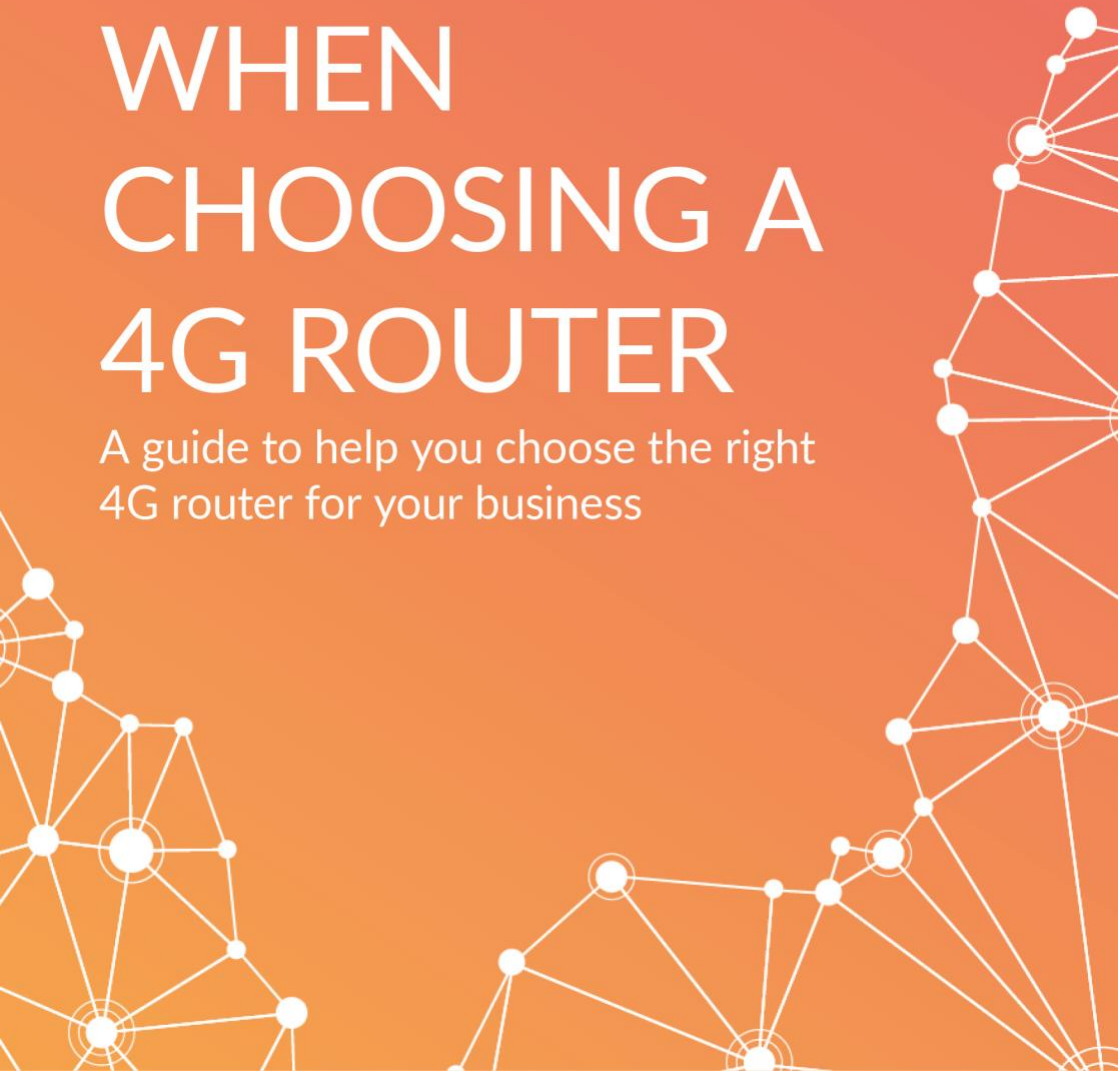
sas
Managed IT Services

# KEY FEATURES TO CONSIDER WHEN CHOOSING A 4G ROUTER

A guide to help you choose the right 4G router for your business



# Contents



# Choosing your hardware

One of the keys to great connectivity is great hardware. But with a plethora of choice on the market, how do you sort the good from the bad to make sure your 4G WAN connection is every bit as robust as you need it to be?

In this document, we build on the information we shared in our IT Managers Guide to 4G WAN in order to guide you through the process of evaluating and selecting the right hardware.

We'll discuss the key features that you should be considering when you come to choose a 4G router and answer the important questions we posed to you earlier in your journey to 4G WAN implementation.

- What is the SIM capacity?
- Does it support multiple SIMs?
- Does it support load balancing?
- Does it have a modular design (and do you need one)?
- What is the SIM capacity?
- Can it include other WAN interfaces?
- Can it act as a WiFi controller for
- larger installations with multiple WiFi access points?
- Does it support SIM failover?
- Does it support Power over Ethernet (PoE)?
- Does it offer reporting?
- Does it offer WiFi access?
- Can it prioritise by traffic type?
- Can it support bonding?

# Your SIMs

The number of SIMs you can install into your 4G router, together with the number of connections it supports, are crucial first steps in assessing your requirements.

Not all routers are built alike, so here are the key areas you should be looking at:

## Multi-SIM

The speed and reliability you'll need from your service will likely require more than one 4G connection.

To ensure that you're able to maximise performance, your 4G router will need to support Multi-SIM – where multiple SIM cards are installed into the router to form a bonded or load balanced connection.

## SIM capacity

The performance and throughput of a Multi-SIM router is ultimately limited by the number of simultaneous cellular connections it can support, which is usually referred to by the number of SIMs it can accommodate.

The fewer connections your data is flowing through, the less bandwidth you have and the more your performance can suffer.

However, you should also be aware of the difference between 'connections' and 'SIMs' – as once doesn't always relate to the other.

For example, a router may allow you to insert two SIMs – but may only use the first as a live connection and reserve the second for failover – meaning you can only use one connection at a time.

## How many connections should you use?

This all depends on your expected usage – some routers hold capacity for one or two SIMs, others hold up to six, while we ourselves have used up to 18 SIMs for heavy usage scenarios.

Managed Service Providers (MSP), such as SAS, will help you assess your usage scenarios and connectivity needs, ensuring your 4G WAN solution is built on the high-performing connectivity that you need.

# Your connections

Once you've established that your prospective routers can handle the number of SIMs you require for a stable connection, it's time to consider the connection itself.

Here, you need to think about the technology that's being used behind your connectivity and ensure your routers support the connection type you wish to implement.

# Cellular technology

Most 4G routers available today will support a version of 4G known as 'Category 4 LTE', which supports download speeds of up to 150Mbps.

Meanwhile, some manufacturers are rolling out support for 'Category 6 LTE', which doubles this maximum download speed to 300Mbps. How? By using two 'chunks' of the spectrum rather than one.

As Cat 6 LTE is still being rolled out by the Mobile Network Operators (MNOs), it isn't yet available everywhere – but choosing a router that supports this new technology will future-proof your investment and guarantee greater performance once universal coverage has been achieved.

# Connection type

Your connection type is an important consideration if you're looking, for example, to provide guest WiFi at your remote sites.

Some routers support access to the internet. Others can route traffic within a bonded tunnel back to a centralised hub for onward connection to your corporate network. There are also routers that can accommodate both of these connection types.

Top Tip

*Cat 6 LTE is known by a number of interchangeable terms, so keep an eye out for 'LTE-Advanced', 'LTE-A' and '4G+' when considering your choices.*

# Bonding

Routers that support bonding can combine the traffic streams from multiple SIMs into a single connection over a secure tunnel - giving you a high speed, incredibly reliable and secure connection to your company network.

This is an essential feature if you're planning to connect sites with multiple users to your company networks, especially if you require a stable and highly reliable connection for sensitive applications.

## Load balancing

Routers that support load balancing can spread the usage of separate users, sessions and applications across several SIMs – providing great flexibility and performance when used for internet access.

However, it's important to keep in mind that data can only be transferred as fast as the particular SIM it's using can achieve.

If you're planning to run sensitive applications over a load balanced connection - this is not recommended. Should the connection in use drop out, reconnection isn't instant and the session will drop.

Need to find out more about bonding and load balancing? Take a look back at our IT Manager's Guide to 4G WAN.

# Your network performance

Selecting a router that maximises your network performance is crucial. Without it, you could leave yourself open to extensive downtime and poorly performing business-critical applications.

## SIM failover

Typically found in single-connection routers, SIM failover lets you insert two SIMs – one active, and one passive.

This means that, if you lose your primary connection, traffic will failover to your secondary SIM. Using SIMs from different carriers will ensure that the connections are resilient.

SIM failover also has the added benefit of cost control; with it, you can set thresholds on either SIM so when the usage climbs too high the router will automatically failover to your backup SIM, if your router supports this.

## Prioritisation by traffic type

Some 4G routers can be configured to optimise the performance of your network by prioritising traffic based on the type of application.

Using this function, you can route traffic over different connections according to their real-time performance, such as latency, as well as dictate the level of bandwidth different applications have based on their importance.

This is particularly important when you're using performance-sensitive applications, such as Citrix on-site as you're likely to suffer with poor performance and drop-outs if you don't prioritise traffic.

## Data caching

Some 4G routers will allow you to cache data, meaning that multiple users viewing the same information – such as an internet page – can visit a cached version.

The benefits of this are two-fold: Not only does it lead to improved network performance, but it also means you consume far less data by not downloading multiple versions of the same information. This, in turn, reduces data usage.

Top Tip

*Traffic prioritisation is best suited to bonded connections, as you can control the priority of both inbound and outbound. With load a load balanced connection, you can only prioritise outbound traffic.*

# Your device management

After considering the performance of your connection and network, you should look at how you can optimise the access you give users on-site.

## WiFi

While some routers provide wired access only, others come with built-in WiFi. This reduces the need for additional equipment, especially which is especially useful at smaller sites.

As well as assessing if you need WiFi connectivity, you should also establish if you wish to separate corporate and guest access. This keeps traffic apart, and can be combined with Quality of Service (QoS) rules to ensure corporate traffic is prioritised over guest traffic.

For added security, you can direct guests to a captive portal – meaning they must identify themselves before accessing your connection.

This is similar to what you would use connecting to Wi-Fi at a coffee shop, for example.

## WiFi controller

Some 4G routers can act as a WiFi controller, letting you connect multiple access points and control them centrally.

This functionality is ideal for extending your wireless coverage across larger sites – such as construction sites, exhibition halls and popup sites for temporary events.

## Other WAN interfaces

As well as providing WiFi access, some routers can connect an additional WAN circuit that you can use alongside your 4G WAN.

This connection may be a DSL, EFM, Fibre or even a satellite connection – or perhaps the ability to connect to a WiFi hotspot.

Choosing a router with this functionality built-in will allow you to benefit from a range of connectivity options. If you frequently re-deploy your solution other sites, this ensures that you are able to combine additional connections that may not be available at previously deployed sites to give you the most robust and stable connection.

Should your solution be static at a single site, a router that supports multiple WAN interfaces gives you the ability to connect a fixed line circuit when available – and keep your 4G WAN deployment as a robust backup.

# Connecting to your hub

If you're looking to implement a bonded solution, you need to install the technology that links your sites into your corporate network. This is done through a device known as a hub – which is typically installed at a data centre, head office or wherever your server infrastructure is located.

You need to consider what functionality you need from your hub and how it will interact with your routers. Important aspects include:

## Location

Your hub can be housed at a location of your choice, so long as it has a public static IP address. Most often you'll want to host your hub in your own data centre or HQ (so long as you have the physical space), however it is possible to host it in a third party data centre or have your MSP host it on your behalf.

## Capacity

Alongside the physical space to fit your hub, you need to ensure your chosen site has sufficient bandwidth to handle traffic to and from the hub – and that it can be scaled to handle additional bandwidth when required.

The number of sites your hub can support is another item for consideration. Some hubs will limit on throughput alone, while others also limit on the number of live connected devices.

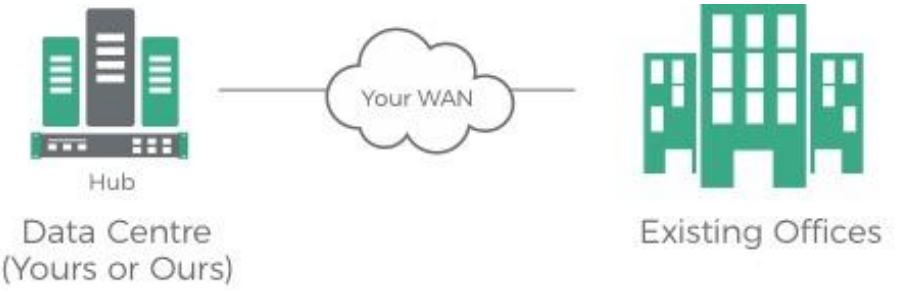
## Security

Ensuring your hub and bond are both secure is crucial to the safety of your data. You should ensure your hub is secured behind a firewall, and that data in transit is securely encrypted between your router and hub.

## Resiliency

The resilience of your bonded solution needs to be considered if you have multiple sites connecting to a hub – as it can act as a single point of failure with the potential to disrupt every site that's connected to the hub.

For added resilience, you should consider installing a secondary hub in an active/passive configuration. The passive hub will shadow the active hub, and will take over its functions in the result of failure – providing complete business continuity.




# Reporting

Reporting is an essential element of your 4G WAN solution as a whole, so choosing a router that can provide valuable information is key.

Some devices will provide you with detailed reporting on cellular usage, including information on which devices are driving the most usage – helping you manage cost and performance.

## Leverage your MSP

As well as the reporting that your router can provide, good MSPs will also offer proactive monitoring and reporting of your 4G WAN solution.

This means you have full visibility of your solution – and is a point we address in our next guide: Essential Questions to Ask for Your 4G WAN RFP.

# Additional functionality

4G routers have a range of additional features and functions that can make them more suitable for your needs. Some of the most popular functions on the market include:

## Modular design

While some router manufacturers use fixed configurations to keep the deployment as simple as possible, others employ a modular design.

This design allows specific cards, commonly known as modules, to be inserted for a particular application or usage scenario. For example, two 4G cards may be installed on one occasion, while a 4G card and a DSL card may be installed on another.

This modular setup has a number of significant benefits, including added flexibility and portability when re-deploying your router to different sites, as well as allowing you to bond multiple technologies.

Modular designs also support features that some non-modular routers do not possess, such as the ability to seamlessly migrate your site to a fixed circuit (such as DSL or EFM) once installed with no switch-out required, or the capability of acting as a backup once a fixed line circuit is installed.

## Power over Ethernet (PoE)

Some routers can provide PoE to devices that are plugged into Ethernet ports. This reduces the need for additional PoE switches or power supplies, for devices such as Wireless Access Points and IP phones.

## Omni-directional aerials

Some routers can support omni-directional aerials – including high-gain aerials you can fix to the top of buildings.

This ensures you receive the highest cellular signal strength possible so that speed, performance and reliability are maximised – no matter the combination of networks used.

# Which routers do we use?

After exploring and considering the features you need in your 4G router, you'll arrive at a natural question:

'So, what's the best for me?'

In our years of experience deploying 4G WAN to hundreds of sites, we've had the chance to explore many different manufacturers and options.

Over recent years, we've settled on two manufacturers for the majority of our installations thanks to their performance and adaptability. These are Peplink and Viprinet.

While both manufacturers provide high-quality products, their feature sets lend them to different usage scenarios, so choosing the right manufacturer for your needs is essential.

## We like Peplink when we need

- Remote site users to access the service via WiFi (without additional hardware)

- To configure local breakout to the internet (not through the tunnel to the data centre)
- The ability to have 2 SIMs for every modem (even on single modem devices) so that if you lose one carrier, you can continue working


## We like Viprinet when we need

- The ability to bond more than 9 SIMs
- The ability to include DSL into the bond by using a DSL card (Peplink can do this using its Ethernet port).
- The flexibility to migrate a site from 4G to fixed line plus 4G, once the fixed circuits are installed

# Peplink

Peplink's range of 4G routers gives them the scope to service anything from small temporary sites to large-scale and vehicular deployments.

What sets them apart is their ability to be quickly deployed as a single piece of hardware and adapt to differing environments while ensuring continuity. They achieve this through:

## Local breakout

Unlike some manufacturers, Peplink routers allow you to breakout locally to the internet rather than send all your traffic down your bonded connection to your hub.

This is ideal if you wish to separate business-centric traffic from general use and allows you to set up guest WiFi.

## Routing & failover

Because Peplinks carry both embedded and redundant SIM slots, it's easy to manage your routing. You can set SIMs to hot failover in the event that the signal is lost, or they're approaching usage limits.

## Built-in WiFi

Peplink's built-in WiFi provides instant wireless connectivity to your site without the need for additional hardware. This makes redeployment easy as your entire solution is housed in a single box.

## Combining different types of access media

Peplink routers allow you to combine different types of access media into the bond, using their ethernet WAN ports.

## Intelligent hubs

When opting for a bonded connection, Peplink's range of hubs utilise 'SpeedFusion' – their own proprietary bonding technology – to provide the highest possible availability and instant failover.

Hubs support multiple sites and ensure great speeds and reliability, making them ideal for delivering superfast VoIP, video streaming and data. They also support high availability installations.

# Viprinet

Viprinet's range of routers are also suitable to be deployed in small, medium and large sites – as well as vehicles.

Their scalability and flexibility ensures they fit perfectly into deployments that can vary in size, where frequent redeployment is needed, and where multiple types of access media are required.

## Scalability

If your solution needs to address varying deployment sizes, Viprinet routers can provide great scalability with their ability to 'stack'.

This means that you can combine several routers into a single bonded connection back to your hub. Using this technique, we've bonded as many as 18 SIMs into a single connection – making it ideal for large-scale deployments.

## Flexibility

Viprinet routers have a modular design that isn't available through many other manufacturers. Using this hot swappable ability, you can insert different cards based on the deployment type and use case.

For example, you can install two 4G cards on one occasion and a 4G card plus a DSL on another.

This provides the ideal solution if you envisage re-deploying your solution to multiple sites, or wish to continue using the router once a fixed connection has been installed.

## Combining different types of access media

Viprinet routers also allow you to combine all different types of access media, including ADSL, SDSL and 4G into the bond, using slot-in cards.

This adaptability means that you can combine a range of access media based on what's available to your site – ensuring complete coverage and continuity.

## Hubs for bonded connections

Viprinet's range of hubs can support the scalability & flexibility delivered by their routers – be this across single or multiple sites.

Built-in redundancy allows the units to remain active even during a disaster situation, while segmentation allows you to terminate several connections on hub but keep traffic separate. This is ideal when your solution is serving a number of different divisions, or if it's being offered as a managed service.

# Your setup options: Small deployments

| | Peplink | Viprinet |
|---|---|---|
| Max. SIMs | 4 | 3 |
| Max bonded throughput on router | 60Mbps | 50Mbps |
| Max bonded throughput on hub | 150Mbps | 250Mbps |

| | | |
|---|---|---|
| Maximum peer devices | 20 | Unrestricted, but recommended 1-50 |
| Local breakout | Y | N |
| Built-in WiFi | Y | N |
| Built-in failover | Y | Y |
| Stackable | N | Y |
| Modular design | N | Y |
| Combining access media | Y (using Ethernet port) | Y |

OR

# Your setup options: Medium deployments

| | Peplink | Viprinet |
|---|---|---|
| Max. SIMs | 4 | 4 |
| Max bonded throughput on router | 60Mbps | 45Mbps |
| Max bonded throughput on hub | 800Mbps | 250Mbps |
| Maximum peer devices | 800 | Unrestricted, but recommended 1-50 |
| Local breakout | Y | N |
| Built-in WiFi | Y | N |
| Built-in failover | Y | Y |
| Stackable | N | Y |
| Modular design | N | Y |
| Combining access media | Y (using Ethernet port) | Y |

OR

# Your setup options: Large deployments

| | Peplink | Viprinet |
|---|---|---|
| Max. SIMs | 8 | 6 |
| Max bonded throughput on router | 120Mbps | 200Mbps |
| Max bonded throughput on hub | 2Gbps | 1Gbps |
| Maximum peer devices | 4,000 | Unrestricted, but recommended 50-100 |
| Local breakout | Y | N |
| Built-in WiFi | Y | N |
| Built-in failover | Y | Y |
| Stackable | N | Y |
| Modular design | N | Y |
| Combining access media | Y (using Ethernet port) | Y |

OR

# Your checklist

To help you see which features mean the most to you, we've created a simple checklist. Read through the key features we've discussed and mark down if they're essential, nice to have or something you can do without.

| Feature | Essential | Nice to have | Can do without |
|---|---|---|---|
| Your SIMs | | | |
| The ability to hold multiple SIM cards | | | |
| The ability to use multiple carriers and quickly scale up | | | |
| Your connections | | | |
| The ability to support Cat 6 LTE (for download speeds up to 300Mbps) | | | |
| The ability to bond multiple SIMs into a single, stable connection | | | |
| The ability to load balance traffic across multiple connections | | | |
| Your network performance | | | |
| The ability to failover onto a backup SIM for business continuity | | | |
| The ability to prioritise your traffic by type | | | |
| The ability to cache data for faster browsing and lower data usage | | | |
| Your device management | | | |
| The ability to use built-in WiFi | | | |

| | | | |
|---|---|---|---|
| The ability to use your router as a WiFi controller | | | |
| The ability to interface other WAN connections such as DLS, EFM or satellite | | | |
| Connecting your hub | | | |
| The ability to host your hub at a third party location (such as your MSP) | | | |
| The ability to scale bandwidth at your chosen hub location | | | |
| The ability to keep your data secure at rest and in transit | | | |
| The ability for your traffic to auto-failover to a second hub | | | |
| The ability to breakout to the internet locally | | | |
| Reporting | | | |
| The ability to view detailed reports on usage and performance | | | |
| A MSP that can provide more in-depth reporting on your solution | | | |
| Additional functionality | | | |
| A modular design for flexibility, adaptability and continuity | | | |
| The ability to provide Power over Ethernet (PoE) to devices such as IP phones | | | |
| The ability to install omni-directional aerials for complete coverage | | | |

# Your next steps

By now you'll hopefully have learned all about the features and benefits of 4G WAN thanks to our IT Managers Guide, and gained a good understanding of the features and benefits you need from your 4G router.

Next, it's time to form your RFP. To help you through the process, our next guide poses the essential questions that you should ask for your 4G WAN RFP and takes you through the justifications on why these questions are so important.


## Are SAS right for me?

To discover more about Rapid Site Deployment – SAS' proven 4G WAN solution – and the hardware we use to drive it, please don't hesitate to get in touch.

# ABOUT SAS

We design, deploy and manage the networks on which our customers run their businesses in an increasingly digital world.

**Our hybrid networks will help customers digitalise their businesses**

**THE BEST PRICE POSSIBLE**
Our hybrid networks, enhanced by SD-WAN, blend carriers and technologies to optimise the price of every site, and minimise installation cost with zero touch deployment. We offer transparent pricing for peace of mind.

**THE FASTEST DEPLOYMENT**
Our hybrid networks let you choose circuits that deliver fastest for each site, and our 4G WAN circuits offer 2 day delivery with seamless transition to permanent circuits.

**THE EASIEST MIGRATION**
We can phase your migrations to suit you, minimising cost and hassle.

**THE BEST PERFORMANCE AND UPTIME**
Our advanced monitoring shows the whole application path, raise 95% of key issues proactively and allows detailed reporting and drill-down to show issues and long-term trends.

**THE MOST ENJOYABLE AND PAIN FREE EXPERIENCE**
Our end to end digital systems and processes deliver Right First Time with clear, accurate bills.

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