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A RESILIENT INTERNET PEERING ARCHITECTURE FOR EMEA

EQUINIX WHITE PAPER

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INTRODUCTION

Peering has been a fundamental component of network and content providers for more than 20 years, providing an open and trusted model for traffic exchange that has underpinned the growth of the internet. As we consume more and more internet-based services, we ask, “Is the existing peering architecture sufficiently resilient to deliver the digital experience required? What trends are emerging as network and content providers re-shape their peering infrastructure to meet the demands of our digital future?”

A RESILIENT INTERNET PEERING ARCHITECTURE FOR EMEA

Executive summary

- For maximum resilience and relevance in the emerging digital economies, network and content providers should deploy and scale their peering edge nodes at major digital hubs that also serve public cloud, digital media, IoT and other sectors
- As organizations expand and embrace global opportunities, availability of a globally consistent platform for secure and high-performance interconnection will be important
- Providers should leverage multiple internet exchanges (IX) within a metro area to build diversified routing alongside supplier resilience
- Peering architecture in EMEA differs widely from country to country. In some locations it has grown up around a very centralized peering ecosystem that can be considered a single point of failure. Businesses need a strategy to diversify the peering edge and leverage new hubs that are sufficiently remote and offer geographic resilience
- The demands of future content delivery and consumer quality of experience will combine with resilience requirements to drive new regional peering models. This will mean stronger primary hubs in smaller EMEA countries and the emergence of strong secondary peering hubs in large EMEA countries

Introduction

Internet traffic is constantly changing and shifting around us. Through our access to the internet, both our personal and professional lives have become more interconnected, with digital ecosystems and digital services assuming a more fundamental role. With this in mind, network and content providers are now focused on a new resilient peering architecture that supports the following trends:

- Internet traffic is no longer best-effort. Enterprises rely on internet-based services to collaborate with suppliers, partners and customers, while billions of dollars, pounds and euros are spent every day across an e-commerce ecosystem that touches every aspect of our lives
- Internet traffic continues to grow at exceptional rates, powered by IP Video, Mobility/5G and a myriad of new high-bandwidth services emerging in the next few years. Overall, IP traffic is forecast to grow at a Compound Annual Growth Rate (CAGR) of 24 percent from 2016 to 2021.¹
- The existing peering nodes are seen by many countries and governments as critical elements of national infrastructure. However, some elements are not adequate for the future demands and it's important to focus on how they are interconnected, used and consumed

¹ Source: Cisco -- Visual Networking Index: Forecast and Methodology, 2016–2021, June 7, 2017

A brief history of peering

Rapid commercialization of internet services started at different times in different countries, but the years 1990-1994 are generally regarded as formative. In North America, we saw the transition from the NSFNET backbone to a more commercial platform and the emergence of MAE-East and other Network Access Points (NAPs). In Europe, commercial ISPs launched at the same time, building transatlantic connectivity as a means of connecting to the new backbone. As consumption increased, this connectivity model proved inefficient and in Europe, by early 1994 organizations realized that a local traffic exchange method was needed in order to scale. LINX, AMS-IX and DE-CIX appeared around this time, and we saw the birth of the Carrier-Neutral Facility (CNF) as a specific type of data center that hosted the first internet exchanges in Europe, enabling providers to exchange traffic locally.

In the second half of the 1990s, the growth of internet services continued at an exceptional pace around the CNF model. Within this environment the organic growth of fledgling ecosystems began, diverging between different countries, with some peering ecosystems becoming more distributed than others, and some countries seeing a dominance of one or two providers or locations. Whatever model and architecture began at this early point is generally the same one that exists today. When we overlay the resilience and redundancy requirements of today's internet on these models and deployments, we begin to understand that changes are needed—and in some markets, it is an urgent call to action.

Resilience starts with peering nodes inside vibrant digital ecosystems

The global digital economy is moving forward on the back of converging trends in internet, cloud, mobility and internet of things (IoT). Internet peering sits at the heart of this revolution, as perhaps one of the key foundational elements in developing digital supply chains. This has implications for peering strategy and architecture beyond previous considerations.

A peering platform fit for the future and one that is resilient to disruptive new services, providers and ecosystems needs to be located within these emerging digital hubs. By deploying the new peering infrastructure in this way, network and content providers can ensure that their service platforms are always best placed to address the needs of the broader digital economy. The impact of the “network effect” is therefore not only due to internet peering participants, but also to those in adjacent sectors, giving operators maximum value from their peering edge nodes. Those adjacent sectors include public cloud, digital media and IoT, and these are some of the ecosystems alongside which peering should collocate.

Once these digital ecosystem locations are identified, it is important to ensure that there is a strong supply of interconnection models across the full spectrum of peering options: private, public and transit, which ride on data center infrastructure services such as cross connects, metro connects and internet exchange platforms. As most readers will know, private direct peering is highly desired if traffic to and from third parties becomes very large. At the other end of the scale, internet transit services are useful for broad access to all internet destinations at a competitive price. Public peering via internet exchanges provides coverage capabilities somewhere between these two, enabling participants to balance a targeted and aggregated approach with efficient interconnection models and moderate costs.

By deploying peering nodes in these rich ecosystem hubs that provide access to all models and a variety of peers, network and content providers, it will lay the foundation for an effective and highly resilient peering strategy.



Platform resilience—use of multiple internet exchange platforms

A dual vendor or dual provider strategy is well-understood in many areas of telecommunications and internet infrastructure; however, up until very recently, it hasn't always been adopted within the field of internet peering. That is starting to change, and in a number of markets, we see the trend towards use of multiple IX platforms increasing.

A dual IX platform/vendor strategy can help network and content providers achieve resilient peering in a number of ways:

- It provides platform resilience to protect against software bugs or other operational issues that may affect a single IX, but not the alternate
- Using two IX providers in a given country or metro market delivers administrative resilience, insulating network and content providers against any sudden changes in partner status
- A strategy to consume services on a pair of IX platforms helps generate a healthy competitive environment in a metro, ensuring that the proposition is robust, driving IX platform innovation in each market

As this trend takes hold, providers want to see dual and fully resilient data-plane options in major cities. If we consider the situation in London and the two major internet exchanges there, then we can see that to some degree this transformation is already occurring, especially from the content providers.



LINX is one of the largest internet exchanges in the world, while LONAP is a highly professional and respected IX, providing services as an alternate operator for 20 years. Both providers are long-term Equinix IX partners across multiple London sites. A quick poll of the members of both LINX and LONAP in London shows a comprehensive list of internet content magnets: Netflix, Apple, Amazon, Akamai, Microsoft, LinkedIn, Google, Fastly, Twitch, Twitter and Yahoo.

The content providers see value in making their content available over a dual data plane in a major metro because they are attuned to the highly important need for resilience in the delivery of internet-based services. Network providers are less aligned to a dual IX model at present, but we are starting to see this shift as a dual IX platform architecture becomes a key component of a resilient approach.

If we jump to some of the smaller markets, such as Stockholm, Dublin or Milan, we see a highly competent primary IX; however, there is a void where there is not a credible and professional alternative such as a LONAP. These markets are in need of such a player.

At Equinix, we are committed to working as part of the peering community to support the drive for choice and resilience. In late 2017, we will accelerate this commitment further, with the launch of new internet exchange offerings in seven new EMEA markets. Whether it is as a provider of IX services or as a host of IX services for our partner IX providers, Equinix remains the home of internet peering in EMEA and will remain a venue of choice above all else. This choice remains a fundamental building block of a resilient architecture as scalable new internet services are brought online.

Geographic resilience

The organic early years' growth is perhaps the most important characteristic in the shape of the peering infrastructure that we see today, in particular when we look at the geographic dispersion of peering locations. One of the classic examples found in the industry is the "Docklands" model, which is found in London and emulated in other markets, notably at Via Caldera in Milan.



As internet peering expanded rapidly in the years after 1995, a small number of locations in the Docklands area of East London carried the internet traffic of the entire UK. These included and still include the different Telehouse sites, Sovereign House and Equinix LD8 (formerly Telecity Harbour Exchange). These facilities are located extremely close together, just a kilometer or so apart. In the search for resilience, this poses a problem for the industry. This problem first emerged in 2012, as the UK delivered significant new power and other infrastructure into the same part of London for the Olympics, while a number of subsequent failures have prompted providers to reassess the Docklands model in its original form. The cost of these failures is just too high, with hundreds of thousands of subscribers affected. A more resilient geographic spread is clearly needed to protect future internet growth.

The answer has been to identify and start building upon a new internet peering hub. In London, this location is the Equinix campus in West London, which is around 40km away from Docklands. The emergence of such an alternative peering hub is a crucial step in a resilient architecture. It protects against a major geographic single point of failure and also provides for a more scalable model to meet the demands of future traffic growth. Major content and network providers are already starting to deploy larger peering edge nodes at these alternative sites, with some looking to cap the original locations in order to reach a 50/50 split.

A note on market fragmentation:

While most metro areas are driving toward this future with a resilient internet hub, a small number may have a different challenge. Dublin, and to a lesser degree Paris, are markets that have not been able to benefit as much as they would like from the familiar network effect that has been apparent in London and Frankfurt. Some network providers believe these locations need to drive and develop better primary ecosystems through a concerted campus model. This is a debated topic, with competing viewpoints, and while this course may offer some initial short-term benefits, it may lead to an accelerated problem with geographic resilience in the future. In the end, the community needs to come together in these locations to agree on the solution.

Resilience and optimized content delivery through regional peering

As reviewed previously, at least two peering locations positioned a minimum distance apart can offer geographic resilience, typically on opposite sides of a major metro area.

However, if we also consider the future demands of content delivery alongside resilience, then we see that in some countries, the industry will need to go further. Consider large EMEA countries such as the UK, France and Germany, each of which builds its internet peering around a single metro area, such as London, Paris and Frankfurt. The first point to note is that the population spread within the country is not always aligned to this single metro model. In addition, organizations should consider the myriad of services that may appear within the next five years: IoT, connected city, connected car, tactile internet and others that will come on the back of technology and bandwidth enablers like 5G and G.Fast. The performance requirements for these new services may not allow a centralized peering architecture around a single metro area. Businesses will need to find a model that has proximity, latency and quality of experience. That model is regional peering, and in addition to satisfying the proximity demands, it also creates even greater resilience in service delivery. Regional peering, as defined here, has two models:

- In large EMEA markets, at a minimum, we will see the emergence of a second metro area that begins to serve as an internet hub for areas of the population to which it has proximity. Markets that are good candidates for this include Manchester, Munich and Marseille
- In smaller EMEA countries, we will see the strengthening of the primary peering hub; examples being Dublin, Stockholm and Helsinki. While these markets have a mature peering and content architecture, some still believe there is too much traffic hair-pinning in and out of the EMEA super hubs (London, Amsterdam, Frankfurt)

The two trends above are in turn supported by the rise and need for data locality and data sovereignty and the strengthening of markets through subsea cable terminations. (Helsinki, Stockholm and Marseille are good examples of the latter.)

In order for these regional peering models to develop, a strong market for Carrier-Neutral Facility (CNF) operators is needed. In some smaller markets, the levels needed probably did not exist in previous years. However, with the growth of Equinix into these markets continuing, we can see that a broader spread of Tier-1 CNF is becoming the norm, and that is good news for a regional push.

As regional peering creates better service for consumers, it also helps data sovereignty and adds further resilience to the delivery infrastructure by creating diversity with new locations that can easily scale and take pressure off the original sites. The speed and scope at which these hubs will develop is contingent on the types of services that will emerge, but from a resilience perspective they make a lot of sense.

Conclusion

The growth in our digital ecosystems continues at a relentless pace, with traffic levels across all sectors continuing to grow sharply. The internet and peering is a crucial component of this economy, but in order to build a truly resilient peering architecture fit for the next twenty years, it needs further development. Let's get started...



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About Equinix

Equinix, Inc. (Nasdaq: EQIX) connects the world's leading businesses to their customers, employees and partners inside the most interconnected data centers. In 52 markets across five continents, Equinix is where companies come together to realize new opportunities and accelerate their business, IT and cloud strategies.

In a digital economy where enterprise business models are increasingly interdependent, interconnection is essential to success. Equinix operates the only global interconnection platform, sparking new opportunities that are only possible when companies come together.