

## Data Centre Connectivity - Where do I begin?

*This is an all you need to know guide for CTO's, IT Managers, Network Managers and anyone who uses, or is thinking about using Data Centres.*

*When looking at Data Centres and connectivity there is jargon you may be familiar with and some you may not. This guide is aimed at helping you make the right decision for your business by an overview of what you need to know.*

Systems Integrators, Service Providers, Applications and Cloud computing providers are using more and more Data Centre space to host their important equipment. All of this valuable data needs to be connected to staff and customers, often via the internet and sometimes via private networks.

### **So what should you look for when selecting Data Centre network connectivity?**

The following factors are not listed in any priority order, because each customer solution often has different competing demands and working with a connectivity provider who has the ability to provide a tailored and bespoke offering to fit YOUR company's needs is vital.

### **Internet Connectivity**

Many applications now use the internet for their delivery to end-users in offices, at home and on-the-move. But Internet Access is not a commodity and buyers should understand and look out for the following:

- a) **Contention:** This is all about sharing and as all users are not busy sending or receiving at the same time everyone gets the bandwidth they need. The utilisation of the core network is managed by the Network Provider and upgraded when it hits a certain trigger level. Lower prices can be obtained using a contended Internet Access port and there may be no impact on your business. Alternatively you can have a dedicated link to the Internet via a Carrier node which guarantees all the bandwidth for you. The nature of your traffic will determine the best solution.
- b) **Bursting:** This is a method of giving you flexibility. So your traffic may regularly use 30Mb but you want to cope with the times when it peaks above that without having packets lost. Therefore you can take a 100Mb port with a Committed Data Rate (CDR) of 30Mb and pay for any times you burst above the 30Mb on a Pay-As-You-Go basis. A great cost saving for your business without conceding on flexibility to deliver.
- c) **Tier 1 or Tier 2?**  
A Tier 1 Internet provider is a major carrier with multiple international fibre routes. If you select a Tier 1 Carrier you only get their services.  
A Tier 2 Carrier uses multiple Tier 1 Carriers and blends their services so that you get more direct links to European, Asian and US destinations and more resilience if a particular Tier 1 Carrier has a problem.
- d) **Where are you connected to the internet?** In the UK many carriers and Internet Service Providers (ISPs) use Docklands Data Centres as key nodes. However this means there is a bottleneck in how you reach the internet. If there are any issues in Docklands (power, natural disaster or terrorism) your internet access could be affected. Some Network Providers offer options to route to the USA and Europe avoiding London Docklands either by using Manchester or Slough.

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- e) **Future planning:** Internet bandwidth usage is growing (and has been growing for 20 years) at an average of over 50% per annum. Websites and applications demand more bandwidth through more complex designs and use of video and images. So if you are using 100Mb of internet access today, then in 3 years time you may need 350Mb and in 5 years closer to 1Gb.

*If you don't believe this fact take a dial-up modem speed of 14.4Kbps in 1998 and apply the 50% growth per annum rule of thumb for 15 years. The answer is at the bottom of the article.*

As you can see with the various points to consider, engaging with a Network Provider is vital to making the right decisions and saving in the right areas.

### Point-to-Point networks

You may need to connect to other Data Centres and to customers' or suppliers' sites using direct point-to-point or virtual private networks (VPNs). What are the options?

- 1) **Layer 1, 2 or 3.** This refers to the OSI 7 layer model of computer networking.

**Layer 1** is the lowest layer and is a physical connection, either fibre or copper. In the context of Wide Area Networks, Layer 1 means an Optical connection. In this type of network your switch or router is connected directly to an optical port and light is transmitted directly to another Data Centre via optical fibre. This is point-to-point and there is no switching or routing within the Network Provider's network which minimises delays and latency. Layer 1 services only apply to 1Gb and 10Gb services.

**Layer 2** services use Ethernet as the transmission medium. Ethernet networking is simple and accommodates bandwidths from 10Mb to 10Gb with switches used to provide the appropriate service and route it to the destination. Multiple sites can be connected to a Layer 2 network, normally with the Service Provider supplying their own routers to manage the network.

**Layer 3** services are more complex and allow for detailed routing and prioritisation of traffic types (e.g. prioritising voice traffic). Internet Access is a Layer 3 service.

- 2) **Latency** is the length of time taken for data to travel between two sites. Round Trip Delay (RTD) is the time taken to go there and back. Some applications which are actively mirrored in another Data Centre for backup require an RTD of less than 5ms. How far this is in actual miles between Data Centres depends on the length of the fibre between sites (a second diverse route will often be longer) and whether you are using Layer 1, 2 or 3 networks, Layer 1 being the lowest latency. Service Providers need to assess the sensitivity of applications and talk to the Network Provider about the best solution.

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- 3) **Carrier “clouds”:** Network diagrams often show the end-user sites connected to each other via a Carrier network shown as a cloud. This means that within the cloud your data could route anywhere and the route and latency could change daily. Routes are often not logical, e.g. one route from a DC in Kent to London went via Exeter! If latency is important ask your Carrier to define the route and if possible to offer a Layer 1 or Layer 2 route that is fixed.

### Physical diversity and resilience of network connectivity

Data Centre connections are too important not to be scrutinised to ensure that the physical fibre routes are separate and there are no single points of failure. Normally a separation of 5m between routes is deemed sufficient but Carriers may plan in greater separation so that no single event such as street works could take out both routes.

Some Carriers will be able to show detailed route maps between Data Centres to prove the separation and resilience of their design, while others ask you to trust them.

Network resilience also applies to equipment and each link should terminate in separate routing equipment, often located in different racks or Carrier network rooms within Data Centres.

Within the Data Centre there should be separate routes between the Carrier racks and your racks to avoid an inadvertent accident taking out both fibres.

### Specific Carrier requirements

Sometimes customers will require connection to a specific Carrier because they have a global agreement or they want to add the Data Centre to their existing Wide Area Network (WAN). Many Data Centres have a limited range of carriers but those with an Open Access agreement can provide access to all carriers, often using a Wholesale provider to give the Carrier an entry level connection for individual clients.

### Upgrades and lead-times

Installing network connections can be a time-consuming business and with the demands on bandwidth growing all the time you need to know that you can upgrade your connections quickly and easily. This may be by choosing to install a larger bearer initially (e.g. 100Mb on a 1Gb bearer) or agreeing lead-times with the Carrier on particular routes. *You will also need to factor in any new internal cabling such as cross-connects within the Data Centre which will have a 5-10 day lead-time.*

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### Flexibility – Network-as-a-Service (NaaS)

The ultimate in flexible networks comes with a NaaS agreement. These are still in their infancy but generally the “as-a-Service” bit means that you can turn on more bandwidth or burst above fixed limits to accommodate demand without having paid for large amounts of unused capacity. Burstable Internet Access is an example of NaaS but this idea is new in point-to-point or multi-site networks.

### Future-Proof

What happens five years from now when LAN speeds are commonly 100Gb and you want to use this in the Data Centre to Data Centre links? Can your Carrier provide this? Is it on their road map? Is their underlying network architecture even capable of delivering this? Plan for the future and it will save lots of heartache moving to a new Carrier in the future.

### Summary

Networks are highly important in the delivery of our systems and applications to end-users via internet or private networks.

Network connectivity is not a commodity, there are many underlying factors which influence the quality and suitability of solutions.

There are so many different factors to consider and one size doesn't fit all. Engaging with a Network Partner who can understand all your needs and has the network to deliver different options is important for a business to ensure you are 'future proofed'. Service Providers and IT companies should work carefully with a chosen network partner to provide solutions which help them stand out and win business. Engaging the network design team at an early stage helps to instill confidence in the potential customer that the solution is joined up and complete. Next Connex are the UK's leading Data Centre and connectivity provider proven to provide bespoke solutions for all requirements. Call Next Connex today for a discussion about what you should be doing to ensure you've secured your data.

**The answer to the question above is that 14.4Kb in 1998 has now grown to 6.3Mb at 50% growth in bandwidth per annum for 15 years. I hope your broadband is 6.3Mb or greater, otherwise you are behind the curve.**

*Richard Auld is Commercial Director of Next Connex Ltd. – a Data Centre and Internet Infrastructure company that helps Systems Integrators, Service Providers and IT companies to manage the physical infrastructure in the most efficient and flexible way.*

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