WHY IT NEEDS TO ACCELERATE APPLICATION DELIVERY

SHIFTING CENTRE OF GRAVITY

EQUINIX
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The past ten years have seen a sea change in business working practices across the globe. Not that long ago, it was typical for the majority of staff to commute to work, to go to their desks and carry out their day to day work. How different things look today: working from home has become normal, with companies paying staff for equipment and furniture; and in the office, compartmentalised booths have been replaced by hot-desks for increasingly itinerant employees.

One cause of this transition is technology evolution, with the arrival of higher-speed broadband networking playing a significant role in the earlier part of the millennium. More recently we have seen a proliferation of ‘smart’ devices, such as tablets and smartphones, causing the boundaries between work and home to become even more blurred. Expectations have changed: rather than waiting for someone to come in for a meeting, it is now assumed that they can be contactable whether they are in the office or not.

Such changes in working practices and individual behaviours have placed new demands on the IT department. Traditionally, IT involved application and service delivery taking place from a centralised data centre, communicating across a local network to a number of fixed desktop computers. In today’s business environment however, users need to access applications from wherever they are, at any time and across an increasing range of devices.

One solution comes in the form of cloud-based providers delivering so-called “Software as a Service” (SaaS) applications which can be accessed from anywhere there is a Web browser. While these offer advantages in terms of accessibility, functionality and performance, they add to overall complexity and further increase pressure on the IT department, which needs to administer them alongside maintaining legacy systems.

Users have little interest in what is happening under the bonnet; simply put, when an application cannot be accessed or runs slowly, they become less able to do their jobs and IT gets the blame. But how can IT respond against this background of an increasingly mobile workforce and an increasingly complex array of technologies, to maintain its position and continue delivering applications and services with a consistent user experience?

At Equinix, we do not believe the answer has to mean a steady descent into chaos in which anything goes. Rather, the answer lies in providing a solid delivery foundation, which enables applications to be deployed in the most appropriate way based on their importance to the business and their performance needs. To learn more, read on.
As a starting point, we first need to recognise that increased complexity is inevitable. Given that the main issue this causes is unpredictability, what criteria can we fix to enable organisations to have a clear way forward? Taking things back to basics, business users need access to the services they need, in the manner that they need. This boils down to two sets of criteria for an application:

- **Business criticality** – the expectation from a user perspective on how it should perform
- **Latency sensitivity** – the reality from a technical perspective on how it can perform.

Different types of applications will have different levels of criticality and sensitivity. As shown in the figure, for example, document management systems may not be particularly sensitive to latency, in that a little delay does not make that much difference to the user experience, whereas videoconferencing and audio streaming are more sensitive to, say, network bandwidth problems. Of course poor video or audio quality may not be that business critical – people can do without it and use the phone instead.

The real issues arise when an application or service is both business critical and latency sensitive. At the top end of the scale are applications such as trading or real-time equipment monitoring – if these become slow or inaccessible, the business will immediately suffer. Equally, problems “in the network” can render VPN access to corporate systems or virtual desktop environments unusable, with direct impact on home worker productivity.
In other words, each application type in use by the business has different expectations and constraints, and needs to be treated individually in terms of:

- Whether it needs to be accessed by employees working remotely.
- What are the performance criteria it must meet to fit with user and business needs?
- What constraints and limitations exist in terms of its own architecture and deployment?

Answering such questions enables the creation of a realistic picture of how to deliver applications in a way that supports the business. While the first two questions may have quite specific answers, IT departments have more flexibility in terms of the third, in that a number of architecture and deployment options exist.

As an example, consider the simple scenario of a globally distributed team needing access to a shared spreadsheet. The data file itself might be quite large – perhaps several megabytes of information. Possible ways of accessing the spreadsheet include:

1. Each person that needs to access the spreadsheet keeps a local copy, then emails any changes around the team if they update it. This is possible if the data is not changed very often, and if the other users do not need to know about the changes at the moment that they occur.

2. The data is stored using a web-based spreadsheet application which allows parallel editing. This allows immediate update and distribution of changes, but tends to limit the functionality to basic editing. It also requires guaranteed Internet access.

3. Store the spreadsheet in a centralised content management system, and have users access it remotely. Sufficient network bandwidth is required to assure the data file can be opened quickly, otherwise editing becomes a very slow process.

4. Access the spreadsheet using a remote desktop or Virtual Desktop Infrastructure (VDI), such that the spreadsheet application and data are both located “on the network”. This option requires online access and network bandwidth can once again be an issue, this time for speed of display.

As this example shows, there is no single option for any application. As well as performance, other criteria such as data security, confidentiality, business continuity and device support add to the complexity, and put additional pressure on both systems and operational resource.

With all of this in mind, what are the key elements of a foundation for application delivery – and how can Equinix help enable this?
At Equinix, our perspective boils down to an understanding that applications are no longer delivered as products, but as services. Enabling this to happen requires three elements to be in place:

- A highly resilient, distributed infrastructure architecture built on commodity hardware.
- Delivery mechanisms which make best use of bandwidth within and at the edge of the network.
- Dynamic, scalable distribution of infrastructure and application resources.

Let us cover each of these in turn.

**Highly resilient infrastructure architecture**

Resiliency has always been an important facet of IT architecture. Traditional infrastructure has tended to follow a “2N” failover model – that is, take whatever servers, storage and other hardware and double it, such that if one system fails, the other can be brought online. While this approach works, it is nonetheless expensive: indeed twice as expensive as the cost of a single system. It also requires high-speed network connections between the primary and failover system, custom scripting, data replication and so on. Finally it is reliant on highly reliable hardware: the hope is that neither system goes down; if it does, then there is only one chance of recourse available.

A more modern approach benefits from the ability to distribute workloads across commodity hardware in a service-based architecture. Given that features such as load balancing and data replication are already taken into account, it is possible to adopt an N+1 hardware architecture – that is, take the number of servers and add one, or a small number, to cover the potential risk of failure.

This approach, as adopted in dynamic data centre environments by cloud service providers and in modern colocation facilities such as those offered by Equinix, means that the architecture no longer needs to depend on highly reliable hardware, on the basis that additional equipment can always be brought to bear. However the overall architecture is more resilient and better able to deal with fluctuations of resource demand.
Network-optimised delivery mechanisms

The second key criterion is to ensure that communication mechanisms never become a bottleneck. Taking the network as a whole, we have the following variables to consider:

- Connections between organisations and providers, such as Equinix, can be fixed dependent on network performance requirements and costs.
- Connections within and between providers (including cloud/SaaS providers) offer the highest available bandwidth and minimal latency.
- Connections from business users in remote offices, public Wifi or mobile require lower bandwidth and offer little or no performance guarantee.

Given the increasing need to access applications and services from remote locations, a principle emerges. That is, in order to minimise latency, service delivery should be moved as close as possible to remote users – in other words, to the edge of ‘the cloud’.

To achieve this, Equinix offers a number of capabilities, including:

- **Network Performance Hubs.** By providing extensive networking capabilities within the colocation facility, organisations only need to consider the connection between their offices and Equinix. Not only does this reduce complexity and increase performance, it also offers peace of mind that both current and future needs can be met without major overhaul.

- **Direct Interconnection** offers the highest possible speed connectivity between parties within the same physical facility. For example, an interconnection could be created between a high-transaction online retailer and a financial service company, or a research organisation and an analytics partner, or indeed a manufacturer and a cloud-based SaaS provider.

- **Cache arrays** enable consistent content delivery even when the amount of content to be transferred cannot be predicted in advance. For example, online content and gaming sites may wish to launch a new service, but with no clear picture of how much it will be used. Placing an array of cache servers at the edge of the network takes the load away from core servers and corporate systems.

Options such as these facilitate decisions about how best to structure applications depending on how they will be used. For example, legacy and back-end systems can be hosted in the corporate data centre; a high-bandwidth data connection (Ethernet or MPLS) can connect the data centre to one or more Equinix facilities; a combination of technologies can be used to ensure applications are integrated and delivered to remote users with minimal latency.
Dynamic, scalable resource distribution

The final piece of the puzzle is to ensure that the resulting application architecture can be administered and managed. Many applications can be scaled in advance but some will need reconfiguration as needs change and loads are better understood.

One example of this comes from ThousandEyes, with whom Equinix has partnered and licensed a service that enables operations managers to view and reconfigure application architectures based on actual latency and performance requirements.

Using facilities such as these, organisations including Box.net, Zynga and indeed Equinix themselves have been able to build service-based architectures to support the scalable delivery of applications to remote users, wherever they are in the world. So, how can organisations achieve the same benefits?
Service-based application delivery changes the nature of what we mean by application architecture. Whereas traditional applications were considered in terms of a software stack built on a single hardware platform, they are now intrinsically distributed. This does not mean that physical infrastructure no longer needs to be considered; rather, those who design and deliver software can choose how and where to deploy each application to best meet the needs of its users.

There are no hard and fast rules: the best approach for one application may not be appropriate for another. As we have seen, latency is not the only criterion to take into account in application architecture decisions, which are also dependent on:

- **Data security** in terms of physical infrastructure, software design and operational processes. Equinix locations are maintained at the highest levels of physical and operational security, minimising the risks sometimes associated with in-house data centres and server rooms.
- **Governance** in terms of both risk management and information management. Colocation with service providers within the same data centre enables organisations to use cloud services while keeping their auditors happy.
- **Integration** with both external cloud services and legacy, back-end systems. Centring the application on Platform Equinix maximises the accessibility of both and minimises the potential for bottlenecks.
- **Manageability** – even if an organisation is migrating its business users to cloud services it still needs a central point of command and control – such as that provided by Equinix Enterprise Cloud Gateway management and monitoring tools.

So, some line of business applications may be kept in-house, for example for governance reasons or because of existing interdependencies; or more complex applications may best run locally on desktop computers, with data being stored remotely. For business-critical, latency-sensitive applications and services requiring maximum security and resilience, the best option may be to benefit from Equinix facilities such as those listed here. It is important to consider each application and usage scenario on its merits, and decide an appropriate location (in-house or otherwise) accordingly.

For new applications, then, organisations have a wealth of new options. But what of existing applications that are already in place? Decision makers should not feel under any pressure to migrate existing applications wholesale – there simply is no need. However some applications, particularly those with performance or latency issues, may be candidates for migration – in whole or in part. To help organisations understand the options available, we have developed the Equinix roadmap to the Cloud Enabled Enterprise, as shown in the diagram

While an organisation’s applications may currently reside more in stages 1 and 2 of the roadmap, options available in stages 3, 4 and 5 may be appropriate for individual applications. Once again, it is important to take each on its own merits.
Equinix Roadmap to the Cloud Enabled Enterprise

1. **LEGACY INFRASTRUCTURE**
The starting point for most enterprises with in-house legacy systems.

2. **DEDICATED CONNECTION**
Private connection from a choice of carriers, bypassing the Internet to reach the Equinix ecosystem of best-of-breed cloud providers.

3. **CLOUD GATEWAY**
Small footprint with core services that deliver Single Sign On (SSO) from legacy systems to public cloud services, even during in-house outages.

4. **PRIVATE CLOUD**
Virtualisation infrastructure that scales over time as business applications are migrated to it, minimising risk and capital investment.

5. **HYBRID CLOUD**
Seamlessly integrated public, private and legacy components allow the business to “use the right tool for the job”, offering maximum flexibility and agility.

6. **PUBLIC CLOUD**
In the long term public cloud services displace legacy and private components, with Platform Equinix™ being the neutral point of interconnection.
Changing business and working practices make traditional, in-house application delivery less and less viable. The future is very quickly becoming the present – while people need to be able to work anywhere, they still have the same expectations on applications and services as if they were sitting at a desk in a central office. Too often, this is not the case – applications run slowly, service quality becomes unsatisfactory and productivity suffers as a result.

While service-based approaches hold the answer, they put increasing demands on infrastructure. Processing, storage and networking capabilities need to deliver as efficiently as if they were operating on the local LAN, but at Internet scale. As the centre of gravity of IT shifts away from corporate data centres and across a number of service providers, the challenge becomes how to deliver across such a highly distributed infrastructure.

Fortunately, a number of options exist to help ensure that users can access the applications and services they need. Platform Equinix is designed from the ground up to deliver on the distributed technology needs of today’s organisations. By incorporating capabilities to maximise performance and enable direct connection between corporate systems and services from third party providers, Equinix can ensure that business users can access applications and services with maximum efficiency.

The benefits of working with a provider such as Equinix go beyond simply responding to today’s user needs, however. For example, once applications are accessible from anywhere, an organisation can introduce (more) flexible working, or enable access from international locations as part of a new globalisation strategy. New application delivery models, based on resilient infrastructure such as that provided by Platform Equinix, enable even the smallest company to reach to the ends of the globe.

Moving applications to the most appropriate location can resolve application service delivery issues, but only if this is done in the right way, putting the right capabilities in the right places to meet business requirements. Taking applications into an expert data centre environment and applying the right model of hybrid cloud delivery can ensure that both goals are achieved. And Equinix can help you Make Your Move.
Equinix, Inc. (Nasdaq: EQIX), connects more than 4,000 companies directly to their customers and partners inside the world’s most networked data centers.

Today, enterprise, cloud, networking, digital media and financial services companies leverage the Equinix interconnection platform in 31 strategic markets across the Americas, EMEA and Asia-Pacific.

By connecting directly to their strategic partners and end users, customers are forming dynamic ecosystems inside Equinix. These interconnected ecosystems enable companies to optimize the performance of their content and applications and protect their vital digital assets.

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