Whitepaper: Market Development for Peering Centers

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Abstract

This document presents a review of peering centers through their history and evolution. Attention to the market and uses of these centers plays a critical role in their development.

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1 Introduction

Peering centers play a critical role in the stability, scalability and economics of the Internet. In today's market, peering centers are redefining their role and expanding their product portfolio. By focusing on their core function of interconnecting networks, peering centers are growing beyond the datacenter and taking on a regional approach. If there are multiple peering centers in one region, it is common to have them interconnected. How and why did peering centers evolve to play such an important role in today's Internet?

2 History

In order to understand the value peering centers bring to the Internet, an general review of their history is beneficial. There are whitepapers and books outlining the history of the Internet and the subject will not be covered in detail here, however a short review focusing on interconnection and current peering strategies follows.

2.1 In the Beginning

When the Internet was conceived, it held the mission to support the US military command and control networks. In order to handle adverse as well as calm conditions, the design involved networks interconnected in an arbitrary mesh. The initial backbone network to which other networks were interconnected was the ARPANET. As research expanded, the US National Science Foundation helped build the second backbone network known as the NSFNET. The Federal Internet Exchange (FIX) served as the interconnection between the federal and academic networks. Similar efforts sponsored by governments were developing networks world-wide (EBONE,CANARIE and WIDE to name a few). In 1989, commercial Internet use and interconnections started in the US. In 1990 the commercial backbones (UUNET, PSINET and CERFNET) formed the Commercial Internet exchange (CIX) to share commercial traffic not permitted on the NSFNET backbone.

Each member of the CIX would bear the cost of connecting to the CIX switching site and exchange routing information with the other members. The exchange of the routing information was called "peering" because each ISP connected acted as equals (ie: peers).

2.2 Beyond the CIX

Over the next few years, the Internet backbone grew and migrated away from ARPANET (shutdown in 1990) and the NSFNET (shutdown in 1995) to a collection of commercially run backbones. In order to assure that these backbones continued to be fully connected, the US Government sponsored interconnection points known as Network Access Points (NAPs). At the same time, commercial efforts were underway to solve the same problem. Metropolitan Fiber Systems (MFS), which is now part of WorldCom/MCI, developed their Metropolian Area Ethernet (MAE) service. MAE-East, located on the east coast of the US in the Washington D.C. area, was one of the largest and was very influential over the next few years. MAE-West, located in the San Jose area of California and the Palo Alto Internet Exchange (PAIX) emerged as leaders in their area. Europe also developed exchange points and the London Internet Exchange (LINX) was one of the largest.

2.3 Today's Picture

Since the mid-1990s, the Internet grew at a phenomenal rate creating numerous scaling issues. Simply put, demand out-paced the available technology. Internet exchanges, now commonly referred to as peering centers gave the ISPs a way to interconnect their networks with a great deal of flexibility. As a result, peering centers were very successful and grew as well. Most major cities in the US and Europe have a peering center. Peering centers are being developed across the globe to interconnect networks in all corners of the world. In addition to the centers connecting the major backbones, there are peering centers specializing in smaller ISPs and/or "regional" content but still with the same focus of network interconnections.

2.4 A Note about MLPAs

When the NAPs were created, a concept called a Multi-lateral Peering Agreement (MLPA) was instituted to assist in the peering configuration and maintenance as well as to assist in the connectedness of the backbones. The MLPA basically said that each member was obligated to peer with all of the other members. Many of the large ISPs were reluctant to agree to this arrangement as the membership could grow to include networks which were not equals (peers). Listening to the market, today very few exchange points institute an MLPA.

3 The Exchange Point Market

The success of peering centers revolves around the fact that they offer a necessary service, the interconnection of networks, in ways that are economically beneficial to its customers. However, the large global backbones do not need to be present at every exchange point for the service to be successful. Many exchange points target their services at the "intermediate" level networks referring to themselves as "regional" services.

3.1 Large ISP Requirements

Since the large ISPs use the peering centers to exchange a great deal of their customers traffic, they are highly dependent and concerned about the peering centers service. Understanding ISPs needs beyond the basic interconnection has played a critical role in the success or failure of peering center strategies.

Carrier neutrality allows ISPs to feel comfortable that they will have a choice for their carrier and transport needs. As competition grew, most large ISPs became part of a carrier and none wanted to be a customer of the other.

Hardened datacenter environmentals, security and control gave the ISPs a dependable service. Note that not all NAPs and exchange points use a colocation datacenter model but instead use an SMDS, Frame Relay or ATM service. Scalability and flexibility made the colocation model desirable for many ISPs. When this model was desired, a hardened datacenter was a necessity.

Reliable operations gave ISPs the confort that interconnections were going to be done right and on-time, and when issues did arrive they were dealt with quickly.

These needs developed into a trust relationship between the ISP and the peering center provider. As the trust grew, so did the dependence and importance of the peering center.

3.2 "Regional" Peering

"Regional" peering exchanges are basically the same thing as a more classical exchange. They offer the same suite of products and services with the same basic set of requirements. The difference is that a "regional" exchange

targets networks and service companies within one specific market segment. Commonly this market segment is based on a geographic proximity to the exchange (ie: a regional exchange in Oklahoma City might target ISPs and content providers specializing in the Oklahoma City area).

4 "Developing" Countries

For the purposes of this whitepaper, a "developing" country is one that is still developing its Internet infrastructure. These countries are usually dominated by a local monopoly. Some countries allow "intermediate" or tier-2/tier-3 providers while still maintaining basically a monopolistic environment for inter-country telecommunication services.

4.1 Competition Equals Cost Reduction

In the presence of any sort of competition, peering centers can play a key role in the cost reduction and viability of new ISPs. Regional peering points can potentially reduce costs by allowing new ISPs to exchange traffic among their respective customers reducing the ISPs dependence for global transit service. This stimulates competition on all levels: local, regional and global telecommunication services and should lead to better service at a reduced price for the consumers.

4.2 Seeding External Growth

The neutrality of a peering center (not being the incumbent provider) can potentially seed and stimulate growth and support from external networks with a desire to build into the country. Having a neutral peering center within a country can be viewed as a significant step toward local competition and growth. External companies can use peering centers as a key node within the region for traffic aggregation and exchange. This leads to additional infrastructure growth and competition leading to more investments in the country.

4.3 Good for the Country

The spread of the Internet is very much dependent upon the availability of telecommunications infrastructure, reliable power and trained staff. All of these requirements are good for businesses within a country as well as the general population. A country can take advantage of the Internet even if the

infrastructure is not widely deployed within the country. Exporting talent either in products or services via the Internet to other countries without having people leave the country is obtainable and proofs already exist.

5 Exchange Point Futures

Exchange points provide a critical service to the Internet. While the definition of an exchange point is growing to include fiber connections in the metro area and multiple peering centers connected together to better service their customer bases, their primary function remains the same: the interconnection of networks.

References

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