

# **A GUIDE TO ACHIEVING LAN-LIKE PERFORMANCE ON WANS**

A large, light gray graphic of a stylized letter 'A' is centered on the page. It consists of two thick, parallel lines that form the shape of the letter, with a slight curve at the top.

Wide area networks (WANs) are essential to the majority of businesses, connecting remote locations and individuals back to centralised IT resources. But as the network is expected to handle more bandwidth intensive applications such as voice and video it is essential to ensure the WAN usage is well managed, eliminating unwanted traffic and accelerating business content.

» **The majority of businesses deploy wide area networks (WANs) to connect the remote parts of the business back to centralised resources**

For most a private network is unaffordable so they rely on the virtual private networks across shared public infrastructure, predominantly the internet

» **Internet traffic continues to grow apace, doubling in volume and speed every two years**

The applications driving the growth such as video and voice communications are more bandwidth hungry

» **Achieving high performance across public networks is paramount for ensuring individuals and business processes are productive**

This requires getting access to priority bandwidth – which has a cost and making sure that employees are using the bandwidth productively

» **Unnecessary traffic needs to be accelerated**

This includes junk email and unproductive end-user activity on the internet but also ensuring that business applications running over the WAN are not too chatty

» **The “wanted” traffic needs to be accelerated**

Using compression, local caching, stream splitting and other techniques it is possible to accelerate “good” data to remote users and reduce the overall use of bandwidth

» **Don't try and do it all at once, address the fundamentals first**

Make sure the best affordable connections are in use, that they are secure and reliable, that the whole network is moving wanted data as quickly as possible and that employees are not wasting their time online.

### Conclusions

A high performance WAN is a key part of the foundations on which today's businesses are built. It enables flexible working, which increasingly carries an environmental message, underpins sound business processes and enables effective communications within organisations and with customers, partners and suppliers. Failure to address WAN performance issues will be to the detriment of most other areas of a business's activity.

## The Congested Internet

The commercial world has undergone a revolution in the last 15 years driven by the direct electronic connection of most businesses and many consumers via the internet. This revolution has changed the way various entities communicate with each other, allowed more flexible working practises and enabled the creation of whole new business models.

Such breakthroughs are not new. The development of the car in the early 20th Century can be said to have achieved all the same things, but that revolution created problems. The roads the car needed to move around became congested.

Employees, having been given the freedom to live further from work, now faced the frustration of commuting. Sales reps, able to extend their range further and wider also struggled with the increasing traffic, and the vans and trucks delivering goods could also become delayed by congestion. Still no one is seriously contemplating abandoning road traffic as the primary means of moving goods and people around. But there are ways to make it more efficient: road tolls, cutting non-essential journeys, car sharing and so on.

The internet is going through pretty much the same experience, but at a much faster pace. According to the American institute for Physics, traffic on the internet has doubled in volume and speed every two years since 1990. But behind these impressive growth rates there are problems with handling the volume of internet traffic and maintaining quality of service. In short, there is more congestion on the internet whilst at the same time it is becoming ever more important for business communications.

Few doubt that the adoption of the internet protocol (IP) as a global networking standard has been a good thing. It has allowed all sorts of applications to be IP enabled and make use of shared networks. As well as data traffic generated by computers, this now includes much voice and increasingly video and television traffic, both of which have to date largely run over other proprietary networks. Using a single standard allows the traffic to pass seamlessly from the public internet to private IP networks and for the data to be received on any suitable IP enabled device, be it a computer, television, telephone etc.

But such applications consume huge amounts of bandwidth and, although the capacity of the internet has at times seemed limitless, the problem will move beyond local bottlenecks to a jamming of all the main arteries if something is not done. Of course, more bandwidth can be added, but this has a cost, and investors will not want to lose their shirts again paying for ungraded infrastructure as they did in the late 1990s.

Private physical IP links connect the different parts of some businesses together, but this is even more expensive than adding shared bandwidth and is not practical for connecting the remotest parts of very large organisations. For example, the UK's National Health Service, despite spending many millions of pounds on its own IP backbone relies on broadband connections over public networks to link in most of its many small outposts.

Another possibility is that organisations and individuals can pay for priority time on the public network. But there is fierce debate about maintaining so called net-neutrality where all users and traffic are treated as equal. Whilst the debate goes on, arguably, the new is not neutral anyway. The creation of virtual private networks allows businesses to make use of secure tunnels through public networks: what goes through the tunnels and the priority given to such traffic by network operators is, well private. So network operators and the businesses they serve have had to start looking at the same sort of solutions that are being considered for road traffic. Preventing unwanted or unnecessary traffic (on the internet these are called packets) and making sure traffic is moving as fast as possible and that it is prioritised when necessary.

## Stopping Unwanted Traffic

Many a motorist would be indignant if it was suggested their journey was unnecessary, even if in many cases it is true. Fortunately consensus on the internet is easier to reach. All would agree that stopping the flow of junk email or spam, which is estimated by some to be greater than 90% of all email traffic, is a good thing.

This problem has been compounded in the last year or so by the growth in the number of image-spam messages, which are typically about three times the size of text based ones and the increasing propensity of users to send around pictures and files attached to emails.

Spam is also used to help propagate viruses and other unsafe content, another good reason to stop it, but today similar dangers are as likely to be encountered whilst surfing the web. Whilst employees might think that unlimited access to the web at work is a good thing, their managers increasingly do not and are seeking to control what employees can and can't do.

This is not just a security issue: for example employees streaming video from You Tube or using free internet telephony such as Skype consume bandwidth. This has a double impact on productivity - not just is an employee wasting time but they are wasting bandwidth that might otherwise be available to other business critical applications.

Applications that are essential to the business might be considered to be above the fray – not true- they too can be wasteful of bandwidth. Imagine if a salesman newly enabled to sell remotely by being given a company car was to reach an agreement with a customer – “hold on I will just drive back to the office and get a contract” – after returning with the contract – “hold on while I just drive back to the office and get a pen”. Of course this would not happen, but many businesses applications behave just like this, they have not been adapted for running across the internet; they are far too “chatty”. In the short term, if they cannot be adapted they can at least be made to run faster, but longer term such applications need to be modified or replaced.

### Accelerating wanted traffic

Having done all that is possible to get rid of the unwanted traffic the next challenge is to accelerate the good stuff. There are no speed cameras on the internet so the faster the better, especially for applications where latency is unacceptable like voice communications. There is much that can be done.

A lot of internet traffic is repetitive. A business might want all its employees to watch a new health and safety video, but if all employees in remote branches stream it from HQ then huge amounts of bandwidth are consumed. Such content is static and can be stored in a local cache at the remote office. When a new version is released it can be downloaded once for use many times. With the right products local cache management can be automated. Regularly used content is stored locally and only downloaded again when an update is detected at the original source. Cache management applies to internal content like the health and safety video and public content, for example software updates or public reports.

But not all content is static. What about a live video feed, say a US based CEO addressing offices in all global offices about a new acquisition? Here technology can still save bandwidth. For example, it is possible to send a single video feed to hubs in Europe and Asia; from there it is split and fed through to local offices; much bandwidth being saved in the process and providing better overall end user experience. Some traffic cannot be cached or split in this way.

One-to-one communications, be they voice and/or video will always require a real time connection and access to some high priority bandwidth. It is still possible to accelerate such traffic using data compression algorithms that allow more to be crammed into fewer packets of information before transmission. It is also important that effective algorithms are available before and after transmission (often referred to as codecs).

Of course compression can be applied to all traffic prior to transmission – all bandwidth saving is good. And there are other things that can help: making sure large email attachments are only transmitted once when addressed to multiple employees and blocking certain types of attachment which are unlikely to be work related, only downloading changes to data (deltas) when backing up computers at remote sites and moving large volumes of data around at off-peak times when there should be plenty of spare local bandwidth are examples.

### Networks are not built in a day

There is a lot to consider here and there is no single solution to these problems, so it is worth prioritising them. These days nearly all businesses are connected to the internet and therefore each other. The quality of that connection will vary and it's worth making sure, especially for remote users, be they small branches, home workers, that they are using the optimal affordable connectivity.

The immediate priority for any connected entity is to ensure it is secure. Of course this is about protecting the business's IT and data assets but it is also about ensuring that employees use the connection for intended purposes, so it is about productivity too. Security is at two levels, firstly ensuring a secure connection using a VPN and secondly to ensure that activity of the users themselves is secure. Productivity will also be impacted if the network connection fails, so secure connections are not enough, they need to remain available at all times. But if a stable secure network fails to perform well, it is still serving the business as it should.

It must also be remembered that whilst performance is the driving force, wasting bandwidth is also likely to have cost implications, both direct, such as the increasing price of high priority bandwidth and indirect, such as the loss of productivity caused by poorly performing networks and employees wasting time due to online distractions.

Once all these issues have been addressed the network manager probably deserves a well – earned break – waiting for the next bandwidth hungry application to come along and consume even more of that increasingly valuable bandwidth.