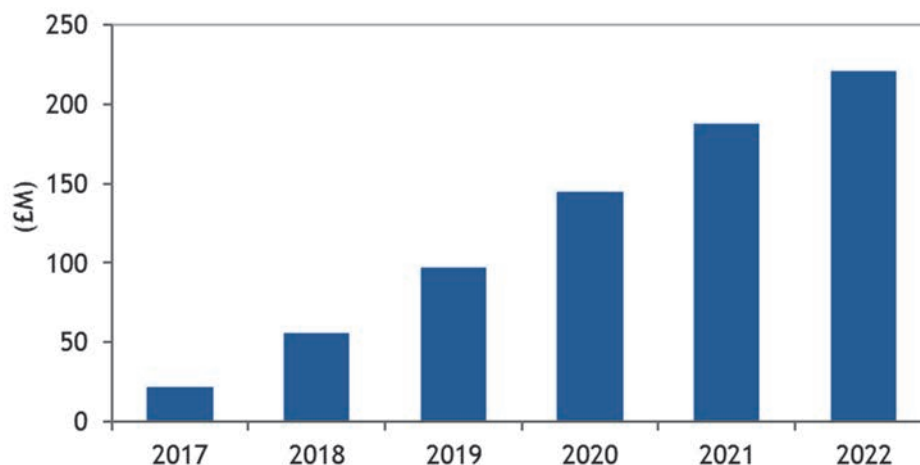
- **Hybrid WAN:** application performance and availability are improved and costs are lowered by maximising utilisation of all available WAN links, which can include technologies like MPLS, broadband or 4G.

- **Simplification of WAN architecture:** SD-WAN brings much-needed architectural simplicity to provision and manage the WAN. Simplification can extend to consolidating network functions at the branch, while enhancing overall performance and operational agility.
- **Improvement of application availability:** SD-WAN can enhance application availability and overall application performance by automatically and intelligently correcting for errors resulting from dropped or out-of-order packets by dynamically routing across several bonded connections.
- **Reduction of dependence on MPLS:** due the transport-agnostic and dynamic nature of SD-WAN, a mix of public and private networks can be used, resulting in more cost-effective bandwidth while keeping pace with changing business needs.
- **Enhanced performance of SaaS and IaaS:** SD-WAN can improve SaaS and IaaS performance by securely and automatically steering traffic on a per-application basis, eliminating the need to backhaul all traffic to the datacentre, minimising latency, and reducing bandwidth consumption.
- **Acceleration of WAN deployments:** SD-WAN can enable faster WAN deployments, as the centralised control and automated overlay provisioning allows enterprises to accelerate WAN deployments, speeding time to revenue/value. Leveraging existing internet connections or mobile connectivity sites can be spun up within days.

Driven by this wide range of benefits and use cases, as well as growing availability and awareness, demand for SD-WAN is accelerating quickly. Figure 4 shows that total revenue from SD-WAN infrastructure and services in the United Kingdom is set to grow at an average rate of 58% per year between 2017 and 2022. The initial wave of deployments primarily focused on multinational organisations that had specific performance or cost issues, particularly with branches in less developed regions. As organisations are increasingly recognising the wider range of benefits that SD-WAN can bring, interest and demand are now clearly spreading across the full spectrum, from small to large, public to private sector, and multinational to domestically oriented companies.



Figure 4  
UK — SD-WAN Revenue



Source: IDC, 2018

### All SD-WANs Are Not Created Equal

All SD-WANs are not created equal. SD-WAN has become a very popular term over the past few years, but it can have a different meaning for different parties. There are many providers in the market that have come from different backgrounds and have developed their own solutions. These solutions can vary considerably, not just in terms of functionality, but also the service and delivery model, integration with underlay networks, or the partner ecosystem.

In terms of delivery model, on one end of the spectrum is the do-it-yourself model, on the other is the completely managed solution, and we see a growing range of models in-between, including so-called co-managed solutions where an organisation can control certain parameters within an environment that is managed by a service provider. Key considerations include the level of control, complexity, and cost. When making this choice, it is important for an organisation to select a model that gives a balance that is aligned with the in-house resource and expertise levels, as well as capex versus opex preferences.

IDC foresees the highest growth potential for managed services. UK revenue for managed services is set to grow at an average pace of 93% until 2022. This will clearly outpace growth for DIY infrastructure (29% CAGR), as most organisations will prefer to outsource the complexity of the WAN to a service partner, so that they can focus on their core business.

A related consideration in this respect should be single- versus multi-sourcing. SD-WAN solutions differ in the extent to which they provide an end-to-end solution. Point solutions may be right for organisations that have the integration capabilities, the required manpower to manage multiple relationships, and value the freedom of choice of a multi-sourcing strategy, whereas for others an end-to-end networking solution with a single point of contact with complete accountability would be a more fitting solution.

*Growth in managed services will outpace that of DIY infrastructure, as most organisations will prefer to outsource the complexity*

A point of particular attention in this context is the role of the underlay connectivity. Is an integrated solution that combines SD-WAN and underlay connectivity the model of choice, or is it a model in which connectivity is sourced separately? In its essence, SD-WAN is an access-agnostic overlay technology that can combine different types of connectivity such as internet, MPLS, and mobile. However, that does not do away with the importance of the underlay. At the end of the day, the performance of SD-WAN will still be subject to the quality of the underlay networks it uses.

Moving to SD-WAN does not automatically mean all private connectivity can simply be replaced with Internet. What SD-WAN does do is allow organisations to balance the use of private and public connectivity to a more optimal combination of cost and performance for every location and application. IDC expects private connectivity, like MPLS, will still play an important role in this mix. This is underlined by the results of IDC's Enterprise Communications Survey, in which only 11% of organisations expect to have a completely internet-based WAN in two years.

### What is Holding Back Faster Adoption of SD-WAN?

A number of aspects could have a slowing impact on the pace of deployment of SD-WAN. Figure 5 details the main factors that inhibit or prevent the adoption of SD-WAN. Interestingly, and despite the focus of many SD-WAN providers in this area, security tops this list. In IDC's view, this underlines the importance of security in the networking decision. This means organisations will scrutinise the security aspects of SD-WAN, or any new networking solution, before deciding to adopt or scale up the level of deployment. This scrutiny may therefore slow down adoption, but will not prevent it once the solution has passed the test.

Cost is seen as another key factor in this respect. Adopting SD-WAN will typically mean incremental investment in additional technology, and organisations may be struggling to find budget for this, particularly when considered on a standalone basis. IDC advises organisations to take a more holistic approach to the business case covering all WAN requirements, benefits and associated cost, not just for the SD-WAN solution, but also underlay connectivity and other relevant WAN elements.

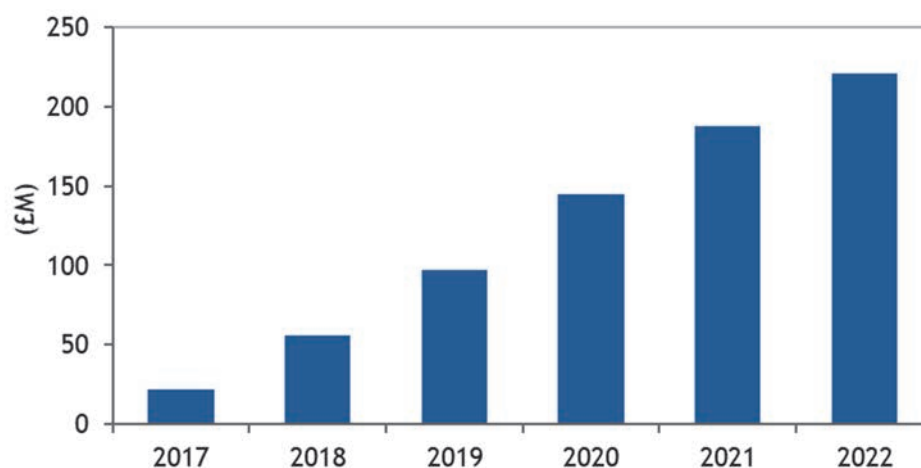
The lack of C-level vision and understanding of potential is perceived as another important pain point, being mentioned by 30% of respondents. This ties back to the lack of visibility of the network in many organisations, as discussed earlier in this document. IT and network executives need to educate the organisation on the criticality of the network for delivering on digital transformation objectives. This will help the business case for network transformation in general and SD-WAN in particular.

Despite the strong growth in interest and adoption, SD-WAN is still a relatively young type of solution, and with it being developed from different angles, there is little standardisation. This is also cause for caution among organisations; 29% of UK organisations see this as a main inhibitor for SD-WAN. In this context, it is wise to ask potential suppliers for their track record and proof points and consider how open they are in terms of software, partners, ecosystems and APIs.

Skills gaps are a near ubiquitous phenomenon nowadays, and networking and SD-WAN are no different. 29% of organisations feel that they may lack the necessary skills to deploy SD-WAN. IDC believes this concern should be addressed in the broader context of choice for a managed or DIY deployment model, as discussed in the previous section.

**Figure 5**  
**Inhibitors to SD-WAN Adoption**

Q. What are the main factors that inhibit or prevent your adoption of SD-WAN?



Source: IDC European Enterprise Communications Survey, 2018 (UK organisations, n = 152)

### What is Next for SD-WAN

SD-WAN is currently positioned as a specific solution in its own right that serves as an alternative to traditional WANs. In the long term, we expect that we will no longer be talking about SD-WAN as a separate proposition. The mainstream WAN will simply become software defined. The majority of SD-WAN deployments have been based on dedicated customer premises equipment (CPE). We believe that the evolution of SD-WAN will go hand in hand with that of network function virtualisation, where a growing range of virtual functions can be deployed on a single piece of commodity hardware.

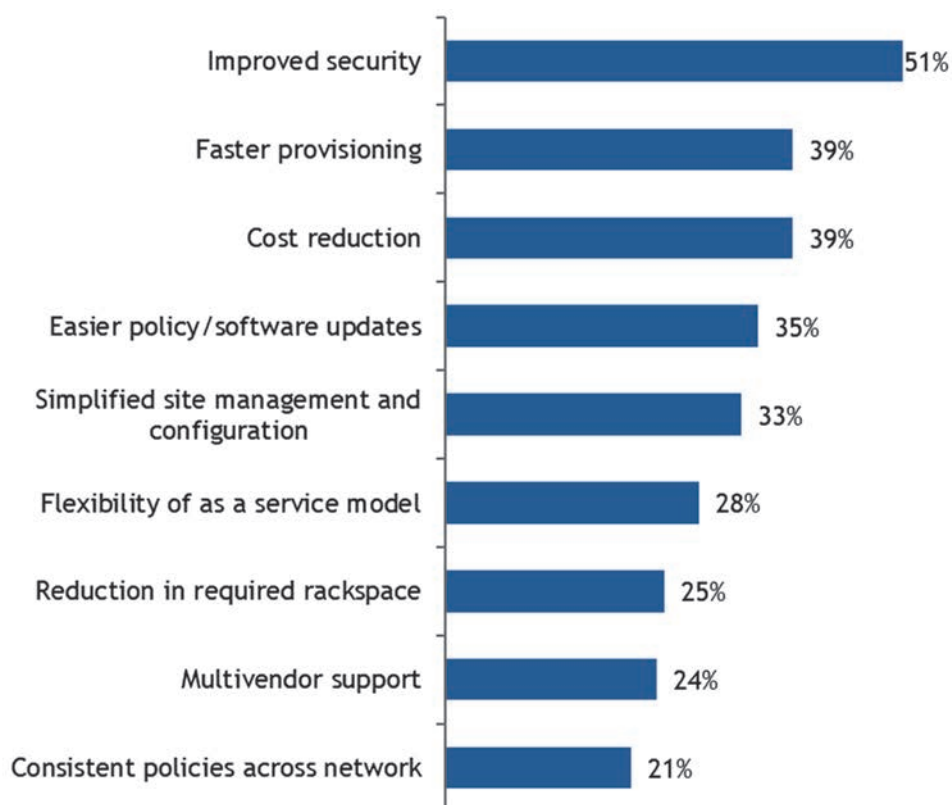
This will give way to the emergence of the software-defined branch (SD-Branch). An SD-Branch will have a single industry-standard server hosting a range of virtual appliances (vCPEs). This range of functionality is not limited to WAN-specific functions like SD-WAN, routing, firewall, WAN optimisation and application performance management, but also extends into the LAN environment with wireless LAN, and voice/UC. This brings the promise of unified and simplified management, cost and space efficiency, as well as as-a-service consumption models that organisations have grown used to from their adoption of cloud services.

IDC expects SD-WAN to be among the key drivers of demand for this type of solutions, along with security functions. IDC expects total revenue from vCPE software in Europe, the Middle East, and Africa to show strong growth at an

*The mainstream WAN will simply become software defined*

average rate of 67% between 2017 and 2022 as more solutions become available and organisations seek to realise benefits associated with virtualisation in terms of improved security, cost efficiency and simplicity. Figure 6 provides further detail on the top benefits associated with virtual network services.

**Figure 6**  
Top Benefits of Virtual Network Services



Source: IDC European Enterprise Communications Survey, 2018 (UK organisations using/planning virtual network services, n = 106)

The proliferation of network virtualisation will expand the range of available service models beyond the traditional do-it-yourself solutions and longer-term managed service contracts. As-a-service models, with on-demand and pay-as-you-go functionality, have become mainstream through the adoption of cloud, and they are now making their way into the network world. At the same time, a new breed of co-managed models is emerging. This includes service propositions where end-users can self-manage part of the functionality, features, or parameters within the context of a broader service that is managed by a service provider.

The network will also become increasingly intelligent. A growing use of the capabilities of artificial intelligence, machine learning and network virtualisation will drive the development of intent-based networking: a software-based network management system that uses advanced automation, visibility, and analytics tools to implement, secure, and dynamically maintain the desired state of the network. This kind of functionality will increasingly be integrated into SD-WAN solutions over time, eliminating the need for human intervention and reducing complexity while driving performance and scalability.

### Essential Guidance

Digital transformation should go hand in hand with network transformation. The network underpins every aspect of digital transformation, which in turn redefines network requirements and drives them to unprecedented heights. When it comes to the network, doing nothing is not an option. To successfully transform into a digital-native enterprise, organisations will need a digital-native network — an application-centric network that supports the right end-user experience through improved flexibility, manageability, scalability, cost-effectiveness, and security.

Too often, the network is seen as a mere cost centre, and is invisible to much of the organisation, including senior management. Instead the network should be positioned as a critical enabler of digital transformation, and the business case for network transformation should be built on that basis.

SD-WAN will be a cornerstone of that network transformation. Organisations should start exploring today, if they have not done so already, what benefits SD-WAN may or may not bring to their organisation. This should be done in the context of a wider evaluation of the current state of the WAN and what is needed in the future. This should include connectivity and additional network functions. Only a holistic approach can allow an organisation to exploit the full potential of SD-WAN.

Security plays a critical role when it comes to enterprise networks, and its importance will only continue to grow. This should be reflected in any transformation plans. Security should be an integral part of the WAN design, and organisations should scrutinise the security capabilities of solutions and providers in their selection process.

Organisations should carefully consider the migration path. The business increasingly depends on the network, so the stakes are high. Designing a future proof network is one thing; migrating to it from the current architecture in the most seamless and risk-averse manner is another. In this respect it is also important to consider the longer term; for example, how easy will it be to move from SD-WAN to SD-Branch?

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*When it comes to the network, doing nothing is not an option.*

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There are many things to take into account when selecting a solution provider, but at the end of the day an organisation needs to find the partner that best addresses *their* specific needs. IDC advises that organisations consider the following points:

- **Portfolio.** Features and functions are clearly important, but so is the way in which these can be mixed to accommodate the needs of different sites, users, and applications. And how easy is it to add, modify or stop certain features?
- **Partner ecosystem.** Understand who a network provider is working with, how open its ecosystem is, and whether it can meet an organisation's needs in terms of additional network functionality.
- **Deployment model.** This boils down to a choice between do-it-yourself and managed services. Can an organisation self-manage, or does it outsource complexity to a managed service partner? The choice of models is growing, and it is important that this balance is aligned with in-house resource and expertise levels and capex/opex preferences.
- **Sourcing strategy.** Does the organisation want a single point of contact and accountability of an end-to-end solution, or does it prefer the freedom of choice of a multi-sourcing strategy? An organisation will need to have the resources to manage the wider range of relationships that come with a multi-sourcing strategy.
- **Track record.** How well does a potential provider fit the specific profile and requirements of an organisation? A trusted partner will be able to provide the proof points showing that it has been serving similar clients successfully, and has the required migration capabilities and resources to provide support where and when it is needed.

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