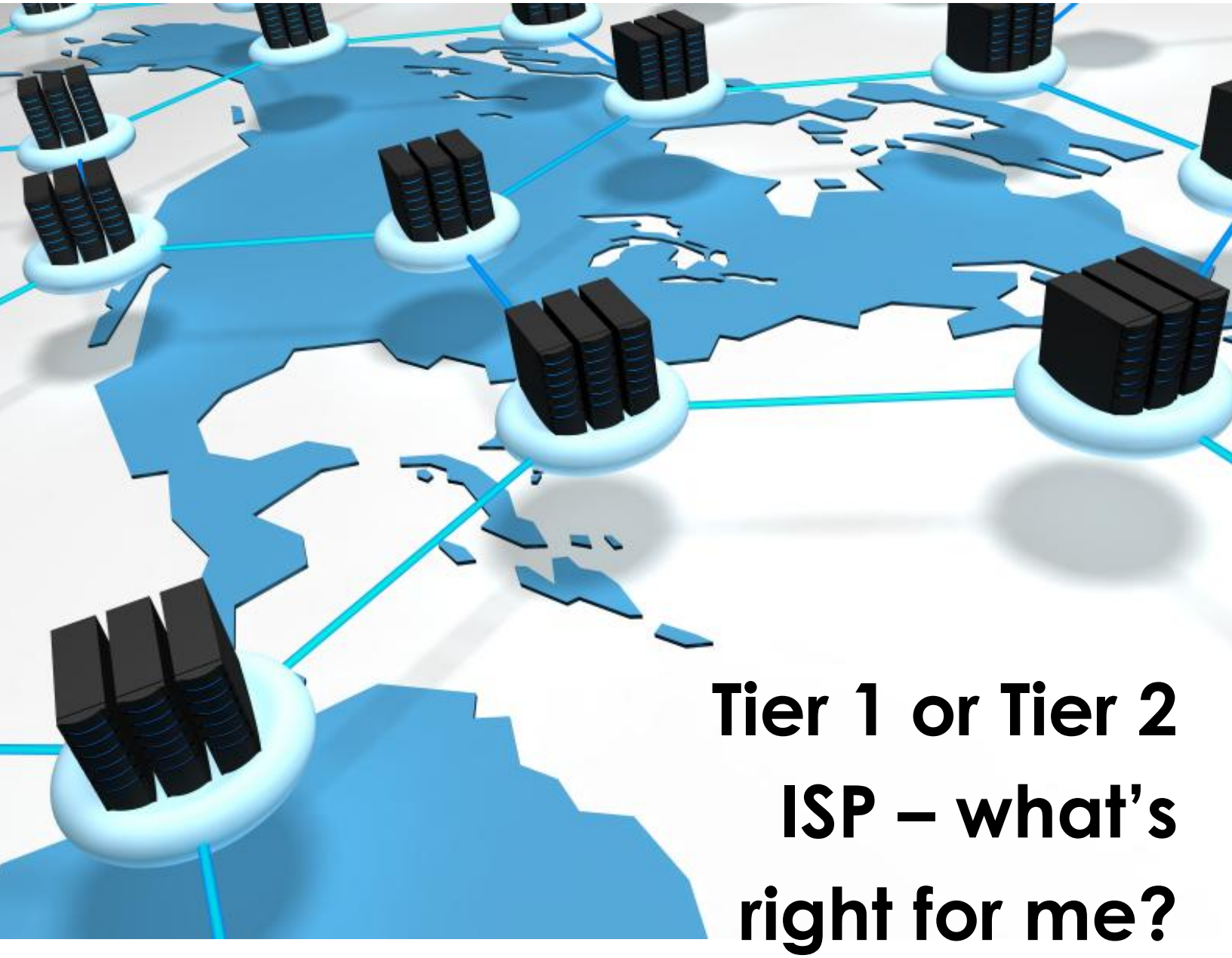
A PacketExchange White Paper



Tier 1 or Tier 2 ISP – what's right for me?

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Should I choose a Tier 1 or Tier 2 Internet Provider?

The Internet is a tool that is enabling ubiquitous communications. From our computers to our handheld devices, televisions, video surveillance, financial institutions, hospitals, homes and beyond, applications are continually developed that require end users the ability to access higher bandwidth speeds. But speed isn't the only factor to consider when evaluating quality Internet transit: access to content and the quickest route (reduced latency) is important to realizing optimal IP connectivity as well. Content providers, ISPs, Cable companies and telcos that service the general marketplace are continually evaluating the most efficient routes and the providers that offer those routes in order to achieve the best cost and quality service for its end users. This is why it is important to understand the differences between Tier 1 and Tier 2 IP backbone Providers to ensure the end-user experience is the best balance of both price and quality.

To understand how to choose an IP backbone provider, we first should understand how providers differ from one another. Tier 1 network providers are networks that peer with all other Tier 1 networks, settlement free (ie; no money changes hands). Tier 1 networks pass traffic between each network for free; there is no cost to transit another Tier 1 network's backbone. Tier 2 IP backbone providers must pay to transit another network's backbone that includes buying transit from Tier 1 networks as well as other Tier 2 networks, though there is often the opportunity to peer (exchange traffic destined for each other's networks at no cost) with other Tier 2 networks.

Most of these peering interconnection points are done within colocation facilities, like Telx. Telx is also an example of an interconnection facility that also offers an Internet Exchange platform, the Telx Internet Exchange (TIE), to facilitate peering between Tier 1 and Tier 2 network providers on a platform, managed specifically for the purpose of offering the greatest number of networks through a single connection (or port). As networks interconnect with one another, Internet traffic can pass over other networks that are controlled by engineers seeking the best (can't say that—engineers don't care about price!) price, distance or latency and the number of 'hops' (the number of routers or networks traffic has to pass through to reach its end point), which could affect latency and price (adversely).

To further complicate matters, the routing tables that decide which path the data should travel are highly complex. The Internet routing table is made up of about 300,000 individual routes that represent IP address ranges. A Tier 1 network, by definition, is required to peer with all other Tier 1 networks and by definition, does not have to pay to route traffic to another Tier 1 network (or any of those specific IP routes). Therefore, since sending traffic over a Tier 1 peer doesn't cost anything, these providers are motivated to get traffic off their network as quickly as possible. But this will not help the end-user who is streaming live video from a cable provider, for example. By doing so, Tier 1 Network providers send traffic via routes that are learned through other Tier 1 providers, regardless of performance, flexibility or redundancy. In addition, since routing traffic among Tier 1 peers is free, it is extremely cost effective to sell access to their networks, particularly to content heavy users (gigabit connections and higher). Therefore, Tier 1 IP backbone providers can offer reduced IP transit costs. However, since they are

motivated by cost-savings, quality isn't a factor in how traffic is routed. Therefore, price, not quality, is achieved but rarely both.

Tier 2 network providers, inherently, have many more routing options to choose from – since they are buying transit routes no matter which provider the traffic needs to traverse. However, these purchasing decisions can be made for a variety of reasons, including the type of traffic, the global reach required, budgets, network speed required and more. This flexibility also creates an immense amount of confusion to buyers, since clearly some Tier 2 networks route solely on price, or quality or luck of the draw. So choosing the right Tier 2 becomes critical.

There are many ways to test network providers' routing choices, but at the end of the day buyers should consider the following:

1. The extent (quantity + quality) of the provider's global peering relationships
2. The ability to provide quality end-to-end solutions
3. The flexibility in providing its services
4. The companies the provider partners with
5. Perhaps most importantly, the customer service provided throughout the process

Since Tier 1 network providers are motivated to keep get traffic off their network as quickly as possible through their other Tier 1 peering relationships, the buyers' experience can be unpredictable. A Tier 2 network provider, such as PacketExchange, can offer visibility into its routing procedures, which ensures IP traffic will be routed through the most direct and closest path; this direct path provides a more reliable transit solution. In addition, quality Tier 2s like PacketExchange who manage multiple, global peering relationships have the ability to configure the network to consistently optimize the IP route.

When evaluating providers, here are a few key questions to consider:

1. How many global direct peering relationships does the provider have?
2. Which Tier 1 backbone providers does it connect to?
3. Where can you interconnect to the provider?
4. Are there SLAs offered?
5. Lastly, during the process it is important to recognize how questions were answered and how quickly you received a response.

PacketExchange has focused its business model on creating more efficient peering connections among other Tier 2 providers in order to deliver content and streaming media more efficiently for and between its customers. The company's goal is to connect to as many networks as it can, in as many locations as possible, in order to bypass the Tier 1 'inner circle' as often as possible. This doesn't mean that Tier 1 providers are not necessary, because indeed they are – but more often than not, Tier 1s are not the shortest or more efficient route to a destination from a cost and quality stand-point.

Another factor is whether a buyer has its own Autonomous System Number (ASN). Today there are over 43,000 unique ASNs active in the routing table, which allows each network to connect to the Internet. A benefit for a network to have its own ASN is the ability to multi-home. Multi-homing is the ability to connect to multiple transit providers in order to improve performance. It provides operators the ability to route traffic through a best route, as well as having an alternative redundant provider should a network connection fail. In order to have a multi-homed solution, a provider must use Border Gateway Protocol (BGP), and in order to BGP, a network operator must have an ASN.

As a buyer evaluates its Internet backbone options, consider multi-homing as well. This will give network operators the opportunity to choose a primary provider as well as a secondary provider. This will ease the burden on your network decision, since you could purchase transit from two complimentary providers – which could include both a Tier 1 and a Tier 2 IP backbone provider – just make sure the Tier 2 is not already buying from your Tier 1 choice.

For more questions on how to choose your network provider, either a Tier 1, Tier 2 or even both, please email enquiries@packetexchange.net.