



The Telstra Ultimate SD-WAN Guide

Tips, tricks, and traps to avoid
to make SD-WAN a success

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Introduction

Change is a universal business truth.

And businesses today are facing more of it than ever.

Technology can play a vital role in helping businesses adapt to change but that requires enterprise networks – currently just coping under the pressure of cloud-served applications, video, mobility, Big Data and more – to be more than just reliable and secure.

Can networks play a bigger role in helping businesses seize new opportunities and respond to headwinds?



The rise of hybrid networks

The rise of Software-defined Networking has created opportunities for businesses to use a mix of private and public internet networks for their site connectivity needs.

And to orchestrate it all, organisations are turning to Software-defined Wide Area Networking (SD-WAN).



SD-WAN uptake accelerates

Designed and implemented well, SD-WAN helps deliver improved application performance, simplified management, greater network visibility and more resiliency.

It's no wonder global adoption is rapidly increasing¹.

But moving a whole-of-business network to SD-WAN while ensuring the organisation keeps operating as usual during the transition comes with its share of complexity and risks.

And with over 60 different types of vendors and technologies in the market, choosing the right solution for your organisation can be daunting.

The Telstra Ultimate Guide to SD-WAN offers you the key insights you need to make your SD-WAN journey a success, whether you are considering it for your business or already planning your transition to hybrid networking.

The information in this guide is based on the experience our internationally-accredited expert consultants have from providing nearly 7,000 managed SD-WAN devices for organisations in every industry vertical. We hope you find this guide useful.

60%

of enterprises will have implemented SD-WAN by 2023, up from less than 20% in 2019.

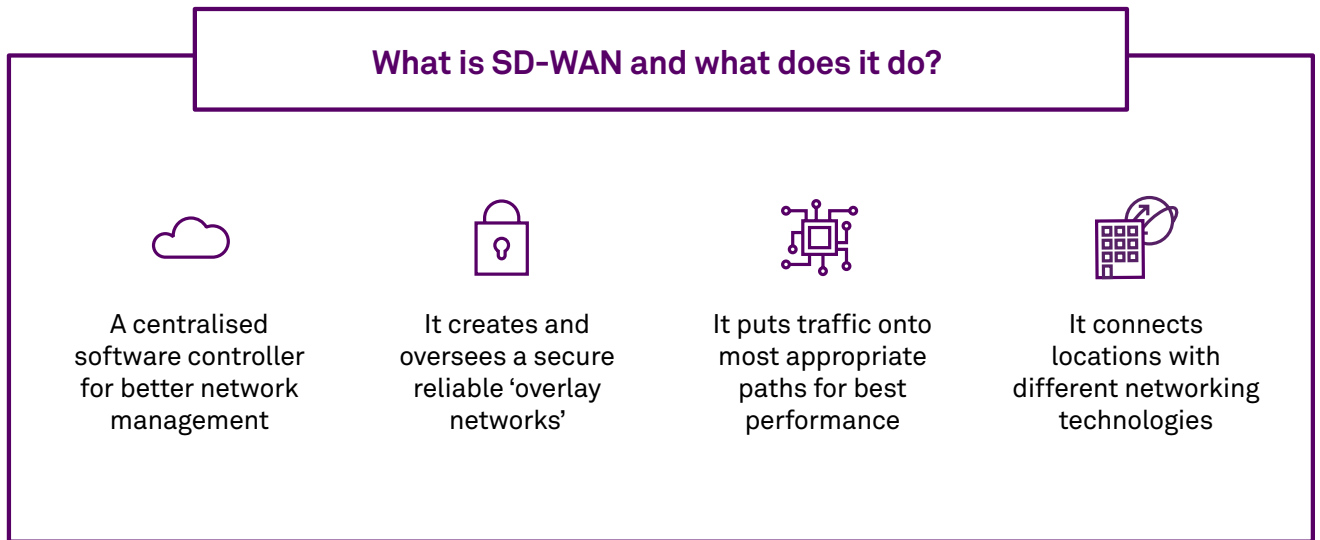
¹Gartner. 2020. Forecast Analysis: Enterprise Networking Connectivity Growth Trends, Worldwide. [online] Available at: <<https://www.gartner.com/en/documents/3969496/forecast-analysis-enterprise-networking-connectivity-gro>> [Accessed 21 July 2020].



What is SD-WAN?

SD-WAN is an acronym for Software-Defined Networking in a Wide Area Network (WAN). It simplifies the management and operation of a WAN by decoupling (separating) the networking hardware from its control mechanism.

SD-WAN enables the orchestration of a range of networking technologies, such as the Internet and LTE for transport-agnostic connectivity, easy deployment and central management. Critically, it has the intelligence to automatically adjust traffic flows between multiple links.



SDN vs SD-WAN?

Software-defined networking (SDN) refers to an approach in which networks are provisioned, managed, and programmed through software interfaces. SDN is intended to address the fact that static architecture of traditional networks is decentralised and complex to manage while current networks require flexibility and easy troubleshooting.

SD-WAN is the application of SDN technology to wide area networks. It enables the separation of the control and transport planes — one principle of software-defined networking.



Traditional WAN vs SD-WAN

A traditional wide area network architecture commonly uses a hub and spoke design.

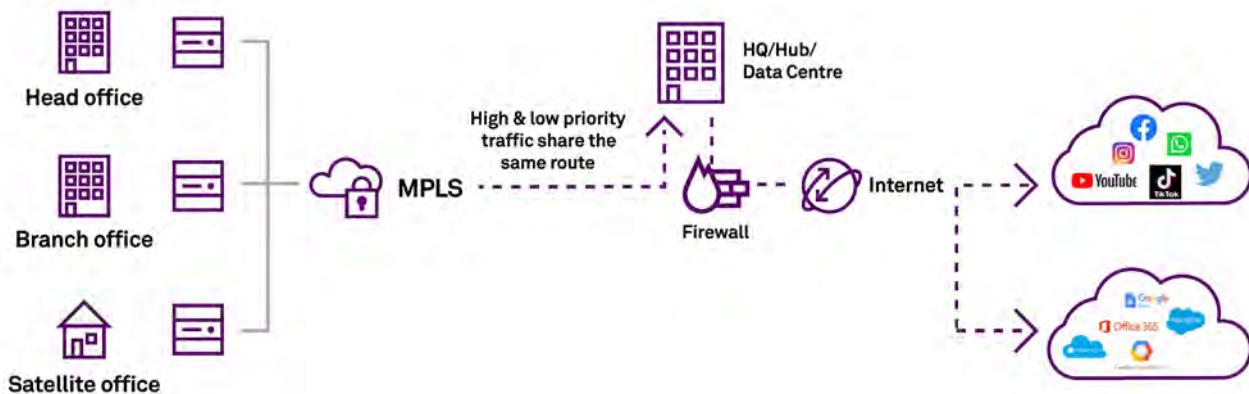
In this design, data from each branch site is backhauled to the organisation's data centre where security inspections can be applied.

Dedicated MPLS circuits help ensure security and reliable connectivity. Each branch site will have multiple devices on-premises to manage. Many applications exist in the enterprise data centre while those destined for the Internet travel through a VPN to an Internet gateway in the data centre and back again.

This type of architecture suits a lot of business use cases because it is highly secure with a centralised Internet breakout and applications are hosted in a private data centre.

Traditional Network Scenario

All traffic routed through MPLS, potential to impact user experience.



SD-WAN Scenario

Intelligent traffic routing to help deliver optimal application performance.

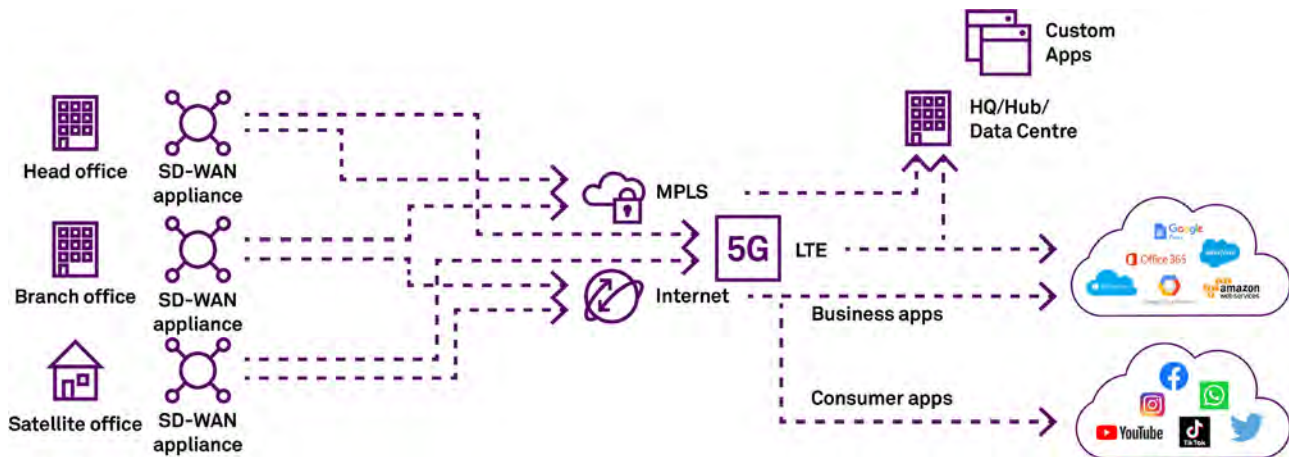


Fig 1. Comparison between a traditional WAN network vs SD-WAN.

SD-WAN is more flexible and available than a standard WAN because it is abstracted from hardware. It can replace the hub and spoke design by enabling network managers to use different transport types for different applications.

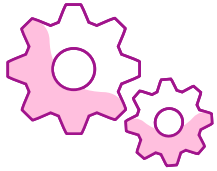
SD-WAN architectures creates a network overlay and moves the control plane to a centralised location, enabling central IT teams to configure, manage, monitor and secure most aspects of the WAN, removing the need for an on-premises IT team at each branch site.

For example, branch sites can have direct internet access for cloud apps over the public internet rather than having to send traffic to the organisation's data centre. Centralised policies determine which path traffic should take based on the business' priorities.

Overlay vs Underlay

Underlay refers to the transport providing connectivity — for example MPLS, the Internet or LTE.

An SD-WAN overlay refers to the virtual network created over the top of the transport to separate network control from the physical hardware (see the section on **the importance of the underlay** for more details).



How does SD-WAN work?



1

Deploy a mix of private MPLS and public Internet services over Fibre, nbn™ and LTE to cater to performance requirements.



2

Create logical network over the top of any transport type with application-aware performance policies to decide routing.

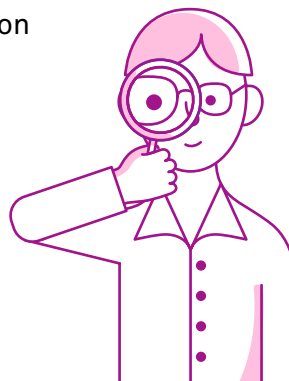


3

Centralise network management platform and policy controller to remove need for multiple on-site IT teams.

4

Understand what's happening on the network through SD-WAN application performance monitoring, analytics and visualisation.



5

Securely and intelligently direct traffic over the right path based on agreed profiles via network controller.

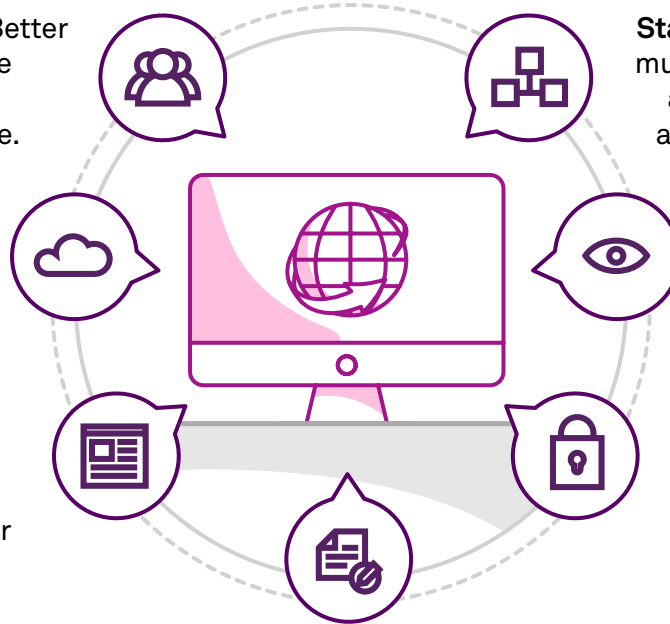


The business drivers for SD-WAN adoption

Give your team wings: Better application performance means better team collaboration experience.

Rise of cloud: Shift to cloud-based business apps and data putting additional pressure on networks.

Change at pace: Make network more agile to respond to challenges or seize opportunities.



Stay up: The ability to control multiple access paths means additional redundancies to avoid significant disruption.

See more, manage better: Visibility of application traffic to optimise performance, manage resources, and maintain security.

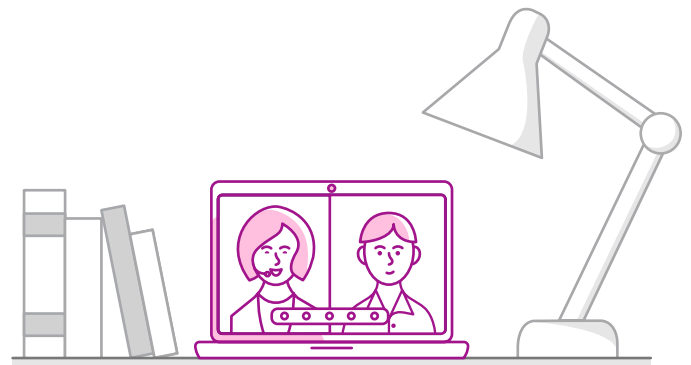
Be safer: Easier to ensure consistent policies across sites and to segment network usage.

Simplify complexity: Centralised control enables easy rollout of policy changes and quickly deploy new sites.

Keeping pace with business change

Business today has been shaped by globalised competition, distributed enterprises, dispersed workforces, and demands for a better experience from staff and customers.

New technologies are supporting new agile ways of working and enabling organisations to respond to challenges and seize opportunities.



The two sides of the Covid-19 crisis

The Covid-19 pandemic created a crisis for many businesses. For some, the absence of physical foot traffic meant the need to scale back operations. Many have put large-scale digital transformations on hold as they tackle the immediate challenges of connecting distributed teams and keeping operations going.

For others, their customers and users went online, offering the opportunity to create new direct channels, if they have the technology to support them.

“The queues are invisible but they’re crashing servers and online fulfilment processes around the country. Many ecommerce channels cannot meet the current demand – meaning lost sales.”

– KPMG, Australia, April 2020².

²Jane Cohen, M., 2020. COVID-19: Retail'S Survival And Revival. [online] KPMG. Available at: <<https://home.kpmg/au/en/home/insights/2020/04/coronavirus-covid-19-retail-survival-and-revival.html>> [Accessed 22 July 2020].



The rise of cloud

Many of the core tools, applications and solutions modern enterprises use to manage operations, get work done, unite dispersed teams and serve customers are based in the cloud. Think the likes of Microsoft O365 / Teams, G-suite, Salesforce and SAP HANA Cloud.

While traditional WANs using private networks excel at secure, high performance inter-branch connectivity, connecting to cloud apps is also critical. The shift in the location of businesses' apps and data from private data centre to public cloud places additional demands on networks.

Cloud adoption continues to grow

Most enterprises see their cloud usage exceeding their plan this year due to impacts of the coronavirus (COVID-19) pandemic³.

Fifty-nine percent of enterprises expect their cloud usage will be slightly or significantly higher than planned, according to the Flexera 2020 State of the Cloud Report. Half of small and medium-sized businesses also expect their cloud usage to escalate.

Software-as-a-Service (SaaS) is by far the largest (cloud) segment, accounting for close to 70 per cent of the market⁴. Respondents to the Flexera research are running 53 per cent of their workloads in public clouds, and that number is expected to reach 60 per cent within 12 months.



Better business productivity

Teams rely on their applications to support collaboration and serve customers. The better the application performance, the more effective they can be. If application performance deteriorates because of the network, business productivity is impacted.

The explosion of WAN traffic caused by cloud adoption means private circuits become clogged with Internet-destined traffic, degrading application performance and increasing transport costs.

Backhauling traffic through the WAN makes less sense when many cloud and SaaS providers build Points of Presence (PoPs) to reach many points on the Internet with low latency.

Direct internet breakouts at each branch site provide lower latency connections and can be more cost efficient. SD-WAN helps IT teams manage these connections centrally without having to configure every breakout at every site.

³Weins, K., 2020. Cloud Computing Trends: 2020 State Of The Cloud Report | Flexera Blog. [online] Flexera Blog. Available at: <<https://www.flexera.com/blog/industry-trends/trend-of-cloud-computing-2020/>> [Accessed 22 July 2020].

⁴ANZ - EN. 2020. Australia's Market Replace with: Report. [online] Available at: <<https://www.bcg.com/en-au/publications/2019/economic-impact-public-cloud-apac/australia>> [Accessed 22 July 2020].



The rise of video collaboration

The Covid-19 global pandemic in 2020 has accelerated the use of high bandwidth collaboration tools. Many of these are cloud-based SaaS solutions. By April 2020 Zoom had more than 300 million daily participants in meetings. Microsoft Teams usage increased to more than 75 million daily active users in April 2020 (a 70 per cent increase in users in one month) with 200 million meeting participants in a single day.⁵

⁵The Verge. 2020. Microsoft Teams Jumps 70 Percent To 75 Million Daily Active Users. [online] Available at: <<https://www.theverge.com/2020/4/29/21241972/microsoft-teams-75-million-daily-active-users-stats>> [Accessed 22 July 2020].

Zoom Blog. 2020. 90-Day Security Plan Progress Report: April 22 - Zoom Blog. [online] Available at: <<https://blog.zoom.us/90-day-security-plan-progress-report-april-22/>> [Accessed 22 July 2020].



Manage their environment with less effort, cost and risk

IT environments are becoming more complex, with more connectivity types, more use cases and more applications to manage. Routine management tasks consume more resources and restrict teams from focusing on strategic initiatives.

Upgrading rigid MPLS/IPVPN circuits can be expensive and time-consuming to deploy. Traditional networking approaches can also make it challenging for IT teams to enact policy changes and deploy edge gear quickly at new sites to connect users to the business' applications.

Simplification strategy

ALDI is rapidly growing, and it needs a future proof network to meet these demands. Infrastructure limitations, legacy stacks and a lack of visibility in network analytics were preventing ALDI from reaching their full potential. Furthermore, ALDI had a series of complex processes involving manual software updates for over 1000 devices which increased risk and caused delay.

In partnership with ALDI, Telstra introduced a new network solution that drives improvements in operational efficiency and customer experience. SD-WAN allows ALDI to more rapidly deploy connectivity to new store sites as their retail footprint continues to grow. Furthermore, SD-WAN provides better utilisation of bandwidth and application performance, allowing ALDI to more readily introduce cloud-based applications into their business.



Improve resiliency

Businesses depend on connectivity to operate. The 2020 Covid-19 pandemic has accelerated the shift online through the growth in remote working, ecommerce and digital content consumption. With more aspects of business taking place digitally, the ability to keep applications running is critical.

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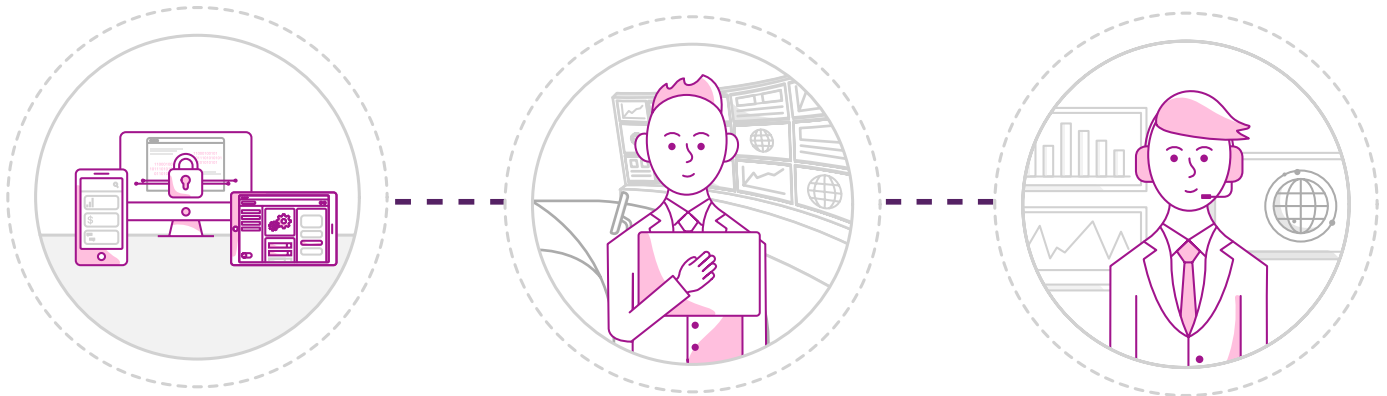
the estimated hourly cost of high application downtime.⁶

SD-WAN solutions switch traffic between different paths in the event of a fault or poor performance on one path, so end users and customers can avoid significant disruption to services.

⁶Veeam Software. 2020. CXO Research: Legacy Technology And Lack Of Skills Hindering Digital Transformation And IT Modernization. [online] Available at: <<https://www.veeam.com/news/cxo-research-legacy-technology-and-lack-of-skills-hindering-digital-transformation-and-it-modernization.html>> [Accessed 22 July 2020].



Gain more visibility of the network



IT managers need to understand what applications and devices are creating traffic on their networks to ensure optimum performance, efficient resource use, maintain security and plan strategic transformation initiatives.

SD-WAN can help give network operators more visibility into cloud and application traffic as services are routed through the overlay. Alarms and alerts help to identify potential problems before they escalate into business disruptions.

Organisations can gain complete insight into their network by combining SD-WAN with visibility and monitoring tools for their underlay network.



Security

SD-WAN can help businesses to improve their security by making it easier to ensure consistent policies across sites. SD-WAN is also useful for larger organisations that want to segment network usage.

For example, a hospital may want to offer patients Wi-Fi access without using the corporate network. The hospital with SD-WAN can use Virtual Routing and Forwarding (VRF) to create logical networks, enabling guest use of the Wi-Fi while limiting the security risks by separating the two different traffic types.

When to consider SD-WAN

- If you have a complex and disparate WAN environment
- If you are deploying Internet to offload traffic from MPLS at branch sites
- If you are transitioning to SaaS (O365/Salesforce/Cloud Voice)
- If you are reaching end-of-support router refresh or MPLS contract renewal

Four use cases for SD-WAN

Use Case

As a business...

So that...

SD-WAN helps you

Application performance



I want critical collaboration and similar applications to perform regardless of other competing factors.

My business operates efficiently, and I can serve my customers well.



Design a fit-for-purpose solution that maintains peak performance of nominated applications.

Branch office resiliency



I need my branch locations to be "always connected" with the required bandwidth.

Business continuity is maintained at all times.



Achieve carriage diversity, with backup scenarios.

Payload segregation



I would like to ensure that non-critical Internet traffic can be routed directly without congesting my corporate network.

I can control costs with my private network and maintain reliability for my business critical apps at the same time.



Orchestrate traffic splitting via intelligent routing, ensuring your branch sites operate efficiently.

Centralised policy control



I want to decide and implement site-based policies centrally.

It is simple, easy and quick to roll out corporate network policies.



Streamline policy management and changes across your network.



SD-WAN architecture

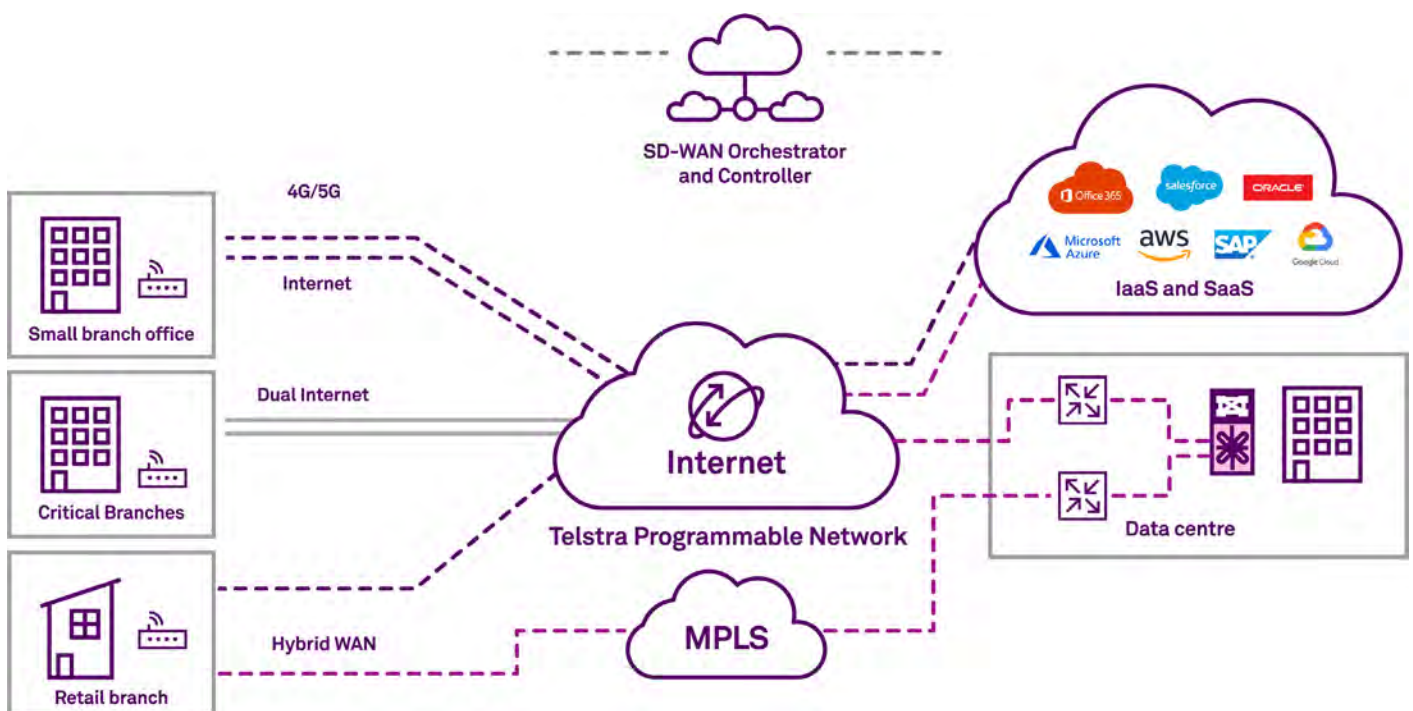
SD-WAN employs an abstracted architecture for its network.

In an abstracted architecture, the network is divided into two parts: the control plane and the forwarding plane. This architecture moves the control plane to a central location like an organisation's headquarters. The central team can manage the network without requiring onsite support at all times to reconfigure settings to deploy new features.

The three components of an SD-WAN architecture

1. **The SD-WAN edge.** The edge is where the network endpoints reside. This can be a branch office, a remote data centre, or a public cloud platform.
2. **The SD-WAN Controller.** The controller is the virtualised manager for network, overseeing traffic and applying policy and protocol set by operators.
3. **The SD-WAN Orchestrator.** The orchestrator centralises management and enables operators to see the network through a single pane of glass and set policy for the orchestrator to execute.⁷

Many vendors will delegate the controller to either the edge device or use a single orchestrator to conduct both orchestrator and controller functions.



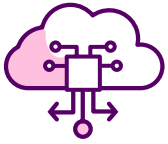
⁷SDXCentral.com. 2020. What Is SD-WAN (Software-Defined Wide-Area Network)?. [online] Available at: <<https://www.sdxcentral.com/networking/sd-wan/definitions/software-defined-sdn-wan/>> [Accessed 22 July 2020].



SD-WAN policy rules

SD-WAN devices can filter and apply performance and security rules to traffic based on criteria including application and application type.

The rules assign the data packets to a traffic class. IT managers can use rules to determine the path of data traffic based on standards for latency, jitter and packet loss. If a threshold for one of those criteria is met, the SD-WAN device will switch the traffic to the next best path in line with the set policies.



Top SD-WAN network architecture considerations



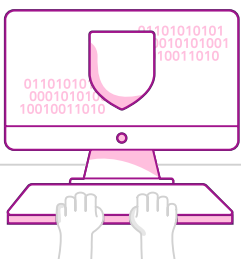
Start with outcomes

Review your connectivity needs and determine what your network transformation is trying to achieve.



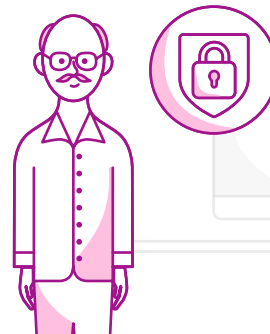
Review network design

SD-WAN cannot change the laws of physics. How you design the network, including the underlying carriage, will impact outcomes significantly.



Always be thinking about security

With added attack surfaces, consider what appliances or solutions you need to reduce risks.



Cut carriage complexity

Simplify the underlying carriage setup and avoid varied requirements for individual sites.



The right SD-WAN architecture design and deployment helps you maximise the potential of your networks and enhance business agility. Getting it wrong may mean disruptions during transitions and the potential to require an entire rebuild.

SD-WAN is not a one-size-fits-all solution. Here are the top considerations when planning an SD-WAN architecture.

01

Business requirements drive technology choices

Every network is unique and every organisation's needs are different. The sheer range of possible solutions, combinations of services, and the number of vendor technologies on the market demand a detailed strategy to deliver the promised benefits.

The first step in determining the right architecture is to understand the business objectives for your network transformation and determine the metrics of success.

Does your organisation require high-quality video conferencing? Do you have critical business apps such as your customer relationship management database (CRM) which you want to prioritise to ensure availability? Are there external factors such as regulatory or government requirements for service availability?

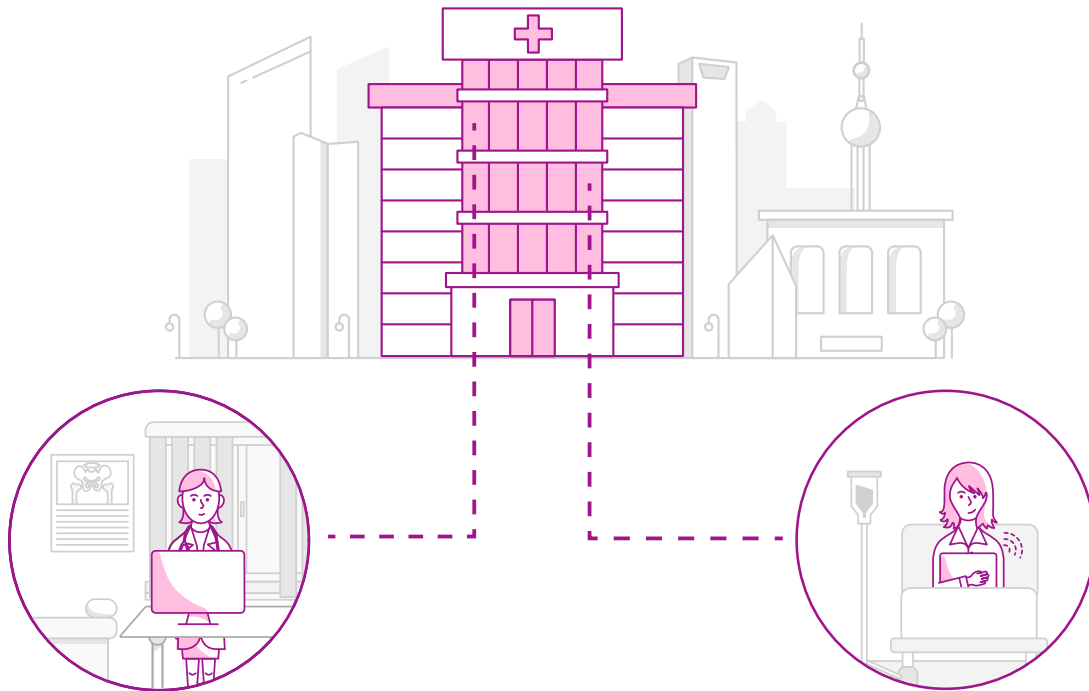
Review your branches to identify the types of sites you have and any relevant requirements. For example, do core sites have different requirements compared to non-core sites?

Customer example — Hospital sector networking requirements

The following scenarios show the range of network requirements for a large healthcare provider. Understanding these criteria helped to shape the network strategy and architecture.

Government requirements for resiliency

- Fixed Access WAN connectivity.
- Internet access for site-to-data centre or site-to-site use cases.
- Reduce number of devices at site:
 - Current: High availability (H/A) MPLS + internet routers.
 - Future: Single set of H/A routers for MPLS and Internet.
- Potential use of LTE, only for core applications (allowing high uptime for core applications such as patient record databases).



Non-critical sites

- Internet and MPLS options to be based on site requirements.
- Direct internet access to reduce load on data centres for certain apps.

Patient and third-party connectivity requirements

- Guest internet access.
- Security between corporate network and guest network through segmentation (using Virtual Routing and Forwarding).
- Content filtering (delivered either through cloud or on-premises options).
- Direct internet access to reduce load on data centres.

02

Review network design

SD-WAN technologies can help you get better performance from your networks and make the most of your bandwidth.

However, SD-WAN cannot change the laws of physics and your network design is a significant influence on SD-WAN's ability to deliver the promised benefits.

Consider whether your planned transport types are robust enough to carry future traffic, not just your current volume.

Your chosen cloud architecture will also influence your SD-WAN design. Many public cloud users

are also opting to deploy dedicated cloud interconnects between critical corporate and remote offices and the public cloud provider. These will need to be incorporated into your SD-WAN architecture.

Improve your network's resiliency by choosing diverse connectivity options (such as including 4G for wireless back up). Diverse options enable you to take advantage of SD-WAN's capability to redirect traffic onto another path if the usual path is unavailable.



03

Cut carriage complexity

Network architects can avoid building in complexity by simplifying the underlying carriage. With the flexibility offered by SD-WAN, it can be tempting to develop specific requirements for individual sites.

This creates a network tailored to the specific needs of the business at that moment. However, this is a complex architecture and does not enable you to roll out new applications without

separate templates for each of the site and connectivity types.

Ultimately, the more variation you have across the sites, the more complex it becomes. If customisation on a per site basis is important to you, carefully review whether your chosen vendors can support it with one template and firewall. Otherwise, it will become increasingly difficult to manage.

04

Security goes hand-in-hand with network design

SD-WAN architectures create a number of security questions.

First, unlike traditional WANs, SD-WAN leverages the internet and, in some cases cellular networks, which can expose your business to a broader attack surface (the number of locations a potential attacker can attempt to gain entry to your network).

In a traditional network design, you have one or potentially two public internet connections touching the network, so your potential attack surface is relatively confined.

Consider the security appliances and solutions you'll need when deploying SD-WAN to reduce the risk of exposure to a security breach.

Second, the ability to set granular security policies at branch sites puts the onus on IT managers to ensure each security feature is deployed and configured correctly.

We recommend adopting cloud-based security solutions for securing your branch internet breakouts. Cloud security products have end-point controls to help protect staff laptops.



They are easier to deploy and are updated by the vendors. This saves you from managing multiple firewalls.

Third, organisations need to consider what kind of segmentation they require to keep data on the right networks. Sending critical personal or financial data over the internet may not be appropriate for an organisation. The solution is to segment certain sites or data and traffic types.

ALDI's secure, segmented and resilient SD-WAN network

Telstra helped implement a Managed SD-WAN solution which combined wired and wireless networks for triple redundancy to support an enhanced customer experiences at checkout. The SD-WAN solution also enabled to achieve proper segmentation within their network so that their point of sale and other internal data is protected within their core network.



Traps to avoid with your SD-WAN strategy



“SD-WAN will reduce my network costs”



“Don't need MPLS anymore”



“Current router hardware vendor”



“Go with the ‘best’ solution out there!”

Trap 01:



SD-WAN will reduce my network costs

In some quarters, SD-WAN has been positioned as a silver bullet for spiralling network management costs and application performance problems. While SD-WAN deployments may help to reduce carriage link costs, you should factor in the total cost of design, deployment and ongoing management.

SD-WAN delivers more performance bang for your buck but is unlikely to be a major cost efficiency gain on its own. Instead, consider the full benefits enabled by the new use cases, improved resiliency and SaaS performance, organisational agility and speed to market that SD-WAN can help deliver.

Trap 03:



We can default to our current router hardware vendor

Getting the most business value from SD-WAN is not as simple as incorporating your current hardware provider's SD-capabilities into your network. Vendors will always recommend their own devices, even if their capabilities may not meet all your organisation's requirements or achieve your goals.

There are a variety of SD-WAN technologies in market from entry-level to fully-featured solutions. Evaluate the technologies against your business use cases and demands. Is it more important to have more features and controls or a simpler management experience?

Trap 02:



It removes the need for MPLS

Very few organisations will use the Internet exclusively for their corporate data traffic because of security requirements for critical data and/or the need for high-speed core connectivity for certain applications. SLAs on MPLS will be much higher than on public internet (which are typically 'best effort').

Trap 04:



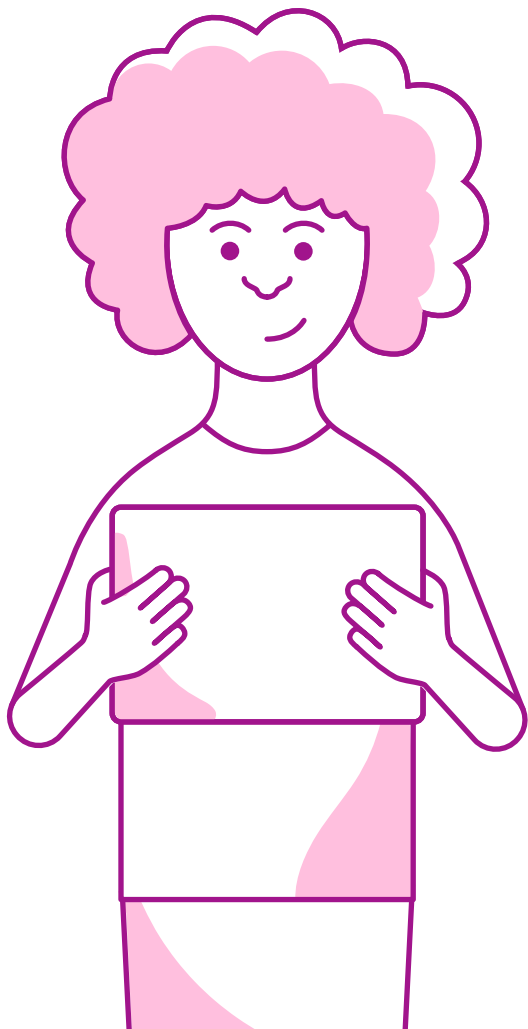
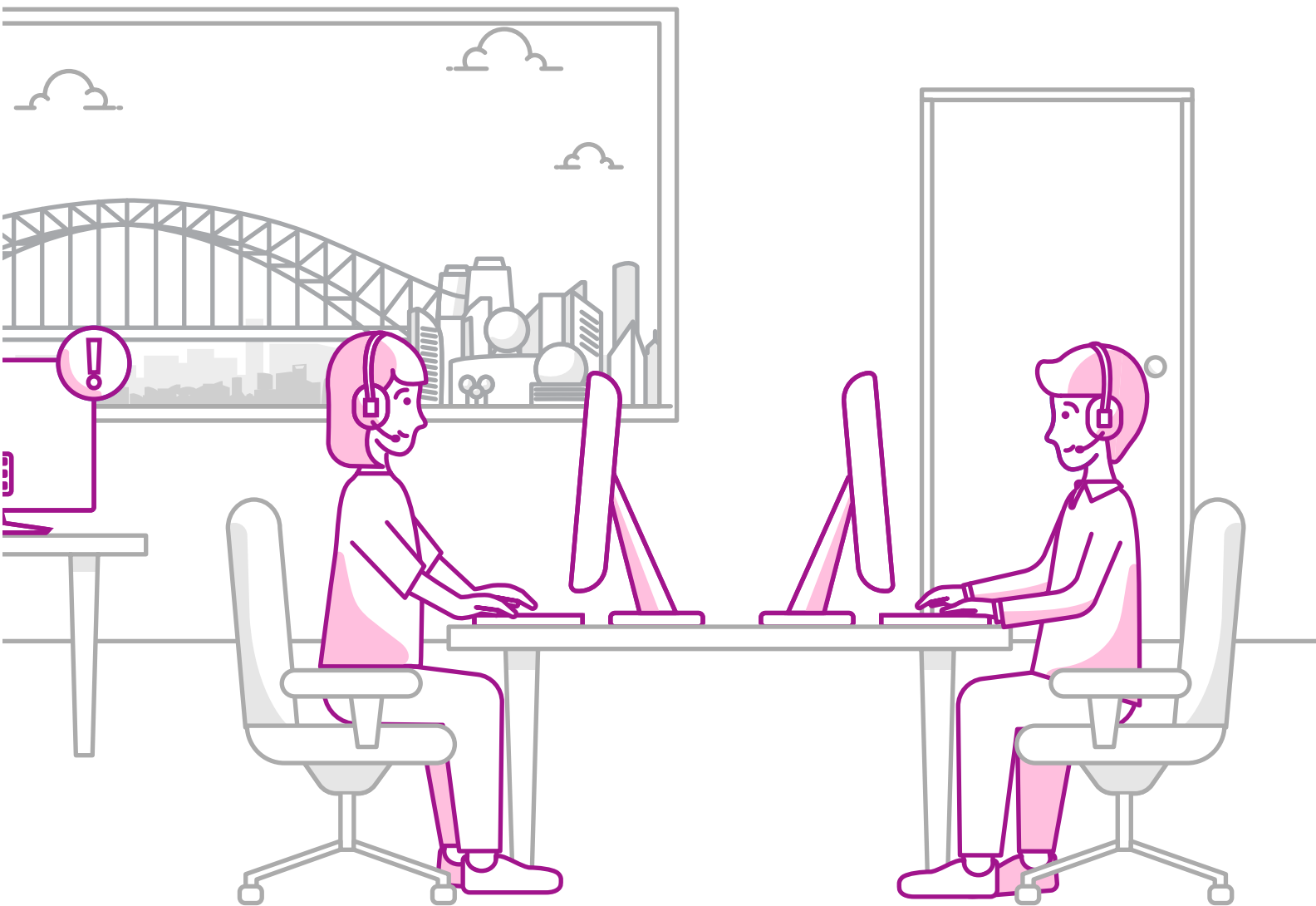
Best-of-breed is always the best approach

It is tempting to combine best-of-breed technologies. However, best-of-breed solutions can become hard to manage and restrict your ability to make changes in the future.

Alternatively, choosing to adopt one ecosystem might not provide you with market-leading features in every area but may be easier to manage and optimise.

A good example of this is a boutique retailer looking at their Wi-Fi, LAN and SD-WAN needs. A best-of-breed approach could provide them with advanced features from multiple vendors. However, they would miss out on a single management plane and the ability to reduce the number of devices on-site while a single device may be able to fulfil the entire network's requirements.

Ultimately, your decisions should be driven by your business needs rather than the technology type.



SD-WAN myths and realities

SD-WAN does:

- Enable better value from your network
- Increase site resiliency and reduce business risk
- Improve user experience for SaaS access
- Reduce complexity and improve repeatability (lowering operational overhead)

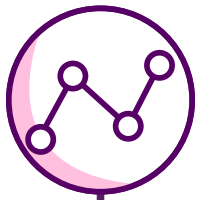
SD-WAN does not:

- Inherently save you carriage costs
- Remove the need for MPLS
- Fix underlying WAN issues



Making the transition

At Telstra, we have sold nearly 7,000 managed SD-WAN devices for our customers around the world. Here are some of our suggested best practices for migrating onto your SD-WAN network based on our experience in network migrations at scale.



Establish benchmarks

Understanding your current network status enables you to measure success as you transition over to SD-WAN.

Begin by measuring user experience for all the end user use cases, starting with your priority applications running in public clouds such as AWS and Azure, and business critical SaaS apps like Office 365, Salesforce and Workday. Don't forget VoIP, video and collaboration tools like WebEx and Zoom.

Use the performance of these apps and services perform over your current MPLS network as a baseline. Metrics you may want to consider include transaction performance, response time, availability, and network latency, packet loss and jitter statistics⁹.



Plan the migration

Robust migration plans are essential to avoid costly and time-consuming fixes once the rollout begins. A good plan will help you:

- Ensure there are no disruptions to the existing network performance.
- Determine processes to support your operations when half your sites are on SD-WAN and the others are not.
- Create a tight interconnect between security and network teams (if applicable), and avoid having to rework network design choices if they fall foul of organisational security policies.
- Identify the most important apps to keep up at all costs (for example, your point of sale or CRM).
- Plan your carriage requirements ahead of time so you aren't waiting to build new connectivity such as fibre links.



Pilot then stagger the rollout

Pilot the solution to finalise your design before rolling out incrementally to the broader network. This way you can confirm applications work correctly over the proposed solution.

Continue measuring performance against your key metrics (see above) at each site so you can make adjustments early on.

If you are considering self-managing your SD-WAN network after deployment, you will need to be deeply involved in the rollout to understand the security policies, traffic routing and site requirements and features.

⁹ Henthorn-Iwane, A. and Henthorn-Iwane, A., 2020. Visibility For SD-WAN Deployment Best Practices. [online] Internet and Cloud Intelligence Blog | ThousandEyes. Available at: <<https://blog.thousandeyes.com/visibility-drives-sd-wan-deployment-best-practices/>> [Accessed 28 July 2020].



Lessons learnt from SD-WAN migrations



Understand the complexity

Be prepared for upfront work to get SD-WAN right and be aware of ongoing needs.



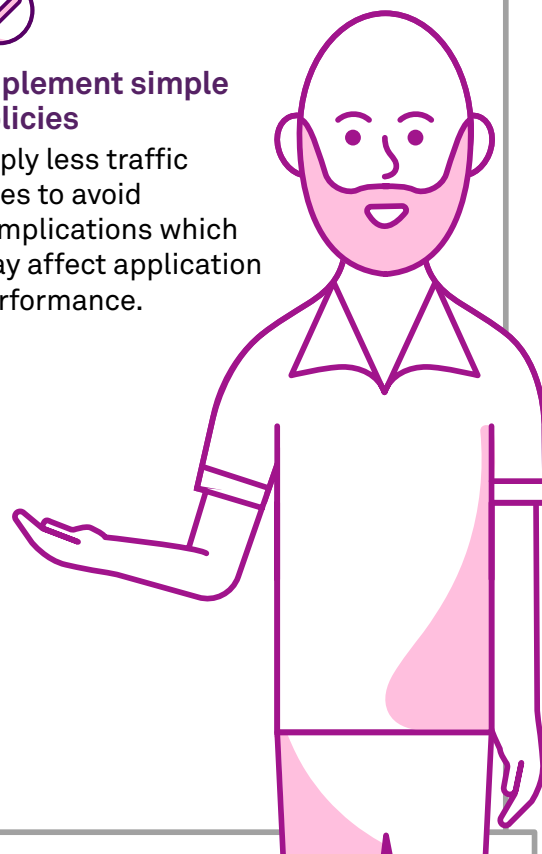
Seek consistency over snowflakes

Be consistent and use limited templates rather than deploying bespoke sites.



Implement simple policies

Apply less traffic rules to avoid complications which may affect application performance.



Decouple security tools from hardware choices

Be prepared for upfront work to get SD-WAN right and be aware of ongoing needs.



Think whole-of-business

Use the SD-WAN transition opportunity to meet current and future needs.

ROI beyond cost savings:
Build broader business cases beyond cost savings and focus on prioritising your 'must-haves' vs 'could-haves'.



1. Understand the complexity

Simplicity is one of the key benefits of SD-WAN. IT teams can look forward to managing their networks through a graphical user interface, with centralised policy controls and automated traffic switching.

But it's a misconception that SD-WAN is easy to set up simply because it employs a software overlay.

Designing and deploying an optimised SD-WAN is a complex endeavour initially. Much of the work and resources required for SD-WAN deployments are front-loaded to get the design right and avoid problems occurring during roll out and operation.

The ongoing management of multiple connectivity contracts, SD-WAN devices, WAN optimisation, reconfigurations, and monitoring can also impose a significant burden on IT teams.



2. Seek consistency over snowflakes

Be consistent and limit the number of templates you use to deliver the benefits of control and change management you can achieve with SD-WAN. Bespoke sites can result in traditional routing issues requiring individual changes per site.

Designing and deploying unique WAN technology at every site can cause more management and deployment overheads, negating the savings from right-sizing the WAN for each individual use case.



3. Implement simple policies

SD-WAN control and orchestration tools make it straightforward to write policies that would be highly complex in a traditional WAN. For example, network managers can label traffic from office collaboration apps as “high priority” to ensure adequate performance levels. Network managers can clearly see which links are carrying what applications, and a variety of per-user application usage metrics.

However, as tempting as it is to explore the full potential of this flexibility, the more rules you apply, the more complicated management becomes and the more likely you will experience performance dips. We advise our customers to use rules that are appropriate to their business needs rather than trying to define every application flow and edge case.



4. Decouple security tools from hardware choices

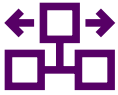
SD-WAN devices in market each have their strengths and there is no ‘one box to rule them all’. Their capabilities are influenced by their origins. For example, most devices are either firewalls supplemented with SD-WAN capabilities or SD-WAN devices with firewalls added on. The former will be better at security functions, while the latter will have more routing/SD-WAN features and may be easier to manage.

If securing your internet breakouts is your primary security concern, you can provision cloud-based solutions separately. By decoupling the SD-WAN vendor decision from the security vendor decision you can choose the SD-WAN capabilities best suited to your business rather than compromising in pursuit of one all-rounder CPE box.

The SD-WAN platform is so flexible, you can paint yourself into a corner fast in terms of SLAs. Typically, you’d assign routes to certain traffic, but SD-WAN applies SLAs at the application level. If you put in place an SLA that says you’ll tolerate 1% of loss on voice over IP, you might find the SLA is too sensitive and the voice packets change transports 80 times per day, hurting the production environment and forcing the overall implementation to fail.¹¹

¹⁰Coevolve. 2020. SD-WAN Technical Architectural And Design Considerations. [online] Available at: <<https://www.coevolve.com/sd-wan/technical-considerations/>> [Accessed 22 July 2020].

¹¹Gittlen, S., 2020. SD-WAN: The Inside Scoop From Real-World Deployments. [online] Network World. Available at: <<https://www.networkworld.com/article/3316568/sd-wan-the-inside-scoop-from-real-world-deployments.html>> [Accessed 28 July 2020].



5. Create a broader business case for SD-WAN investment

When it comes to building the business case for SD-WAN investments, there are two learnings from our experience of working with our partners and customers.

As previously stated, IT leaders should not view SD-WAN as a silver bullet for reducing networking costs. A significant decrease in overall cost might raise questions about support staff expertise and service-level agreements (SLAs).

Instead, IT leaders can achieve broader executive buy-in by tying the investment to broader projects. These can be technical — for example, SD-WAN enabling an organisation's migration to public cloud — or based on delivering a better quality of experience to staff or customers.

Secondly, IT teams can ensure SD-WAN costs do not blow out by focusing on essential requirements rather than an extensive wish list of features. For example, is it necessary to effect changes to your network within 12 hours or is a lower SLA acceptable?

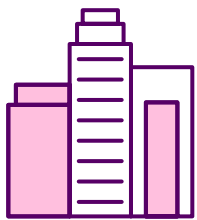
Distinguishing what is essential to your business and what is simply nice-to-have will help reduce complexity and cost to the business and help build a strong business case for the investment.



6. Take a whole-of-business approach

Common triggers for organisations to consider SD-WAN include the end-of-life of their current WAN equipment, such as a router, and the need for a network refresh.

Rather than simply solving the issue with a new router or increased capacity, IT leaders can use these triggers to undertake a whole-of-business approach to identify current and future needs. This shift in mindset can set up organisations for success even as business demands change, as global architecture firm Woods Bagot can attest (see case study).



**Woods Bagot:
Making virtual design
collaboration easy and
scalable with a global,
agile network**



Woods Bagot is an architectural firm with over 1,000 people working across 17 major cities in Australia, Asia, Europe, Middle East and North America. They use a global studio model with teams collaborating across borders and using technology to share design intelligence.



Challenge

Facing increasing demand for its award-winning services and in response to business growth, Woods Bagot wanted to explore how they could further diversify their networks to increase resilience, optimise network routing for more cost efficiency, and enable greater agility when setting up or turning off site connections.

Not having a large in-house IT and network team meant Woods Bagot required a partner who could provide ongoing management, support, and service resolution for their network.

- Growing global bandwidth demand placed on the network
- Fast business growth with the need to quickly provision or turn off sites
- Small internal IT team required ongoing support to continuously derive optimum value from their network
- Enabling the global workforce of up to 1000 people to work remotely without compromising the quality of services



Solution

Telstra partnered with Woods Bagot to design and implemented a Global Managed SD-WAN (Cisco Meraki MX SD-WAN) and Managed Wi-Fi solution, with hybrid WAN access via Telstra's Global Internet Direct and Global IPVPN.

The Telstra Global Managed SD-WAN solution helps Woods Bagot derive all the benefits of a diverse, secure and agile network so its teams can collaborate efficiently around the world.

The managed solution provides Woods Bagot with a single point of contact for its network, proactive monitoring and alarming of devices and network visibility through best-in-class portals. The internal IT team can work collaboratively with Telstra to optimise application performance and intervene at a degraded site before the link goes down.

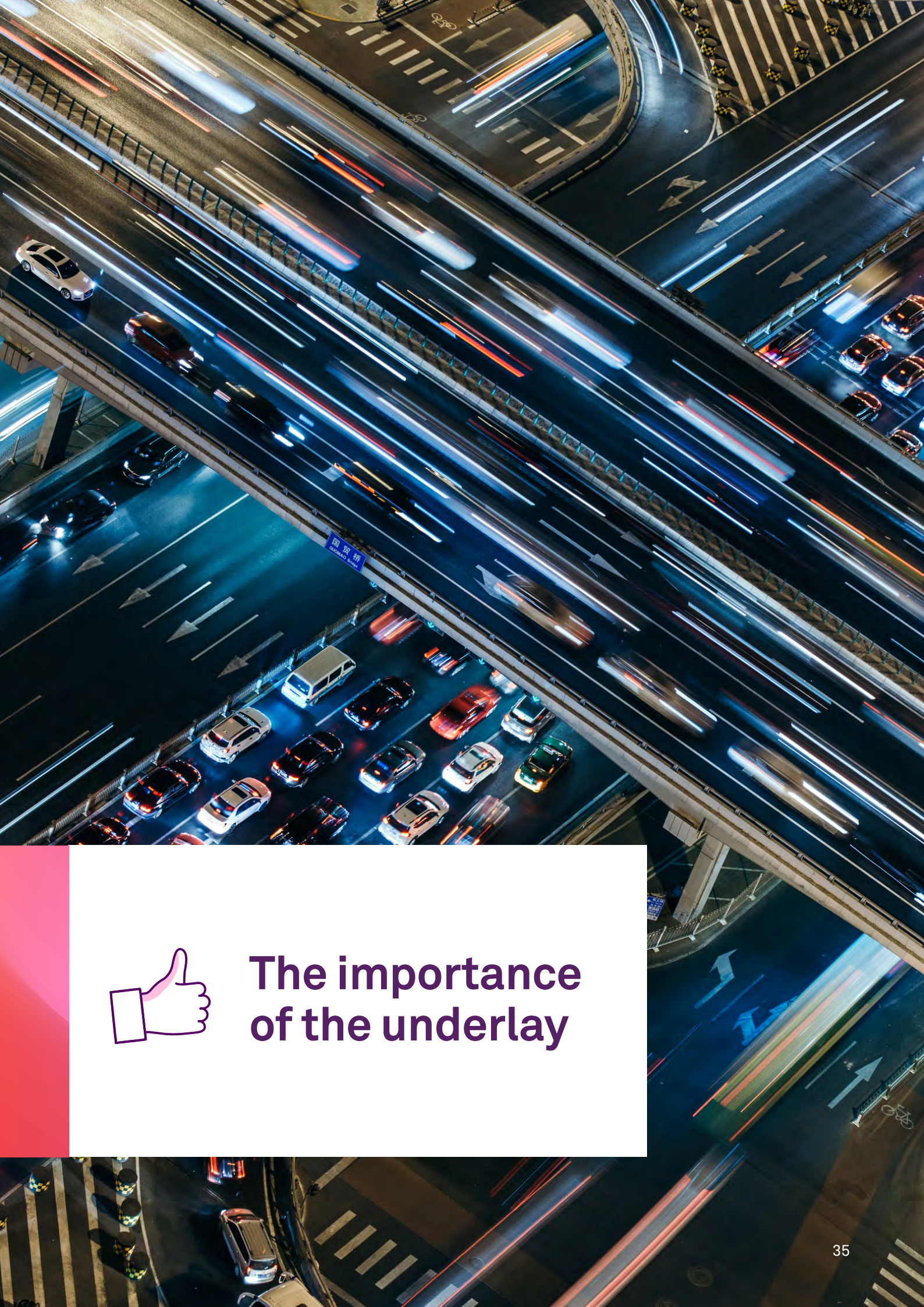
Telstra's Managed Network Operation Centre manages multiple layers of complexity in the SD-WAN technology, minimising risk to the business through faster resolution times.



In 2020, at the outbreak of the global coronavirus pandemic, Woods Bagot's global managed SD-WAN network was the backbone to the firm's swift response, allowing the business to continue operating without interruption. The robustness of the solution allowed the firm to continue the collaboration essential to innovative design, when COVID-19 kept everyone at home.

"The deployment through Telstra has been seamless. Now, I can easily log into the Meraki dashboard to see my network and quickly pinpoint any issues. If there's an issue, I know there's a dedicated number to call within Telstra and they'll handle the incident to resolution. This takes the strain off my IT team to manage the network so they can focus on other strategic projects. The end user experience has increased dramatically ... it just works."

Tom Leyden
Global Leader of IT
Woods Bagot



The importance of the underlay

Excitement about SD-WAN tends to focus on the overlay because of what it enables network managers to do. The decoupling of transport from the control plane sees core functions, such as packet routing, quality of service and route or packet policy enforcement, move from the underlay to the overlay. The underlay simply provides IP connectivity.

However, the overall performance depends on the ability of the underlay network to do its job.



Right-sizing bandwidth

Today's distributed computing model poses other considerations around WAN connectivity. Many companies have shifted their applications and data away from on-premises data centres to private or public clouds.

Your SD-WAN underlay network must be able to accommodate these data flows. WAN selection and bandwidth sizing must be reworked to squeeze the most out of the SD-WAN. This means existing WAN links will need to be right-sized for bandwidth, latency and resiliency.



Redundant, resilient options

The resilience and performance of the underlying network is critical. A single link network with SD-WAN overlay will remain a precarious proposition for businesses because outages on the underlay network will result in outages on the overlay network. Similarly, deploying SD-WAN on a consumer-grade internet link will not deliver the business benefits.

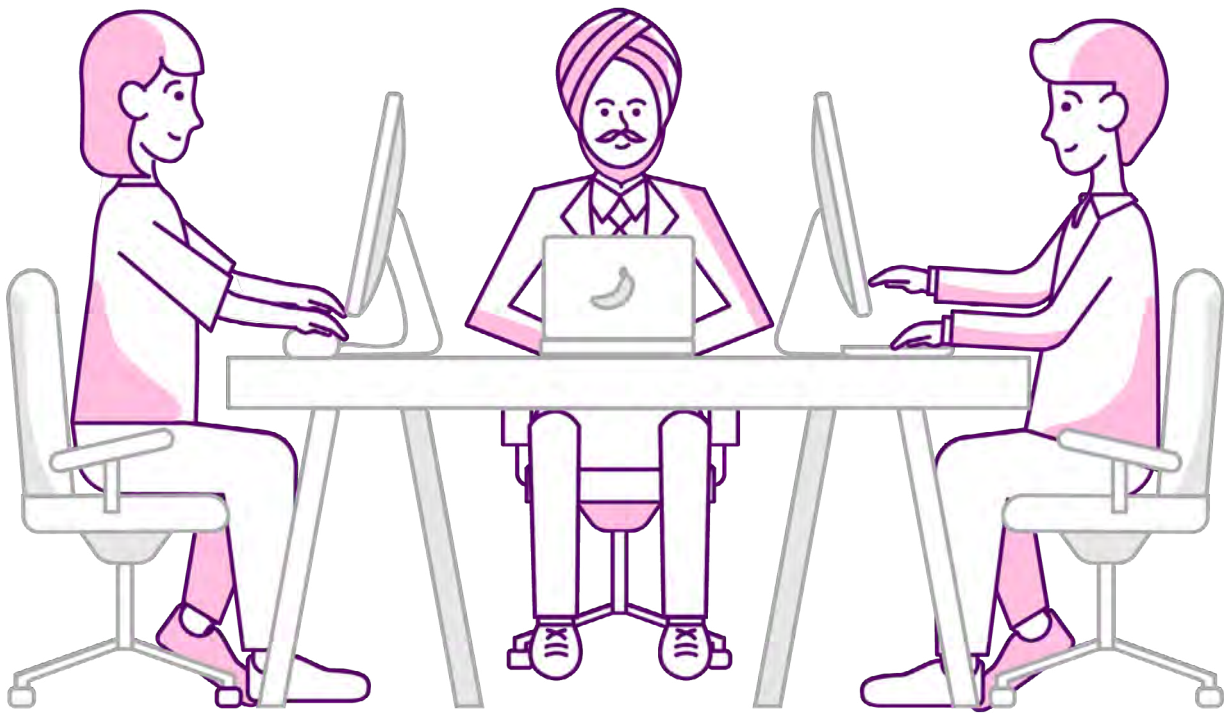
A well-designed underlay network will leverage multiple redundancies to ensure high availability. The choice of network routes will also influence performance, making it vital to select vendors with network capabilities to suit your organisation's needs.



Think mobile too

Your underlay networks can use more than just fixed networks. Network architects can supplement fixed MPLS, Layer 2 and internet links with high speed mobile connectivity via 4G LTE (and 5G as vendors release CPEs to support the next-generation mobile standard).

Mobile networks provide useful back up options that can help guarantee last mile diversity (something that is challenging in a multi-provider WAN solution) to increase site availability. They also enable organisations to serve sites where fixed networks may not be present or sufficiently performant.



How ALDI uses mobile networks in SD-WAN

ALDI is an example of an organisation using mobile networks as a critical part of its SD-WAN solution. Telstra helped ALDI implement a Managed SD-WAN solution which combined wired and wireless networks for triple redundancy and to support an enhanced customer experiences at checkout. ALDI was also able to deploy network services to new sites faster with SD-WAN incorporating Telstra's mobile networks.



Not all internet services are created equal

Some internet services, particularly consumer-grade and some lower-end business-grade services, are shared by other customers. Shared capacity means a spike in traffic may affect your application performance.

If the performance of your internet connectivity is important to you, consider using uncontended services. Uncontended services provide dedicated capacity for your needs, helping to ensure optimal performance at all times.



Catholic Education WA: How SD-WAN and the right connectivity enable digital transformation at scale

Catholic Education WA (CEWA) had a vision to provide its students, staff and communities with a world-class digital platform.

To achieve this goal, CEWA implemented the “LEADing Lights” digital transformation initiative - a single digital ecosystem for all CEWA schools, early care centres and central and regional offices. It aims to create seamless communication, collaboration, simplify administration and share analytics through a single, unified platform.



Solution

To achieve coverage across all schools within the CEWA network, Telstra deployed Government-wide IP (GWIP) fibre services and Software-Defined Wide Area Networking (SD-WAN) for better bandwidth efficiency and application performance.

In order to support the increased demand on CEWA's network, Telstra used Telstra Internet Direct (TID) to create a direct, uncontended connection to the internet, with guaranteed bandwidth around the clock. Bandwidth upgrades to all schools also ensure that each department now experiences optimal speeds. A Managed Data Network (MON) streamlined the management of network equipment and ensures the network is ready if CEWA decides to expand or upgrade in the future .



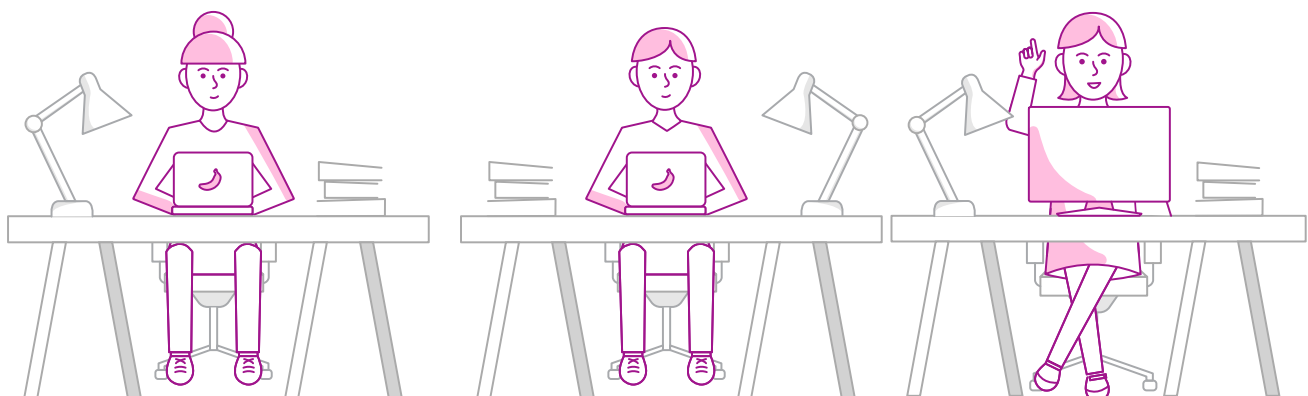
Outcomes

LEADing Lights has been rolled out across all schools, early care centres and central offices, and is helping teachers, administrative staff, students and parents re-imagine learning experiences and accelerate administrative and school processes.

A ten-fold lift in network capacity is enabling schools to on-board onto the platform seamlessly and to quickly deploy the applications they need. Telstra's technology and partnerships have empowered CEWA schools, early care centres and head offices to facilitate a more engaged and connected community.

“For us, reliable connectivity is everything... We now have a platform that provides my students and me with opportunities to collaborate in real-time.”

Kerry Dermietzel
Assistant Principal
Wanalirri Catholic School – Gibb River





The SD-WAN buyer's guide

There are a variety of sourcing options for organisations to choose from. Hardware vendors such as Cisco or VMWare can sell directly to businesses, and there are many managed and professional service providers who offer different capabilities.

Here are the top criteria for choosing your SD-WAN partner.



Experience

Choose a partner with deep experience in your type of organisation. Credentials in industry verticals are important because, for example, banks have very different set of requirements than hospitals, which in turn differ dramatically from retailers.

A partner's demonstrable track record of successfully delivering and deploying SD-WAN solutions in your sector can give you more confidence in their ability to deliver on your needs (as compared to specific expertise for a particular technology).

Selecting a partner with experience in SD-WAN technologies and the underlying connectivity will help ensure the underlay is optimised to support your new networking ambitions. See [Importance of the underlay](#) for more.



Security credentials

If you are taking SD-WAN as a managed service, does your provider have the right level of assurance and appropriate alarming tools? Have they conducted penetration testing and security audits on the platform? Does the provider have its own security team or leverage another vendor to offer the services?



Support and management capabilities

The best managed service providers can complement your internal capabilities throughout your SD-WAN journey. Consider partners who can help in the following ways:

- **Solution design:** Will they work with you to design the solution to budget, gather requirements to configure the solution, and set traffic profiles and quality of service policies across multiple carriage links? Those who use engineering-designed, standardised templates will offer a simplified deployment and the flexibility to scale your network up and down as needed.

- **Ongoing support & monitoring:** Will they perform maintenance, monitor for performance issues and troubleshoot system problems? Can they make configuration changes and update orchestration profiles, function and device templates?
- **Service desk:** Does your partner provide a service desk functionality along with online tools to process service requests quickly and efficiently?
- **Evolve your IT:** The better partners in the market will assist you with technology advice and provide a complete ICT embedded function to help drive better business outcomes through technology.



Visibility across the network

The overlay network might mask which link is down or degraded. This can result in too much time spent troubleshooting.

Combining SD-WAN visibility with monitoring the WAN links at the underlay level will provide more granular and relevant information when troubleshooting.

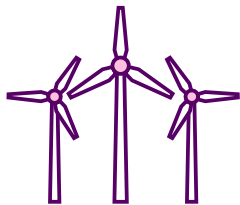
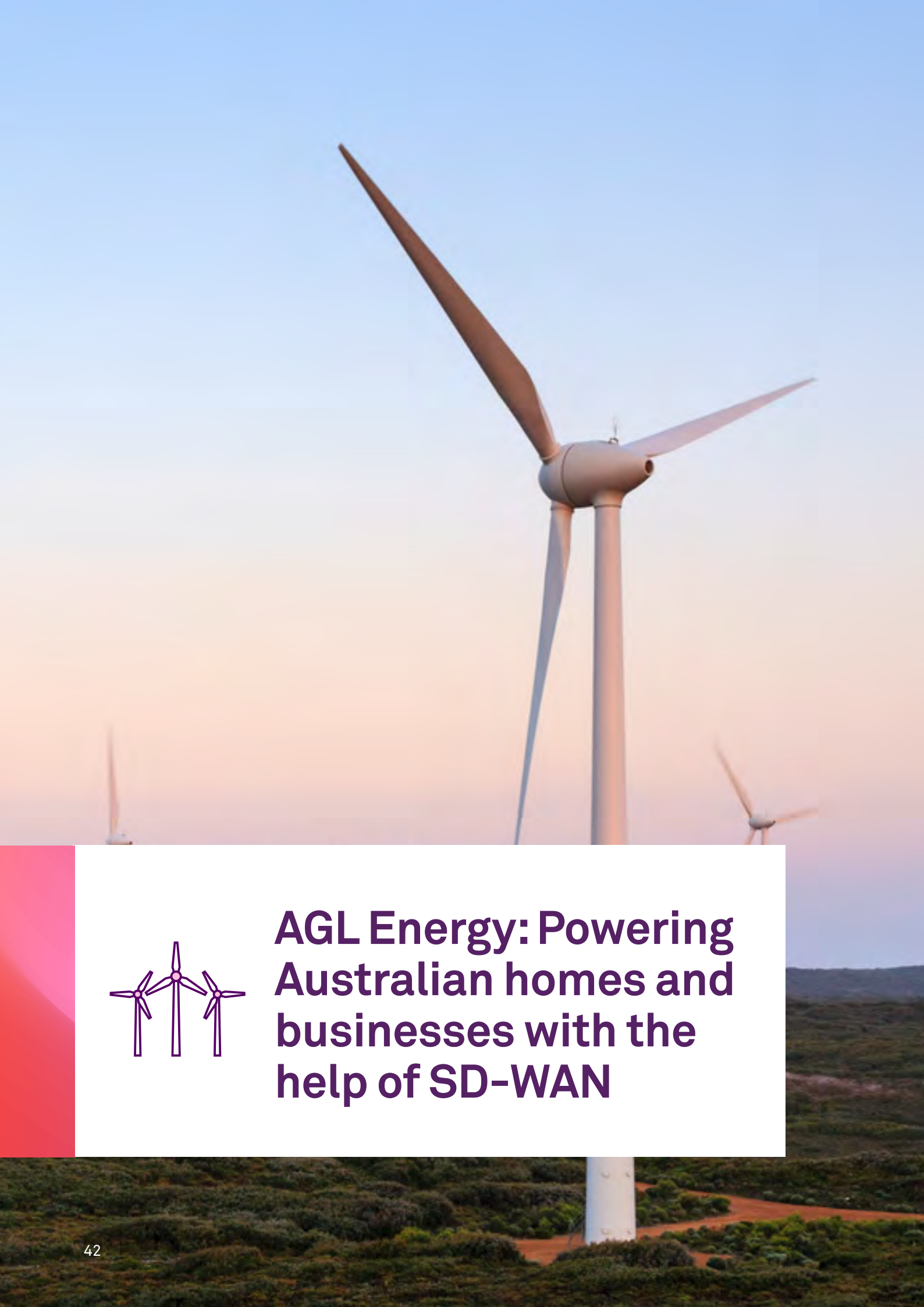
Look for partners who can offer centralised dashboards for visibility of all managed devices (including SD-WAN) while also giving you statistics on performance including throughputs and application usage.



Data analytics

Evaluate whether your partner provides you with the raw data or analytics to inform management decisions.

For example, knowing whether 150mb went to a certain application is not useful on its own. When you have insights such as bandwidth utilisation trends on a site basis you can determine whether the network is working well and plan decisions around capacity provisioning. If there is a problem, you can judge whether it's likely to be a one-off or a longer-term issue.



AGL Energy: Powering Australian homes and businesses with the help of SD-WAN

AGL Energy, a leading Australia integrated energy company, was experiencing increased demand on their MPLS network after moving to SaaS-delivered applications and migrating from ISDN to SIP. The network was also becoming expensive to manage as internet traffic was forced through their data centre rather than a direct internet breakout. This, along with their ongoing migration from ISDN to SIP, forced AGL Energy to rethink its network strategy.



Solution

AGL Energy sought the advice of Telstra Purple's experts on how SD-WAN could deliver a better user experience for SaaS services while also meeting their requirements to drive cost out of the business.

Based on this engagement, AGL Energy selected Cisco SD-WAN on ISR-4ks delivered through Telstra's Integrated Operations Management Product (IOM). IOM offers improved visibility of AGLs entire network (WAN, LAN and WLAN), while also giving AGL Energy direct access to a dedicated team of Level-3 experts who run their entire network.



Outcomes

The managed SD-WAN solution has been successfully rolled-out to the majority of AGLs key sites, delivered and managed through Telstra's IOM platform. Phase 2 of the rollout involves migrating the rest of AGLs domestic network into their SD-WAN overlay.

The solution has delivered the benefits of SD-WAN including better site network resilience, consistency of application performance and minimised service disruption. AGL Energy now enjoys increased cost-efficiency and network management with the benefits of optimal performance and end-user experience.

- By choosing Telstra IOM, AGL Energy gets the certainty of a single Assurance Network Operations Centre from Telstra to run WAN, LAN and WLAN networks via IOM with a single partner to manage their network end-to-end.
- Telstra IOM provides AGL Energy with proactive alarming and comprehensive reporting – a single pane of glass that helps them quickly detect, diagnose and resolve multi-vendor network performance issues.

“AGL is all about putting our customers first; SD-WAN allows AGL to deliver improved experience to our “internal” customers. Partnering with Telstra and Cisco has been instrumental in the success of our SD-WAN implementation, ensuring the successful design, delivery and operations. And more importantly the seamless transition of services from traditional connected networks to SD-WAN services”

**Ming Teh, Platform Owner,
Cloud & Infrastructure
AGL Energy**



Telstra for SD-WAN



The Telstra network platform unites applications, processes and technologies to accelerate performance, so you can deliver the best experience to your staff and customers.



Unrivalled expertise

Together with our Telstra-accredited Partners, we have the expertise and capabilities to help meet your SD-WAN requirements. Our expert consultants, who possess an impressive list of internationally recognised certifications and accreditations, can help you to integrate and fine tune your SD-WAN so it fits your business needs.

Ongoing access to expert design and management services will help free your staff from daily network operational tasks so they can focus on projects that deliver strategic business value.



Our partnerships with leading vendors

We work closely with major technology vendors like Cisco and VMWare (VeloCloud) to understand their roadmaps and request new features. Our vendor-neutral approach gives us a broad view of the latest SD-WAN and security technologies, and helps to ensure we deliver the right solution for your business.



Integrated Operations Management

SD-WAN, together with Integrated Operations Management from Telstra enables you to get visibility and control of your network via a complete, integrated view of both overlay and underlay. This gives you the benefit of sharing Telstra's view of network data, so you can run reports and extract data for graphical analysis.



Reliable, high quality performance through the Telstra network

Our extensive, high-quality services are underpinned by a secure and reliable network infrastructure. You'll have access to Australia's largest internet backbone with more access points than any other provider. Our network spans 225,000 kms of fibre plus 4G mobile connectivity to 98% of the population and global reach to 2,000 PoPs in over 200 countries.

With our 5G/LTE networks, we can help you rapidly deploy new sites and maintain business continuity, giving you the confidence to seize new opportunities and keep delivering for your customers and your teams.



Ready to chat about SD-WAN or would love a demo?

Request call-back

