HYBRID NETWORKS OFFER THE PROMISE OF GREATER FLEXIBILITY AND CAPACITY, IMPROVED APPLICATION PERFORMANCE AND CHEAPER PRICE POINTS THAN TRADITIONAL WIDE AREA NETWORKS (WAN) THROUGH THE DEPLOYMENT OF A COMBINATION OF TRANSPORT TECHNOLOGIES. HOWEVER THEY DO ADD COMPLEXITY AND ORGANISATIONS NEED TO CAREFULLY ASSESS THEIR REQUIREMENTS IN ORDER TO DERIVE THE MAXIMUM BENEFIT FROM HYBRID NETWORK DEPLOYMENTS.

The ability to separate WAN traffic and route it via multiple links and over the Internet has been available for many years. However it is only comparatively recently that organisations have sought to leverage full hybrid network solutions as part of their core WAN delivery model. This enables the separation and routing of application traffic in an agile, flexible and cost-effective manner. A hybrid network is a network where every site within your company is connected both to the Internet and the private WAN (typically MPLS- Multi Protocol Label Switching) in some way. Each and every application and the traffic that is generated can be designed to traverse either the Internet or the private WAN on a case-by-case basis.
THE RISE OF THE HYBRID NETWORK MODEL

1 A TREND TOWARDS HYBRID NETWORKS
When assessing why so many organisations are seeking to leverage hybrid networks it is important to consider the market forces that are influencing this change in direction. These include:

1.1 INCREASING BANDWIDTH DEMAND
With increased reliance on technology, all organisations are experiencing exponential growth in network data volumes. Global predictions estimate that public network capacity is growing at a compound rate of 24% annually. Corporate data growth is understood to be growing at a similar rate.

1.2 RISE IN CLOUD APPLICATIONS AND SERVICES USE
More applications and workloads are heading to the cloud. The cloud is the fastest growing segment of enterprise software, and ZK Research predicts that cloud services will grow from $46 billion globally in 2014 to more than $116 billion in 2019. The surge in cloud traffic is driving significantly different traffic patterns over enterprise WANs. Traditional WAN designs carry this traffic to a central data centre before routing it out to the cloud provider, using up internal capacity on external traffic.

1.3 NEED FOR GREATER USER MOBILITY AND COLLABORATION
The rise in mobile workers and virtual employees has made collaboration technologies including unified communications and video conferencing business critical. Even advances in mobile technologies, and home Internet availability have modified the ways that staff can and expect to be able to communicate and work, with an on-going drive to work at anytime from anywhere. The ZK Research 2015 Unified Communications and Collaboration Study indicates that 89% of organisations have at least partially deployed unified communications. The increasing adoption of multimedia applications, such as voice and video, is putting a strain on today's WANs and creating additional entry points due to user location.

1.4 SPEED OF DEPLOYMENT
Speed of private WAN service deployment is becoming more of a concern as the demand for flexibility and greater agility in provisioning new sites and upgrades increases. Use and delivery of the Internet enables "quicker to deliver" connectivity to new locations or upgrades of existing connections in place of conventional enterprise WAN services.

1.5 NEED FOR LESS HUMAN ERROR
The enterprise WAN can be difficult to optimise. Network managers are often found needing to tweak and tune WAN services. The volume and speed of the changes combined with occasionally poor documentation and manual processes can lead to human error and unnecessary network downtime.

1.6 GREATER NEED FOR COST EFFICIENCIES
Typical utilisation of a private WAN service is between 30% and 40%, with very few companies actually achieving utilisation of over 50% on a regular basis. However bursts of traffic can be handled poorly with unexpected surges in performance degrading the performance for everyone on that network. Routing non-latency/throughput dependent data via lower cost Internet connectivity enables lower bandwidth private WAN services to be provisioned, whilst protecting the latency on more critical time sensitive traffic. Internet connectivity is also a more cost effective solution to be used for resilience, keeping reliability up without the cost of expensive duplicate private WAN services.

2 A TYPICAL HYBRID NETWORK MODEL
As depicted in Figure 1, a hybrid network has a number of sites all of which are connected to the private WAN and the Internet in some way. Each of these connections can be leveraged to provide efficient and flexible connectivity to all private and public connected sites required by an organisation. From Figure 1, it can be seen that a site in a hybrid network is able to connect to:

- MPLS connected resources (other hybrid network sites, corporate data centres and private cloud services);
- directly via its MPLS connection;
- or indirectly via a VPN (Virtual Private Network) over the Internet, the "Cloud based VPN gateway" and the MPLS network;
- or indirectly via a VPN to the “Cloud based Internet breakout” and a VPN from there to the Internet connection to the data centre; and
- the security of private WAN services are accredited end-to-end in accordance with your organisation’s information assurance policy.

- Internet connected resources (remote workers and small sites, public sites, public cloud services);
- via an Internet VPN to a “cloud based Internet breakout”;
- or via MPLS network and a “cloud based Internet breakout”; and
- boundary protection is utilised for security rather than end-to-end assurance.
3 THE BENEFITS OF LEVERAGING HYBRID NETWORK SOLUTIONS

By having a broad range of connectivity options hybrid sites can benefit in the areas detailed below.

3.1 GREATER AGILITY

A traditional private WAN was based around predictable traffic flows from client/server computing and best effort Internet traffic. A hybrid network is much more agile and can accommodate in a dynamic way the increased use of cloud applications, collaboration applications, more flexible workers, that all lead to the increased use of network bandwidth.

3.2 IMPROVED SERVICE RELIABILITY

In the event of service failures within the core network service or within end-point services, active/active routing can be leveraged within the hybrid network to reach and access services in a dynamic way. The organisation is no longer reliant on an active/passive configuration, which makes use of back-up services of the same bandwidth when the primary service fails. This configuration has historically struggled with the issue of knowing whether the back-up service is working effectively until there is an outage to invoke it. In the active/active routing model, all the lines are active and therefore live and monitored all the time. A further benefit is derived from the minimum to zero touch configuration changes needed directly on the infrastructure, thereby reducing the number of human change errors.

3.3 COST EFFICIENCIES IN SERVICE DELIVERY

By having active/active configurations on both services, the organisation is no longer paying for a back-up service that for the majority of the time is not used (whilst the primary service is working). An additional benefit may be derived from the fact that use of Internet connectivity is also considerably cheaper than that for private WAN services.

3.4 EFFICIENT DELIVERY SECURE INTERNET CONNECTIVITY

Significant savings can be achieved and performance improved by leveraging gateways nearer to the hybrid sites and by leveraging cloud based outbound and inbound Internet gateways rather than deploying and routing Internet traffic security infrastructure via data centres.

4 DELIVERY PITFALLS AND CHALLENGES OF HYBRID NETWORK SOLUTIONS

As hybrid network solutions are by their nature significantly more complex, it is essential to appreciate the delivery challenges that must be addressed before the organisation is able to leverage available market solutions. Key challenges and pitfalls that can occur are addressed in the following sections.

4.1 RELIANCE ON TRAFFIC MANAGEMENT

To effectively utilise hybrid solutions and ensure consistent delivery of optimally performing services it is essential that the network traffic and its profile is understood, prioritised and routed correctly. Application traffic behaviour patterns and associated dependencies need to be fully assessed before appropriate decisions are made regarding prioritisation (against other network traffic), queuing and routing. An incorrect decision for a single application or service can result in adverse service delivery performance affecting all applications.

4.2 ROUTING COMPLEXITY

Delivering a robust solution that maintains service when components of the overall
architecture fail, requires defining traffic routing that is aligned to both the organisation’s traffic management rules and existing service availability. This requires in depth definition, implementation and testing of routing across the entire network.

4.3 RELIABILITY AND PERFORMANCE OF INTERNET CONNECTIVITY

The quality, reliability and performance of Internet services can vary greatly, unlike the private WAN (MPLS) services that behave predictably, it is thus essential that “best of breed” services are procured and verified/tested prior to deployment. Key considerations in selecting the right Internet services for a location are:

- last-mile delivery technology;
- inbound and outbound contention ratios/constraints;
- routing to Internet peering points; and
- latency and jitter to other key business locations.

4.4 RELIANCE ON SUPPLIERS

There are a broad range of criteria that need to be considered when procuring and implementing hybrid networks from suppliers. These will significantly influence the operating model required to deliver the optimum outcome for the organisation. Key considerations include:

- Capabilities, skills and knowledge in pro-actively managing traffic prioritisation and routing. Suppliers need to demonstrate they have the technical capabilities and can network manage the service pro-actively.
- Contracts need to incentivise suppliers to provide the service in line with the requirements, both during transition and thereafter. On-going contract management and governance needs to be robust enough to enforce correct supplier behaviours.
- Where the organisation has taken the decision to control traffic management in-house it is essential that rigorous processes are in place to evaluate and manage all network traffic.
- It is best to minimise the number of suppliers within the vendor ecosystem supporting the organisation’s telecommunications infrastructure environment. This helps to ensure that each supplier takes complete responsibility and accountability for delivering full network optimisation and service effectiveness.

5 VENDOR INNOVATION AROUND HYBRID NETWORK SOLUTIONS

Along with the large traditional managed telecommunications services providers, there’s been a lot of recent vendor activity in and around the enterprise WAN. This has been in response to the trend in changing business requirements. Several start-ups have emerged that offer variants of SD-WAN (Software Defined WAN) including but not limited to Glue Networks, Viptela, CloudGenix and Velocloud which reflects the increase in demand for hybrid networks.

In addition there has been increased activity in the more traditional technology suppliers updating or issuing new products in this area. These include:

- Cisco announcing the launch of new hardware and software in conjunction with their IWAN – Intelligent WAN architecture, including a revamp of their path selection software (PFR);
- Ipanema developing new applications and tool sets to help businesses guarantee their application performance across hybrid networks to increase IT efficiency and improve IT agility;
- Silver Peak launching its Unity software architecture, which is an IPSec-based SD-WAN overlay which runs over the Internet and uses “cloud intelligence” to feed information back into the forwarding decision; and
- Nuage Networks extending its data centre overlay solution to the WAN.

6 SOURCING CONSIDERATIONS FOR HYBRID NETWORK SOLUTIONS

When looking to source a hybrid network it is essential that your organisation considers the following points:

- the technical architecture being proposed, which should have proven traffic management tools, and full connectivity service failover between the Internet and private WAN;
- the target operating model and the contract governance model must include a robust, clearly defined approach for 3rd party ISP management; and
- a clear approach to SLAs and service credits for network performance and network performance reporting. This requires greater visibility of the underlying management information and service delivery data collated for the hybrid WAN solution than is necessary for traditional WANs. The ability to source Internet connectivity independently of the managed service provider if required to keep the provisioning timelines for new connectivity services as short as possible.

7 TRANSITION MANAGEMENT FOR HYBRID NETWORKING

When looking to transition onto a hybrid network it is essential that your organisation considers the following key implications. There needs to be:
8 CONCLUSION
The use of cloud applications and bandwidth intensive applications has been on the increase for a number of years and continues to increase exponentially. Likewise, the availability of reliable Internet connectivity has become more widespread. Traditional WAN designs built around a private MPLS network with the use of the Internet restricted to low priority traffic is no longer suitable in the face of this rapid growth and changing requirements in bandwidth demand. As a result there has been a shift in the market towards hybrid networks underpinned by cutting edge vendor technology such as SD-WAN, to provide increased agility at a contained cost.

The supplier landscape has evolved rapidly in response to this market shift with both the new and existing suppliers developing new products and solutions in order to meet the increasing business demands. As a result, the supplier landscape remains a little confusing as the optimal solution definition, and the extent of vendor innovation around SD-WAN and its standardisation is still reaching a level of maturity. It is more important than ever to fully define your network requirements when looking to source such a solution and have a resultant tight contract in place. This contract should be with the best placed supplier(s) for those requirements, allowing for flexibility and agility of your network traffic and the continually increasing importance your business will place on the network. Effective on-going supplier relationship management and fully defined contract governance is also critical in the long-term success of the hybrid networks deployment.

Hybrid networks can deliver huge business benefits over traditional WAN technologies. The success lies in sourcing the right supplier(s), drafting clear and comprehensive business requirements and having effective contract governance frameworks in place.

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