



# CLOUD **INFOPAPER**

Living in a cloud world,  
a hybrid cloud world

# Introduction

The issues that today's IT leaders face are almost always complex in nature. To keep up with the speed of doing business, organisations are having to continually reinvent themselves, and consequently their supporting digital infrastructure. The result is that IT directors and CIOs have sprawling environments to manage.

Cloud strategies are compounding the complexity and they will be the most challenging business driver in the years to come. It has been a disruptive technology that many companies have leveraged to differentiate and innovate. These days, not including cloud-based software in business systems is like running a race with one arm tied behind your back.

Nevertheless, enterprises remain in the very early stage of the shift to cloud. The uptake will be driven by businesses developing digital ways of working as mobile and the Internet of Things (IoT) become the norm. These technologies will shift bandwidth needs and applications toward the edge of the network and closer to customers, resulting in ever-more complex relationships between systems and applications. We will end up living in a hybrid cloud world made up of traditional, private cloud, managed cloud and public cloud architectures.

The cloud environment is very multidimensional and as such, it is among the most abused terms in our industry; it can be public, private or hybrid; software, infrastructure or platform as a service; and single- or multi-tenant (with tenants being other departments or other companies). This presents a reality of co-existence between on premise, private cloud and public cloud solutions, which will be how we live and work for the remainder of our careers.



# What is enterprise cloud computing?

Enterprise cloud computing is using cloud for competitive advantage through opportunities such as cost savings and business innovation. These are achieved by taking advantage of unprecedented speed and agility with vastly improved collaboration among business partners and customers.

Businesses in specialist data centres are reassured by an Uptime Institute Tier III certified, ultra-secure facility that provides 100% uptime; protecting and connecting data, applications, networks and clouds and the global digital economy.

We're a few years in to the Cloud era, and the picture for most users is still confused. Rather than being a brave new world of abstraction, service and affordability, cloud services can be opaque and difficult to cost-optimize. It has become clear that, for all but the most technically adept businesses, assistance and advice is vital for a happy cloud future.



## So what does “cloud computing” mean for the enterprise?

**1) Usage flexibility:** On the cost side, IT and data centre costs can be reduced and tied directly to usage - up or down as needs increase or decrease

**2) Speed to market and reduced financial risk:** Risk and start-up expenses for innovation initiatives can be cut dramatically, enabling companies to test new ideas. With no upfront capital expense, new projects can be scaled up instantly if they take off or shut down quickly if they fail

**3) Collaboration:** Companies don't work alone, and on average, over 20 companies make up today's value chains. Cloud computing allows organisations to work in new ways with partners and collaboration is the key to gaining competitive advantage across the value chain. By participating in the same value delivery system, sharing computing, communication and information resources, greater efficiencies can be achieved

Data centres are the gateway to cloud-centred IT; they provide colocation as an extension to or to support cloud services such as Software-as-a-Service (SaaS) or Infrastructure-as-a-service (IaaS) platforms like Amazon Web Services and Microsoft Azure. However, by the very nature of the technology, the 'home of the cloud' does not exist in a single data centre location. The ability to operate in multi-cloud environments makes a true hybrid model and it is through the combined service of best-of-breed colocation and best-in-class network operators that the cloud is readily available to enterprises across multiple industries.



# 1 On-ramp to cloud: the connectivity factor

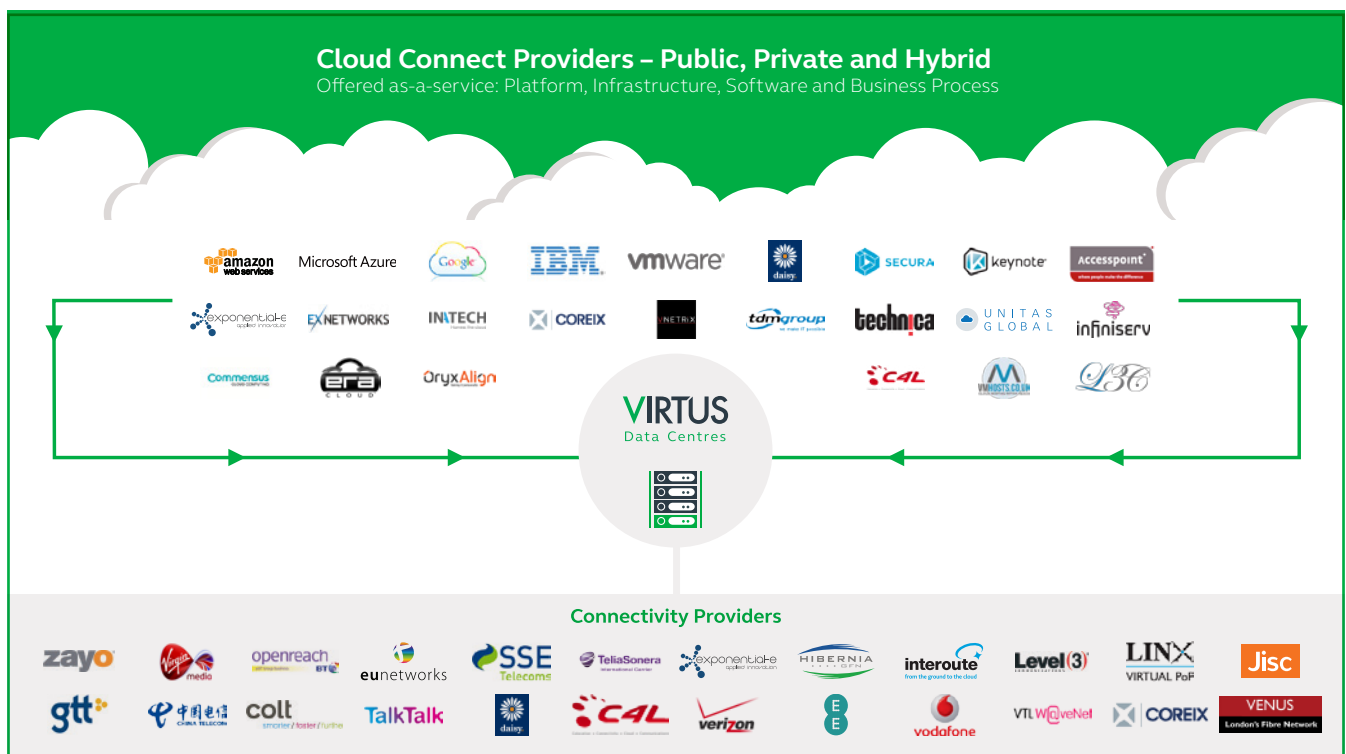
Organisations could just live in the public cloud world, but companies of any significant size don't. Businesses use public clouds for access to huge amounts of data and massive compute capability, for on demand computing when needed, or simply for storage. But they still maintain their own private clouds as a way of processing and adding value to their own sensitive data that they collect and to handle complex computations. This is the hybrid world that is becoming the enterprise standard.

What many of companies don't know is that they can get a better level of performance and service from their chosen cloud providers if they take the services within buildings in which the clouds are housed. Bringing cloud services to an enterprise's own building has challenges that can be avoided by making use of the services from within the data centres where the clouds live. Being located in the same building means the cloud services are a simple cross connect away.

Connectivity to the right carriers is critical if cloud is to work. This ensures that multiple public clouds can be accessed, which will increase performance. The term for this is "on-ramp to cloud". Companies should be aware that whilst some data centre providers can build the best high performance computing platform and a facility that is cost effective to run, without

connectivity provisioning on-ramp to other clouds, businesses won't be able to adopt a hybrid cloud strategy.

Specialist data centres will provide on-ramp to cloud services so customers have direct access to multiple clouds that can work for them to provide increased compute power and performance. Forward looking providers have made the investment of fully diverse multi sub-duct networks so carriers can easily interconnect and businesses can cross connect to a multitude of public clouds. They can easily put a piece of fibre from a company's own systems straight in to Google, Amazon or Microsoft for the most direct connection. The most effective data centre providers make it easy to connect public and private clouds to deliver high performance compute solutions.





# 1 On-ramp to cloud: the connectivity factor

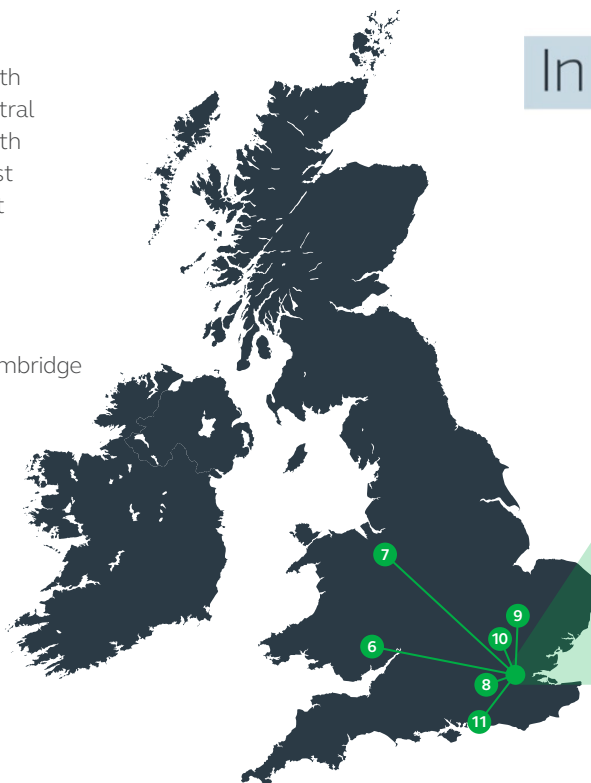
This connectivity is extremely important in a hybrid model as companies need it to reach multiple cloud providers and other enterprises, exchange traffic and connect systems, platforms and applications where necessary. Colocation providers are already designed to be connected to carriers. Those data centres that own a fully diverse fibre duct infrastructure to meet all of the fibre owner/operators make every other possible carrier or related supplier just a cross connect away providing limitless connectivity cost effectively.

A good example of organisations using on-ramp to cloud to make effective use of public data and huge compute power is Jisc (the Joint Information Systems Committee). Jisc is a shared data centre facility for research and education used by approximately 20 leading UK institutions (such as Francis Crick Institute, King's College London, Imperial College, London School of Economics, The Sanger Institute, Brunel University and Liverpool City College) that take advantage of a shared IT infrastructure and high performance computing capabilities. The Institute of Cancer Research uses the shared facility to extract medical data from University College London and other such institutions, and shares the data in a way that allows them to get a better understanding of various forms of cancer and other illnesses. Jisc was a world's first, enabling universities and colleges to be more efficient and effective by increasing collaboration to push the boundaries of research. At the same time, by sharing facilities, they increase energy efficiency and reduce costs.

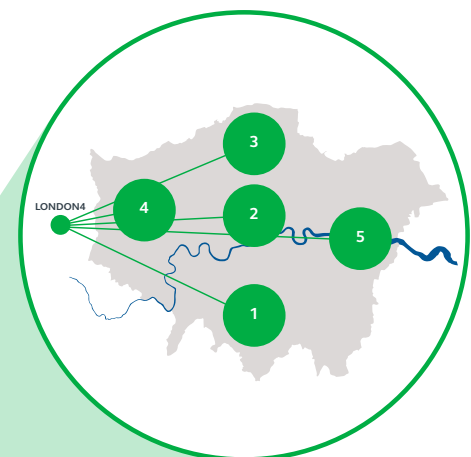
However, IoT and big data combined with machine-to-machine systems are what truly drives the need for high performance computing. As organisations begin to understand that data analytics helps them to become more relevant and innovate, the demand for data will only escalate. Machines will use collected data to drive other device performance speeding the process yet further. As a result, more industries will inevitably use public cloud to gather invaluable data, which will consequently increase the demand for more space and compute power from the data centre. In turn, even greater importance will be put on data centres - their efficiency, total cost of service and connectivity - which will be in increasing demand as the exponential rate of data continues to grow.

Though their functions are intertwined, it is important to note that networks and data centres are increasingly being operated separately. Carriers that own and operate data centres in a dual strategy are rapidly divesting these two distinct businesses due to the high capital investment requirements of both, and reverting to their pure-play model of network only solutions. However, despite their changing business model, carriers and data centres are still working together to provide highly connected colocation services to enterprises and cloud providers.

- 1 London South
- 2 London Central
- 3 London North
- 4 London West
- 5 London East
- 6 Bristol
- 7 Liverpool
- 8 Guildford
- 9 Cambridge
- 10 South of Cambridge
- 11 Brighton



In partnership with **Jisc**



# 2 Colocation on demand: pay as you grow flexibility



Today, the needs and expectations of businesses are changing when it comes to data storage and infrastructure. The data centre market has matured and buying colocation space has become the strategy of choice for many businesses due to the increasing need to be on-ramp to cloud.

However, the relationship between colocation (data centre) and cloud provider is often misunderstood, and consequently the opportunities presented to colocation providers in an increasingly cloud-based IT industry are also misunderstood. What must be understood is that the role of colocation providers in cloud is crucial; both cloud and colocation providers store and process data, but only data centres house servers and other physical infrastructure. Cloud service providers therefore use data centres to house their cloud operations, leading to the claim that colocation providers are the 'home of the cloud'.

Despite these existing misconceptions, cloud and colocation offerings available today exist in a topology that can be modelled to suit any corporate business objective, including rapid growth, consolidation, simplification, mobilisation or simply cost reduction.

Colocation provides the high grade infrastructure needed by diverse industries that use high density computing. For example, the cloud environment used by companies in the media industry must be able to cope with ultra-high density applications, which media companies need for digital rendering due to the high compute power required to layer visual and audio files. The necessary power and associated cooling for the IT hardware to support such applications just isn't reliably available in today's office buildings.

In retail-based businesses, millennials are moving into senior roles and these digital natives expect to be able to use cloud for all of their IT needs. This puts a demand for a seamless, highly scalable service onto cloud providers, who in turn require a colocation provider to give them the power and infrastructure to provide this.

Other industries such as pharmaceuticals also have high performance compute requirements from their cloud infrastructure, due to their requirements for data mining.

If pharmaceutical providers wish to use cloud services, the cloud providers that they choose will need a colocation partner with the ultra-high grade infrastructure from a cooling and power perspective, to support extensive data mining.

For organisations that are involved in a computing network, such as Jisc, high density is very important because the network contains multiple individual clouds that each process huge volumes of data. These clouds are connected and it is essential that they can share data, requiring both connectivity and high performance computing solutions that need high density capabilities from their colocation provider.

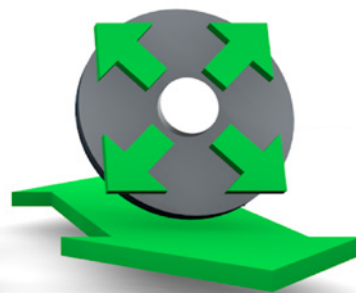
**Density**



**Time**



**Space**



# 2 Colocation on demand: pay as you grow flexibility



Colocation enables cloud solutions by providing the power, cooling and maintenance to service the private cloud, as well as the networks and connectivity to deliver access to the public cloud. Through colocation, cloud providers can provide their customers with hybrid cloud solutions without having to build and manage their own physical data centres – a major cost saving, which can in turn be passed onto customers.

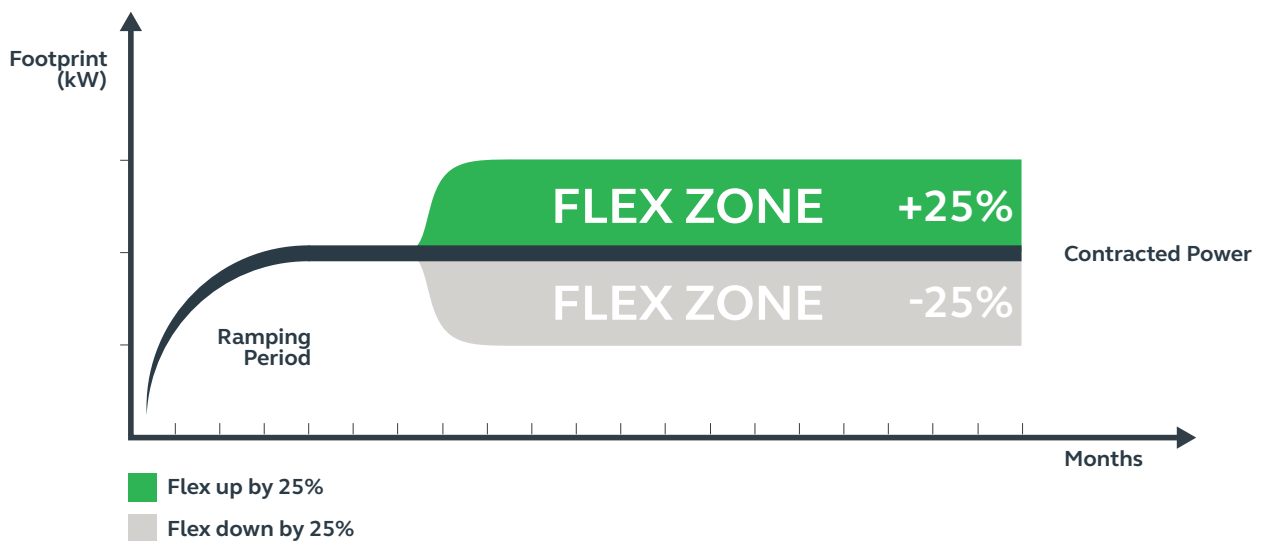
In order to remain competitive, traditional colocation providers must ensure that their data centres are capable of delivering not only a clear on-ramp to cloud, but also first class colocation services with flexible contract options.

Overly rigid long-term data centre contracts are no longer optimal for many global cloud and digital organisations where the fast pace of business and technology can require them to change direction quickly. If enterprises and IT agility are held back by antiquated and inflexible data centre platforms or contracts that can't react quickly in line with business plans, it can lead to missed opportunities and severe IT cost inefficiencies. This is a serious concern for businesses today.

Flexible contract options provide true commercial and technical agility which benefit enterprises. They enable businesses to use information that Data Centre Information Management (DCIM) tools provide to ensure they have the visibility, data, tools and commercial terms needed to match colocation spend with requirements. If business needs change over time, companies should easily be able to change their contract terms to ensure they're not paying for more than they use, or expand density from 4kW to 40kW per rack to optimise space and power cost efficiency.

Providing the ability to flex the contracted power, space and time of the service at any point allows businesses to take full advantage of the differing costs per compute as they increase or decrease IT density. There should also be the option to scale physical space up or down to match changing requirements as well as to extend or reduce time commitments during the contract term.

For smaller businesses, solutions such as Colo-On-Demand enable rack customers to change their contracting requirements on a day-by-day basis. But large enterprises should also be given the ability to vary their space or power density commitment up or down to match IT and business needs. By providing up to the minute, accurate information about IT usage, businesses can be informed so they are able to predict their current and future commitment levels – enabling them to flex their contracts accordingly, which can potentially save millions of pounds over the life of some contracts in unnecessary space and power charges.



# 3 Total Cost of Service



The ability to forecast and understand Total Cost of Service (TCS) goes far beyond simple capital expenditure calculations. Typically, data centres have charged expensive rates because overheads made high prices necessary. However, by taking a smarter approach to building, cooling and running facilities, providers can significantly reduce overheads and pass the cost savings on to customers.

Historically, many larger organisations built their own private data centres for proximity, security and control. However, recent independent industry reports indicate that it is no longer financially viable to build a data centre for requirements of less than approximately 12MW of capacity.

Even data centres that were built 12 months ago are unlikely to offer the dramatic cost efficiencies that newer data centres achieve in running overheads such as cooling technologies. Modern data centres should be hyper efficient and provide a Data Centre Information Management (DCIM) capability - including power usage to-the-rack information - as part of a standard service. DCIM can provide the same level of control over a data centre deployment as if it were privately owned.

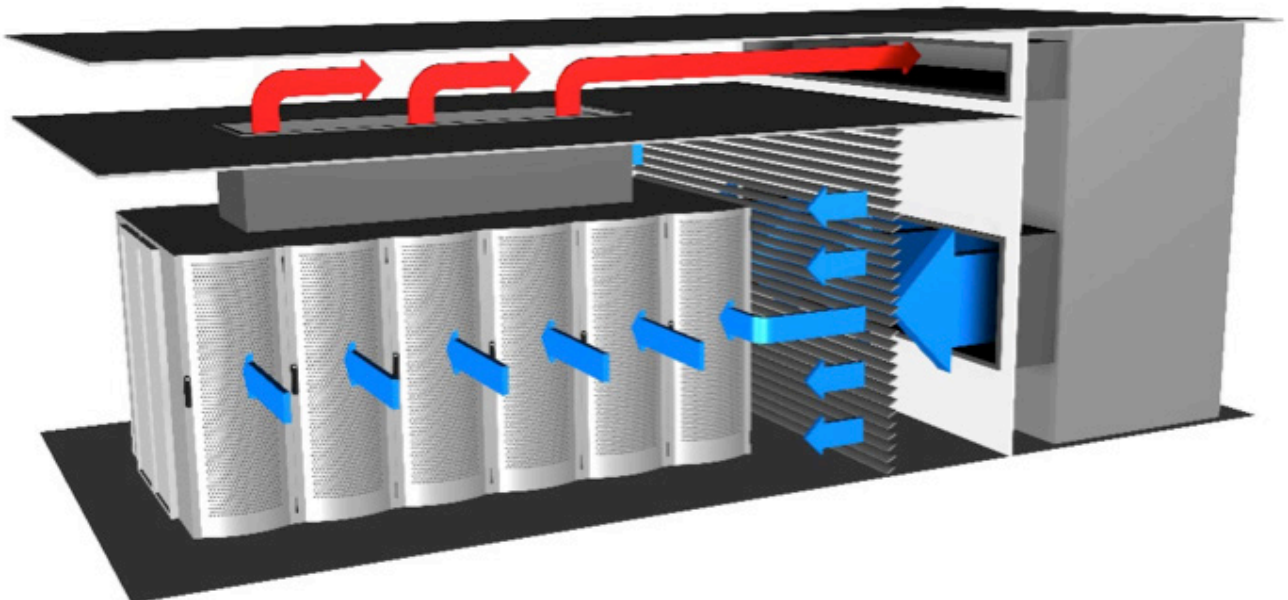
## Things to look out for when calculating TCS:

### 1. Lower build costs per MW of IT load

– Data centre providers can maximise the use of the latest modular development techniques based on years of experience. Having built strong relationships with suppliers over time, they can negotiate and drive down tender pricing.

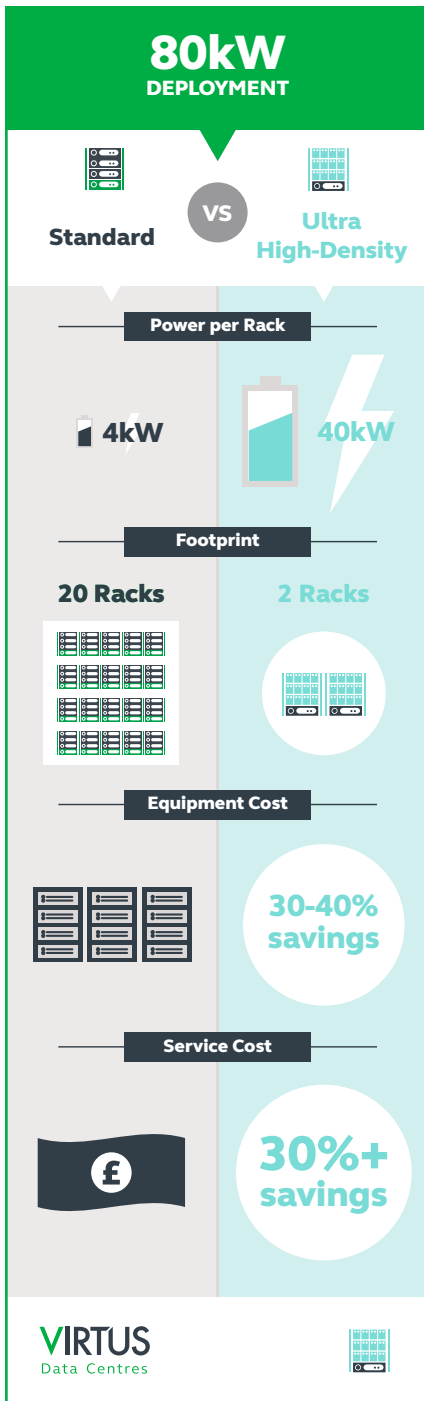
By using more cost effective, high-quality components, providers can build data centres at lower cost per MW, and the benefits are passed on to customers.

## Efficiently deployed data centre cooling





# 3 Total Cost of Service



**2. Reduced energy costs through low PUEs and ultra-efficient cooling technology** – New generation data centre providers use highly efficient cooling technologies. The modular nature enables it to be scaled up in line with the number of servers that need cooling. Importantly, the data centre can achieve design PUE much sooner once operational – it could be years before less efficient data centres are able to do the same.

**3. Flexibility to provide high-density cooling capability** – Generally, costs are driven on a per square metre basis, whilst power is charged on a per kW or rack basis. New generation data centres can cool racks drawing over 40kW (c. 5-6x conventional power densities) enabling colocation providers to charge less per rack or kW while achieving higher rents per unit of build cost. Pricing can be significantly reduced per kW or rack when higher densities are needed.

**4. In-built monitoring and operating support** – By migrating into a colocation facility, companies take advantage of additional services offered by the data centre provider e.g. customer access portals, in-built open protocol Data Centre Infrastructure Management services (DCIM), low-cost on-site remote hands and deboxing services etc.

These can reduce man-hours, travel and operational costs for in-house IT staff who can focus on IT innovation for the business.

**5. Connectivity-rich data centres with ecosystems** – By supplying carrier-rich environments, colocation providers encourage price competition for connectivity services. Cloud hubs offer private and cloud multi-delayer technology platforms for a range of IaaS and PaaS both within and from other data centres.

**6. Flexible contract terms for both colocation space and connectivity** – In a fast paced world where business needs change regularly, the expensive and inflexible long term contracts are no longer palatable to many companies. Flexible contract options provide true commercial and technical agility. If business needs change over time, customers should be able to easily change their contract terms.

Companies should make sure they aren't paying for more than they need and look for a disruptive commercial model, which gives absolute flexibility from a rack to a suite, for a day to a decade. Using a DCIM tool, organisations will have the data, tools and commercial terms needed to match colocation spend with the needs of the businesses. If requirements evolve over time, ensure there is an option to change contract terms accordingly. Look for total transparency and control of usage.

# 4 Location/Latency



Businesses today expect and require low-latency and reliability from data centre providers, with zero tolerance for downtime. Previously, everything was racing to the central cloud and hyper-scale was the panacea: cost efficient, reliable and accessible globally. But, latency intolerance, bandwidth availability, cost, IoT and data sovereignty have led to change.

Amazon claims that a tenth of a second delay in connectivity can cause a drop-in one percent of its sales; and the gaming industry says that latency is the single most important consideration when evaluating a cloud gaming platform. As a result, the trend is to localise the cloud at edge data centres. By providing edge computing in edge data centres, cloud operators have a unique opportunity to move up the value chain.

Choosing a data centre that has direct connects to leading clouds within a few kilometres is critical to business success. They should provide low latency and rich functionality. The data centre doesn't have to be located in a city centre, close to customers, it can be located on the outskirts which takes away the need to pay city centre premiums.

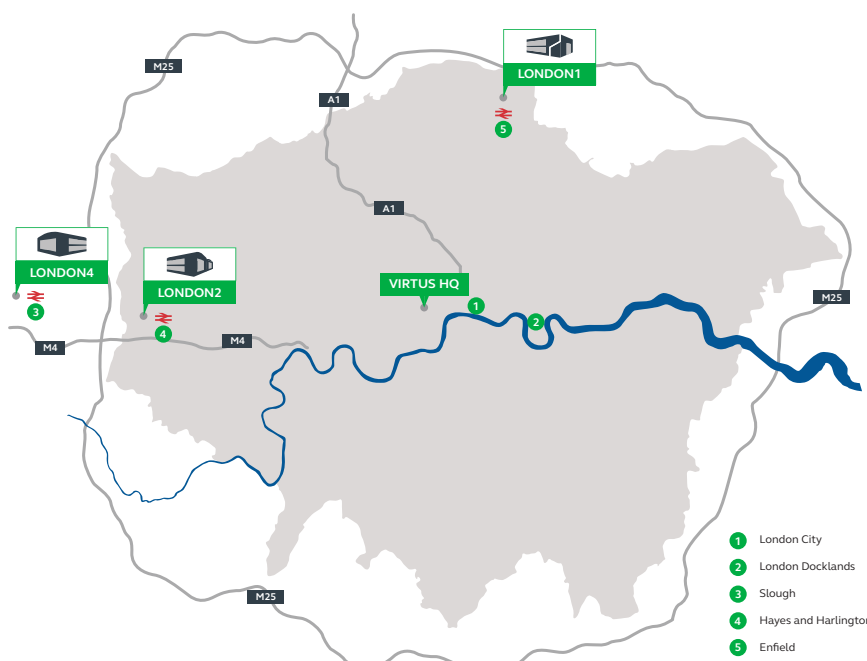
Smart providers that have chosen optimal locations combining low cost availability of ample space and power for hyper efficient data centres with low cost availability of broad and rich connectivity (fibre that today's digital businesses need) should pass their cost savings onto customers. These facilities are far enough from city centres for disaster recovery purposes, but close enough to be easily accessible by local and international businesses.

## Example: Financial Services

Although HFT has traditionally been the dominant strategy for buy-side financial services – accounting for over 70% of trade volumes in 2010 - the trading landscape is shifting. Today it makes up 50% of trade volumes with Smart Order Routing (SOR) principles becoming more popular.

HFT uses sophisticated technological tools and computer algorithms to rapidly trade securities. Its success depends on second-by-second trades and is reliant on technology to buy and sell huge volumes. The ability to move in and out of trading positions in fractions of a second is imperative and close proximity to trading exchanges essential. Therefore, many firms deployed entire IT systems at very expensive retail data centre facilities. These facilities, aware of the advantages of their proximity, charged premium rates for their “finance ecosystems”.

However don't be fooled. The distributed nature of the asset classes across the London metro footprint from Slough, through the City and the Docklands - means that a data centre located in or around the M25 can just as efficiently provide the low latency connections required for fast access to exchanges in a colocation environment. And this can be achieved without the need to pay the ecosystem premium.





# 5 Security

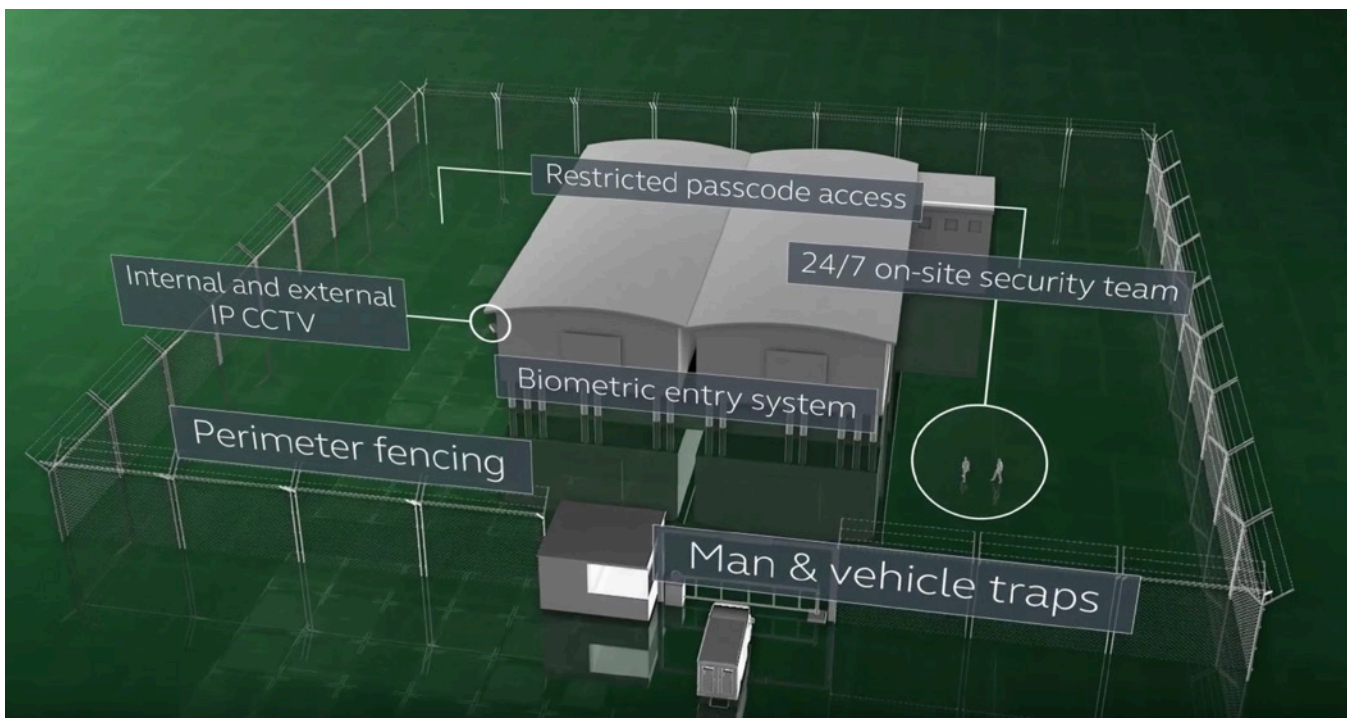
Security is one of the main reasons that some large organisations have traditionally preferred to build their own data centres. As this is becoming financially unviable, data centre providers must demonstrate that the security of their customers' IT infrastructure is one of their highest priorities.

Businesses in specialist data centres are reassured by a Tier III certified, ultra-secure facility that provides 100% uptime; protecting and connecting data, applications, networks and clouds and the global digital economy.

**Security requirements should be looked at in three key ways:**

## 1 Physical

There should be at least seven layers of physical security that can be tailored for enhanced levels, as required. From perimeter fencing with intruder detection, access control, CCTV - external and internal - restricted pass code access, man and vehicle traps; data centres can guarantee the highest security needs that the financial services industry and others require.



## 2 Process

ISO27001:2013 certification should be in place to evidence processes and procedures and show that every aspect of security is tested regularly.





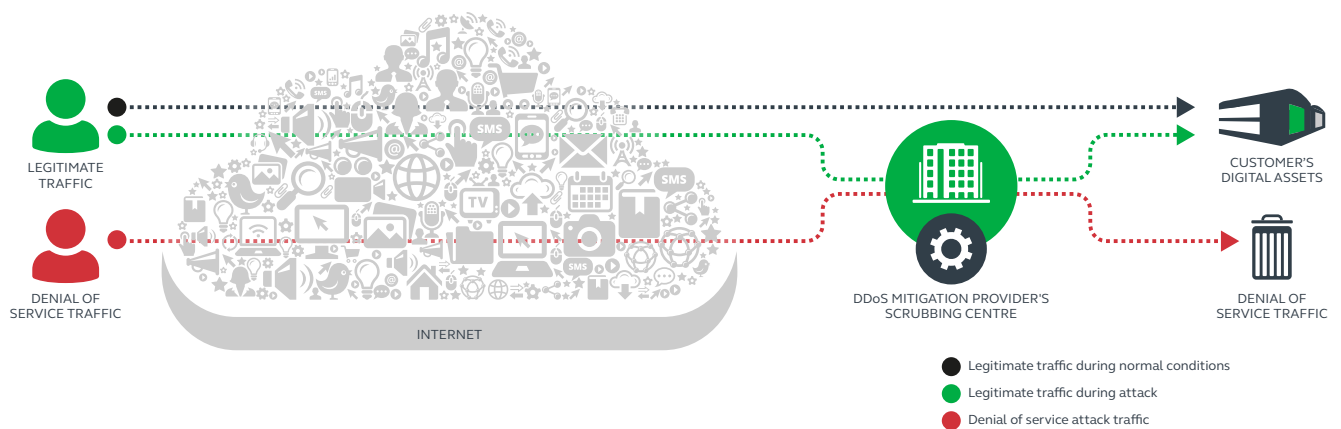
# 5 Security

## 3 Digital

Easy access to a choice of DDoS mitigation services should be available through an ecosystem. Providers that partner with key digital security vendors create a strong defence so businesses can deal with attacks should they materialise. DDoS Mitigation services deliver an enhanced network-based detection and mitigation scrubbing solution alongside network routing, rate limiting and IP filtering; as well as additional capabilities for application layer attacks including advanced behavioural analytics technology.

Data centres should provide a safe pair of hands. Soft factors, such as the operator's management team comprising of highly experienced data centre industry professionals across the major business functions, are just as important and add to security credibility. The service uptime record and customer satisfaction levels, which should be no less than 100%, are also key considerations.

### How DDoS works





# The future of cloud and colocation

In the next ten years, the evolution of emerging technologies such as the virtualisation of network functions, software defined networks and Platform-as-a-Service (PaaS) may affect the relationship between cloud and colocation providers. Both parties will need to adapt to these technologies in order to continue to support the scale and functionality needed by modern businesses.

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In the near future, colocation providers may look to work with Software-as-a-service (SaaS) providers to deliver back-up and recovery services and SaaS Governance e.g. keeping a copy of a customer's cloud data in the data centre. They may also provide cloud access security brokerage or offer businesses the ability to put their data in the data centre and run their applications on cloud as virtual appliances.

In the immediate future, the Internet of Things (IoT) is having an impact, and products such as smart home and smart car applications are already generating huge amounts of data. This is only expected to increase, as Gartner predicts that 20.8 billion connected things will be in use worldwide by 2020. As IoT-enabled products become more sophisticated, machine-to-machine communications using open protocols will see devices consume data in ways that we are only just starting to explore.

This explosion of data will then need to be processed and analysed in order for businesses to make use of it. The volumes of data and speed required for this processing can only be housed in buildings designed specifically for this purpose - a data centre.



# Why VIRTUS?

We know that IT departments across all sectors need to continue to drive revenues whilst tightly controlling costs to maximise margin and profits. VIRTUS has the solution to deliver the highest quality data centre for cloud strategies and exceptional market leading customer service with the brand promise of lowest total cost of service. Customers benefit from specialist attention for their own proposition growth within a superior colocation environment.

Located in and around London's metro area, our data centres are in the right locations providing security, low latency and high connectivity for on-ramp to cloud. They are designed specifically to deliver agility both in colocation and pay as you grow flexibility, making them the gateway to the cloud and the colocation provider of choice for enterprises wanting to deploy cloud based solutions.

VIRTUS customers have access to a host of features to detect and mitigate multi-vector DDoS attacks with unprecedented performance scalability and deployment flexibility, including features which validate, block or rate-limit traffic entering the network. This guarantees customer service availability is maintained no matter what attack type is used, be it: volumetric, protocol, resource or even an application-level attack.

Due to high customer demand, VIRTUS has become the UK's fastest growing data centre provider. We own, design, build and operate the country's most efficient and flexible data centres which have been recognised by the industry for being hyper efficient, delivering ultra-high density and providing highly interconnected facilities. Our goal is to invest in technology to optimise solutions and customer infrastructure support systems with minimum impact on the environment. In this way, cost savings can be transparently passed on to our customers. Financial services organisations can use our scalable infrastructure platform like a utility and plan ahead thanks to certainty over costs.

With literally thousands of fibre pairs in our data centres, we offer our customers limitless bandwidth. We have direct routes to London, Manchester, Europe or the US, or routes avoiding London. Through VIRTUS Cloud Connect we offer direct connections to AWS on low latency paths missing out the London VPoPs used by others and to other direct connect clouds available through private patching on our data centre interconnect networks. Due to the investment we've made in our connectivity portfolio, whatever your connectivity needs VIRTUS has the answer.



# About VIRTUS

VIRTUS Data Centres, the UK's fastest growing data centre provider, owns, designs, builds and operates the country's most efficient and flexible data centres. VIRTUS leads the industry with award winning innovation in hyper efficient, Ultra High Density and highly interconnected facilities.

Located in and around London's metro, VIRTUS offers the best of traditional retail and wholesale colocation models, combining dedicated support and complementary ecosystems with low cost, scalable and custom solutions, in uniquely flexible and customer friendly packages. Customers also benefit from Tier III certified, ultra-secure facilities, that provide 100 per cent uptime; protecting and connecting data, applications, networks and clouds within VIRTUS Data Centres and the global digital economy.

**For more information please go to: [www.virtusdatacentres.com](http://www.virtusdatacentres.com)**

