azured

THE **WAN** THAT YOU WANT

We're all using ever greater amounts of data to keep our businesses moving. We need to work together across continents, but we still want to make things happen more quickly. We need to increase our productivity, but without increasing the cost, or compromising security.

We're also using networking technologies mostly based on ideas that, though revolutionary in the 1970s, have largely stood still while the world has changed around them.

IT'S TIME FOR SOMETHING NEW.

Software-Defined Wide Area Networking, or SD-WAN, transforms business networking performance, making provision more flexible, bandwidth more available, and security more predictable.

More easily configured, more scalable, and more easily managed than traditional WANs, it reduces the overhead of supporting branch offices or a distributed workforce.

As well as increasing capacity to meet an ever growing demand, it also prioritises traffic, creating a new fast lane to support critical services, applications and activities.

Deployed as software and available as a managed service, it is a fast developing, cloud-native concept that has a long term future, bringing benefits in cost, capacity, and performance to every size of business.

This paper explains how SD-WAN is changing corporate networking for the better.

It is a primer on the key concepts, describing the background to SD-WAN and the enabling technologies that surround it.

The paper goes on to explain how SD-WAN is deployed, and how it's managed.

With commercial examples, it illustrates the benefits of the technology to businesses facing growing needs to transfer ever greater amounts of data, to remain flexible and efficient in their operations, and to ensure the security of the information they hold.

Finally, it provides a glimpse of what is to come in networking technologies, considering how SD-WAN opens the door to a more productive and collaborative future.

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INTRODUCING SD-WAN

Developments in networking technologies are frequently born out of necessity. SD-WAN is a response to the seemingly unstoppable growth of data and the need for improvements in how different kinds of information are transferred in business.

Like any networking development it is highly technical and not readily explained without reference to a raft of other technologies on which it relies or to which it is in some way related. This guide aims to make understanding SD-WAN as straightforward as possible, and in the process clear up a few of the inevitable myths that have grown up around it, explaining its place in the field of corporate networking concepts, products and services.

What SD-WAN is and what it's not

SD-WAN is a concept, a technique or approach to networking over a wide area. It's not a protocol, like TCP/IP that underlies the Internet. It is instead an overlying technology for networking sites, devices and people enabling more efficient communication between them.

To achieve that efficiency in operation and delivery of information between users, devices or applications, there is an implied separation of the data, the management, and the network control planes.

That sounds more complicated than it is. As an overlay technology, SD-WAN is not tied to any specific network transport technology, which means it gives network designers and managers more control—and more choice—over the routes that different kinds of data take throughout the network.

The results of the very technical choices that network managers make can be distinctly commercial: prioritisation for network traffic, simpler and cheaper network architectures, less expensive equipment, and more efficient use of outside services (that is, needing less and getting a better price for it).

Why else do we need it?

SD-WAN arose as a way of simplifying network architectures certainly, but it is chiefly a response to changing times.

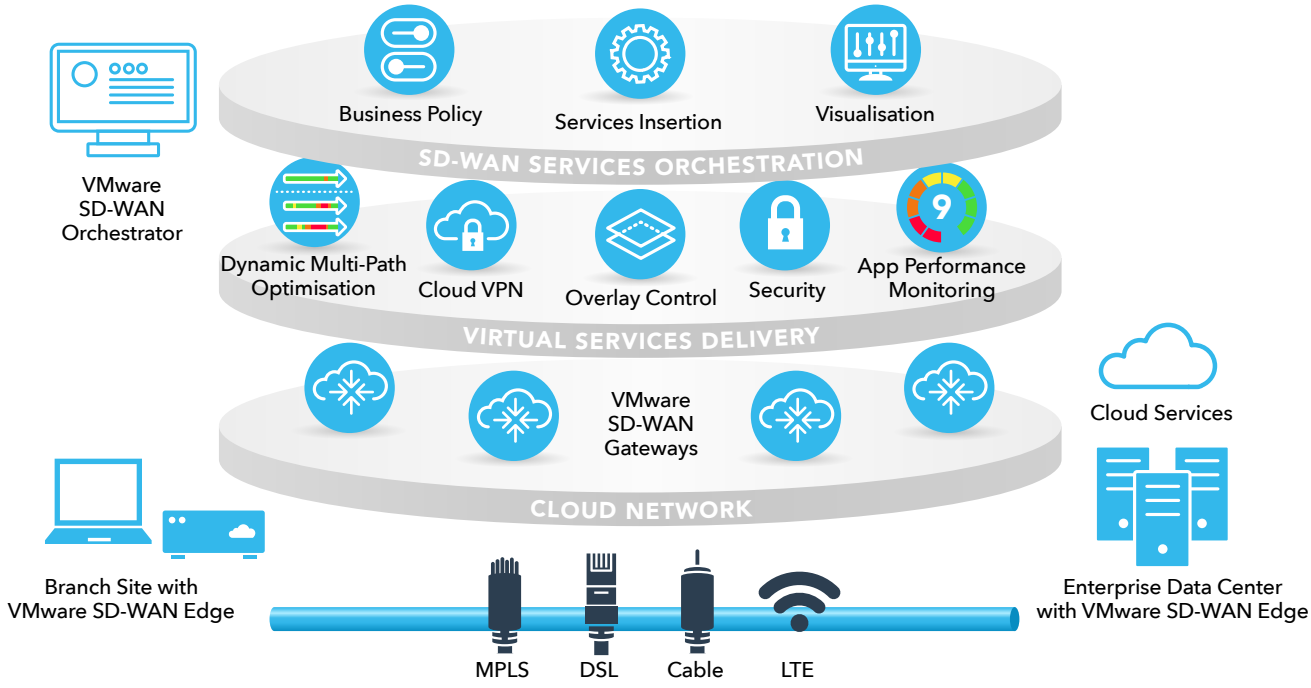
Three emerging trends in network usage have particularly driven the need for new WAN architectures. Firstly, network traffic patterns are different. Where in the client-server world of the past, network connections were relatively simple—users requiring a service of a remote server—today it is more likely that people and systems draw in simultaneous connections to many other servers to satisfy each request. If you think of the range of content on a web page, you get an idea of the problem. A page might carry a central story, but an array of different advertisements or video content from other sources could surround it, and all the content being served up in different ways depending on who's looking at it and from where. Using Software as a Service (SaaS) applications, like Microsoft Office 365, presents a similar illustration of the need for fast and reliable connections.

Allied to the growing variety and complexity of network traffic is the increasing range of portable computing devices demanding resources. In a commercial context, it is most visible in the need for employees to be able to use personal technologies like smartphones, tablets, or notebooks to access the corporate network. Companies are under pressure to develop networking architectures that provide the flexibility that changing business models need and satisfy changing employee expectations of the experience of work. If you add to that the growing Internet of Things (IoT), you can quickly see that the corporate network is a congested highway map with increasing competition for the fastest routes.

Thirdly, the shift toward cloud services, providing flexibility for planning, growth and changing needs, is having a substantial impact on network design and management. Companies expect ever more tailored cloud services while maintaining increased security, and meeting the needs of compliance or audit. Older approaches to networking simply lack the agility needed to accommodate newer business models or fast changing needs.

WHAT DOES SD-WAN ARCHITECTURE LOOK LIKE?

It's common in road transport planning debates to advocate road building as a means to reduce congestion, yet experience shows it serves only to raise total traffic volume. Instead of an increase in the number or size of roads, what's needed is more efficient management of the movement of traffic on them. SD-WAN takes the latter approach to controlling the movement of data around a network–doing a more efficient job with the information highways available.



The above diagram describes a typical SD-WAN architecture with its separate management, control, and data layers and component parts

SD-WAN is formed on top of the physical network connections. Companies can use existing network connections such as IPWAN, DSL, LTE (4G) and MPLS, and by adding appliances to their network edge create an overlay network.

Above the physical network layer, a cloud network, often referred to as the virtual or overlay network is created. Multiple transport methods can be combined by a single appliance to provide the overlay that forms the WAN. In fact, SD-WAN is transport agnostic, so existing and new technologies such as 5G and Wi-Fi 6 can readily be accommodated. Security is provided by IPSEC tunnels, themselves developed to improve the flow of data between edge networks and cloud providers. These connections come together at cloud gateways using proprietary technologies, VMware is a leading example, where traffic can be controlled.

Management of the overlaid network is simplified by separating the network management from the data and control planes. Inherent flexibility and adaptability of the SD-WAN architecture enables network managers to respond to changing needs for network access and provision. Management is made easier through network orchestrators' edge devices with a familiar, graphical interface.

Significantly, network managers can control data routing decisions to ensure Quality of Service (QoS) for critical services or applications. Options exist for immediate transfer to alternative network connections in the event of failure. Taken together, such measures improve by around 30 times the flow rate and volume of traffic.

HOW SD-WAN IS DEPLOYED

How companies choose to adopt SD-WAN for their business greatly depends on size, complexity, and available resources that can be diverted to the project. Early adopters took the DIY option, knitting together the technologies and hardware components while learning on the job. Latterly, commercial managed service providers have developed SD-WAN propositions to take away the pain of deployment and management. For larger businesses, especially those more in regulated markets, retaining complete control of the network may be essential, if burdensome.

Building SD-WAN the way you want it

Doing it yourself doesn't always mean going it alone–there are established commercial SD-WAN technology providers with proprietary solutions. With off the shelf hardware and software, all of which is of course supported by its vendors, it's possible to simplify the project while bending the solution to your needs. If your regulatory framework or attitude to security is restrictive, such an option may well work out for you, but be aware that even with vendor support, substantial on the ground resource is likely to be needed in design and roll-out.

If your resources are plentiful and the level of knowledge is up to what is undeniably a complex challenge, open source options could give you the flexibility to craft an independent solution. Though, as ever, what you save on the software, you're likely to spend on design, configuration and support.

Either of the above options seem to call for resources and an appetite for risk that is probably beyond most SMEs. With IT resources very often at a stretch supporting core business, such projects could be a step too far, especially if the benefits of SD-WAN can be accessed more easily.

Buying SD-WAN as you need it

Subscription is how we buy more or less everything today, so it's no surprise that providers have not been slow to launch managed services to widen the market for SD-WAN. Obviously you are paying for the service provider to maintain the infrastructure that makes up the SD-WAN, as well as the ongoing provision of the service. The key here is that it is a managed service, which for most smaller businesses will be worth the fee on its own. There's a lot of complexity in the SD-WAN architecture, but when expertly configured, that translates into simplicity for the business and its users. And that's how we all want our systems to work: continuously, invisibly, painlessly.

It's a similar model to Amazon Web Services and Microsoft Azure, leaving you free of the capital expenditure, and of the demands such a service makes on business operations.

HOW SD-WAN IS MANAGED

There are two important management roles in any SD-WAN deployment: setting out the governing policies, and maintaining efficient operation.

Proprietary deployments provide an 'orchestration' interface for network managers which use familiar graphic controls for policy development and network management tasks such as deploying new services or monitoring performance. The software also enables managers to set priority status for traffic on the network, to control edge appliances and maintain vigilance on network security.

Security is a subject in itself, of course, and new developments allied to SD-WAN are interesting here too. Secure Access Service Edge (SASE) is a recent response to the increasing threat of cyber crime. It entails the convergence of security services with SD-WAN to increase its strength and resilience against attack. Cloud Access Security Broker (CASB) services, Firewall as a Service (FWaaS) and zero trust (a self-explanatory concept in network security) are being folded into a single cloud-based service model. The advantage from a management perspective is to be able to offer the same degree of security to all the users on a network irrespective of their location, applications or access devices. Commercially, it enables businesses to acquire industrial strength security on a subscription basis like everything else.

CASE STUDY
LEAP LEGAL SOFTWARE

"Sooner or later you're going to look at what you're paying for an indifferent service and say, we've got to find a way out of this,"

so says Greg Horner, MD of LEAP Legal Software in Australia.

But shifting supplier and transforming network architecture are both big decisions that take a lot of confidence that the destination is going to be worth the journey.

The bigger you get, and the more people you have relying on your systems, the harder it is to change anything. This practical and emotional technology lock-in has for years kept businesses like LEAP in rolling contracts with telcos for their network services, despite the knowledge they could get better for less elsewhere.

Azured's SD-WAN solution presented LEAP with a low risk way to move to a new, more powerful, and more predictable future. Designing and building alongside their live operations, gave LEAP's 350 people the certainty that there would be no loss of service, but that when the big switchover came, performance would be greatly enhanced.

LEAP's historic system was based on expensive MPLS links from its three east coast offices, and low grade (40Mb) domestic internet to smaller remote sites across Australia. The service lacked redundancy and was frequently bottlenecked, especially when presenting demos using on-premise equipment.

Using Azured's Network as a Service (NWaaS) solution, the transformation in performance was immediate and palpable. The new architecture was based on 1Gb fibre internet links to the three main sites and 100Mb links to the outlying offices, with 4G backup. The whole system is built on VMware VeloCloud, providing more predictable traffic management and industrial strength security throughout. "Azured halved the annual cost of our network connectivity and management," explains Greg, "and gave us more visibility along with a much improved performance."

One of the biggest issues with telcos is a lack of visibility. You get the service, but very little in the way of reporting. LEAP now have read-only access to the VMware VeloCloud SD-WAN orchestrator, so they have ongoing monitoring and reporting on network performance. LEAP's technical team now has a lot less to worry about, and a single point of contact to manage the supply of its network services and connectivity.

"I think big telcos offer a lot of comfort for people but they rely on your reluctance to move," reflects Greg. "What they offer is not bad, it's just that they can be slow to adapt to changing needs, and while you're happy to keep paying, they lack an incentive to come to you with ideas that could help you and keep you as a customer."

WHAT DOES SD-WAN MEAN FOR MY BUSINESS?

The benefits to business of updating legacy WAN infrastructure to the new SD-WAN go well beyond more efficient operation, traffic management and cost savings, to embrace business information security, operational agility, and employee mobility. The managed service model also makes it easier for businesses of all kinds to benefit from the technology, giving them new opportunities to support growth and innovation.

The fundamental difference between SD-WAN and traditional WAN is in its ability to make more use of low cost IP connections. Without any compromise in security and by optimising connections and traffic flow it can support the increasingly bandwidth hungry applications that workers need whether in the office or not.

With SASE at the heart, SD-WAN improves the security standing of every business. Integrating security with the network shrinks the areas open to potential attack, and reduces risk exposure. SASE protects users' devices as well as their data, making both less vulnerable to cyber attack.

SD-WAN enables secure remote working. More than a VPN, and more reliable, user traffic is secured as close to the service provider edge as possible. It also significantly speeds up application delivery and increases the security of every connection.

In common with other subscription service models, features and security updates are managed by the service provider, reducing IT management resource and saving money over the lifetime of the solution.

Fully managed services operate in a similar way to cloud service providers, providing the security and comfort that businesses get from familiar SaaS contracts.

LOOKING AHEAD

As a new technology concept, SD-WAN breaks free from older ideas, many of which, such as TCP/IP, still underlie the Internet. With the advent of new approaches to managing data flows, innovative applications can be built, no longer held back by the past.

SD-WAN AND THE INTERNET OF THINGS

There is a seemingly limitless number of devices that need to connect to networks–from conventional computing devices, to wearables, and the vast number of sensors used in all kinds of commercial, government and domestic settings. All need access, security, and capacity in the network to perform reliably.

One emerging example illustrates the challenges in existing networks already being solved with changes in network design and operation. For driverless vehicle technology to realise its promise it will be reliant on SD-WAN and 5G networks. Without the data prioritisation and security features of SD-WAN data from cars cannot be shared with other vehicles on the road at the near real-time speeds required.

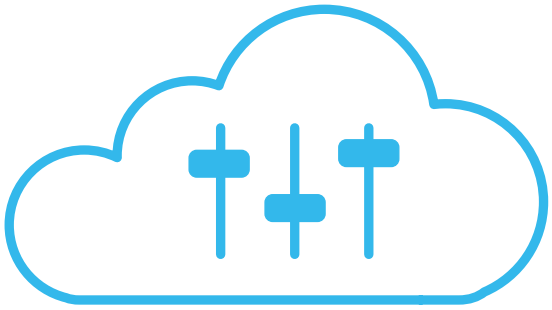
SD-WAN AND COLLABORATIVE NETWORKING

SD-WAN is making it easier for many of us to work, especially during the Covid-19 pandemic. Orchestration software makes it possible to control many thousands of applications from a simple interface. By updating a policy and making it instantly available, it means that users with low latency applications such as Microsoft Teams, or Zoom are able to have real-time conversations globally without interruption. Losing a primary connection no longer means dropping sessions, which can be switched between links on the fly.

SD-WAN AND NEW DATA TRANSFER PROTOCOLS

SD-WAN vendors have developed methods to encapsulate TCP/IP and escape its limitations. These new approaches make it possible to consolidate multiple connections and make them operate as though they're a single connection, creating efficiencies in the network. It also means that dropped connections don't lose the session or any of the data. Now you can take four, 30Mb connections, providing 120Mb/s of throughput and stream data down all four in real-time as if they are one single circuit.

Benefits are obvious to any organisation handling large volumes of data. One topical example is in reporting MRI, CT and X-Ray images by clinicians working remotely, as a result of Covid-19. SD-WAN optimises the links to ensure the best possible throughput, without the overhead of binding connections.



SD-WAN AND THE COMMODITISATION OF THE CLOUD

Cloud computing is fundamentally changing as a result of SD-WAN. We believe it will have a positive impact on cloud. Already, cloud service providers are able to remove barriers to migration between platforms (storage being the historic limitation).

Moving virtual services running in IaaS and PaaS has always been a challenge but with SD-WAN, vendors have the ability to terminate connection in the service provider data centres, using cross-connects. That will make it possible to move your data and services from AWS to Azure, for example, based on spot pricing, just like switching energy providers or credit cards.

We also anticipate cloud orchestration platforms where you will manage your cloud resource across multiple providers in one place. You'll be able to buy resources from providers months in advance, enabling your organisation to get the best value out of the cloud.

For further information about how SD-WAN can benefit your business email **hello@azureduk.com** or **schedule a call** with us.