

# Peering Trend and Practice

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# Brief History of Internet



In **1983**, A new communications protocol was established called Transfer Control Protocol/Internet Protocol (TCP/IP).

- This allowed different kinds of computers on different networks to "talk" to each other.
- All networks could now be connected by a universal language.

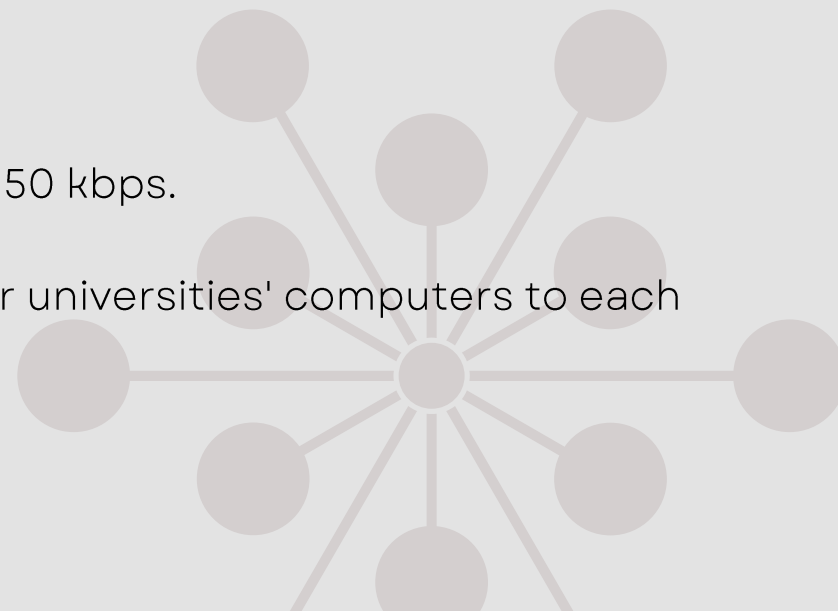
In **1991**, the Internet became available for public access.

1980s

1960s

The Internet started in the **1960s** as a way for government researchers to share information.

- Publishing "ARPANET" in **1967**.
- Proposed line speed 2.4 kbps to 50 kbps.
- In **1969**, it initially connected four universities' computers to each other.



- In **1989**, Tim Berners-Lee, a British scientist, invented the World Wide Web (WWW).

1990s



# Internet Architecture

## Tier 1 Networks

are the backbone of the global internet. Tier 1 companies are linked through peering agreements, granting free access to each other's networks and those to whom they sell transit.

## Tier 2 Networks

also have peering agreements with other networks, but much purchase IP transit from at least one company to reach the entire network.

## Tier 3 Networks

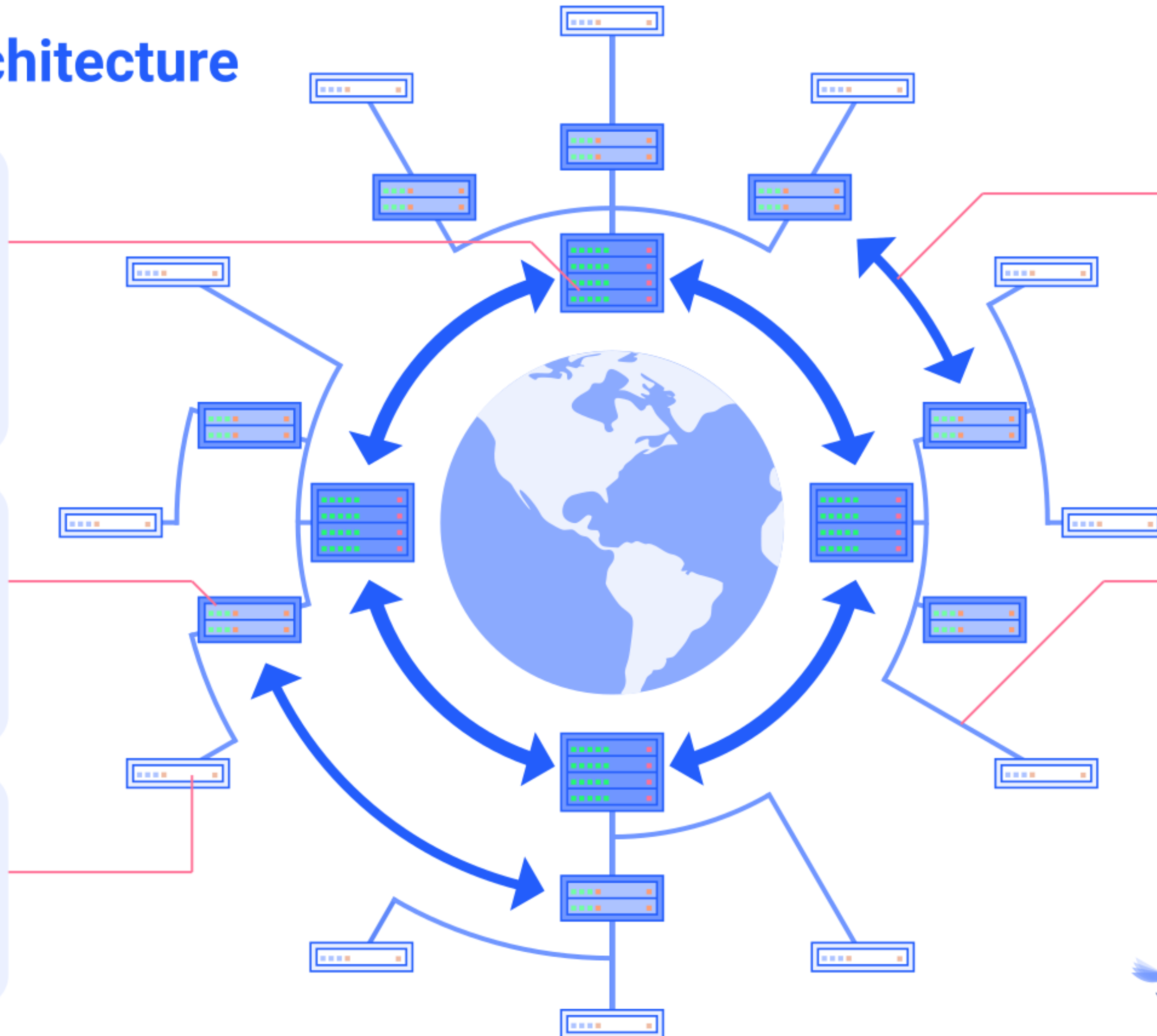
are smaller regional networks that rely on IP transit to access anything beyond their own infrastructure.

## Peering

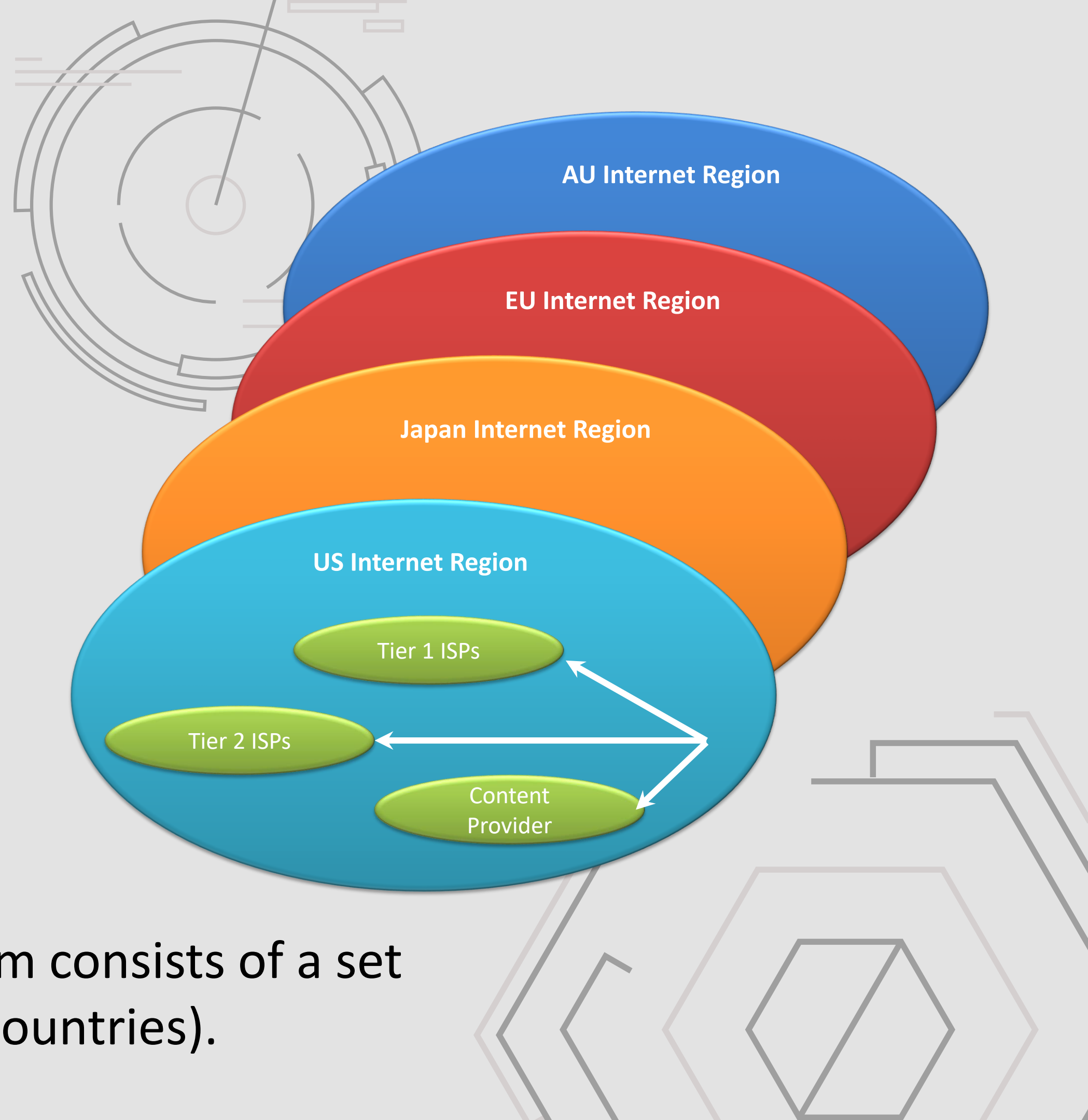
is a voluntary interconnection of separate networks to exchange traffic. Peering grants access to a company's entire network and the networks to which it sells transit. Neither party pays the other for access.

## IP Transit

allows traffic to cross a network for a fee. Purchasing transit from a larger network gives access to that network, its peers, and all their downstream customers that have also purchased transit.



# The Global Internet Peering Ecosystem



The Global Internet Peering Ecosystem consists of a set of interconnected internet regions (Countries).

# Tier 1 ISPs

## Peering Motivation

- Tier 1 ISPs don't pay transit fees, so they are only motivated to peer with each other as a way to provide connectivity for their customers.
- Generally, Tier 1 ISPs don't want to peer with non-Tier 1 ISPs.

## Peering Policy

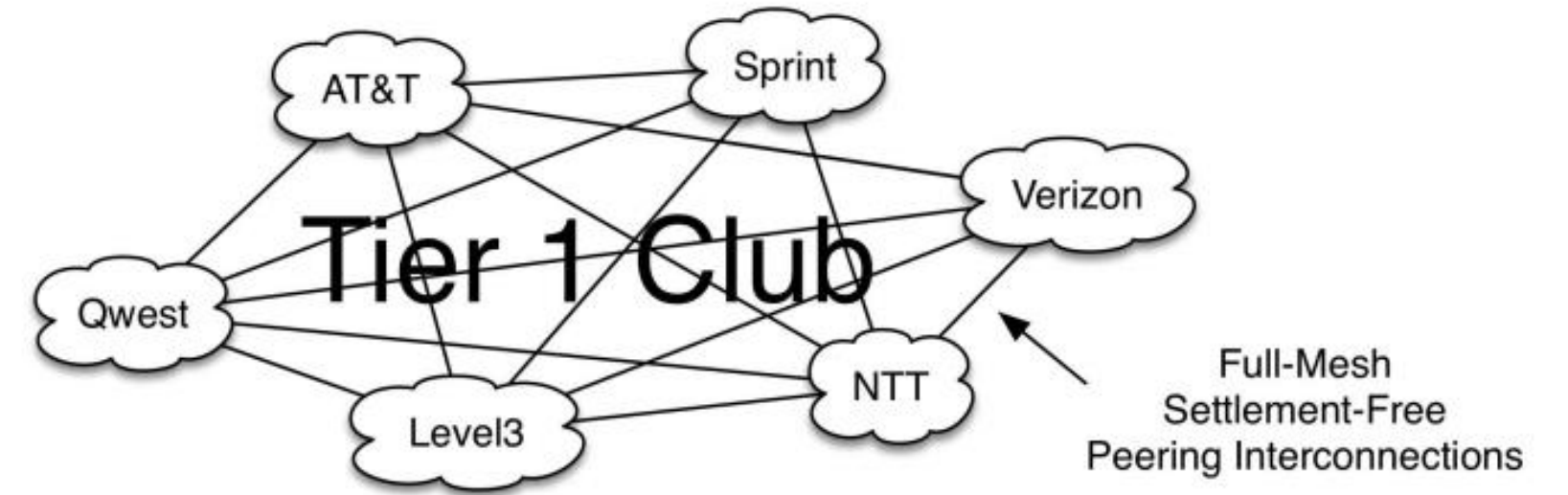
- Most Tier 1 is seen as Restrictive Peering Policies.

Reference

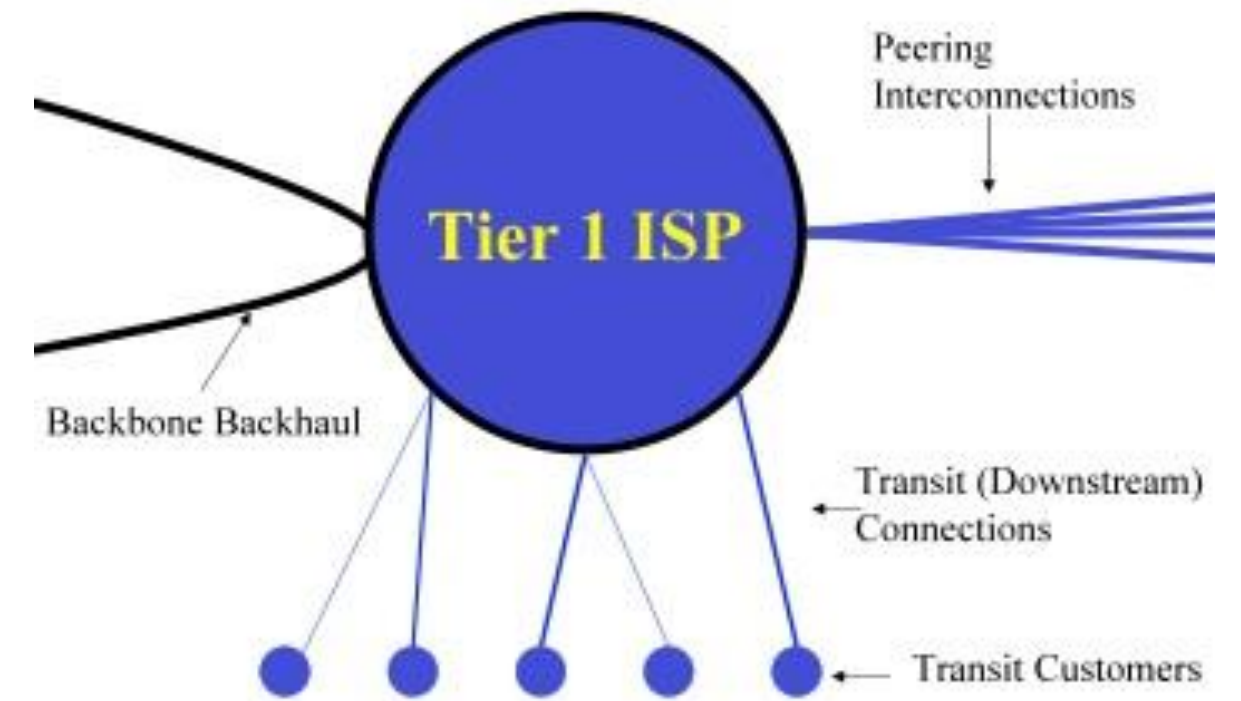
Qwest - [http://www.qwest.com/legal/peering\\_na.html](http://www.qwest.com/legal/peering_na.html)

AT&T - <http://www.corp.att.com/peering/>

Verizon - <http://www.verizonbusiness.com/terms/peering/>



Tier 1 ISP Peering Interconnections



Tier 1 ISP Model



# Case Study

**International Story.** For example, a large international ISP built into Brazil and was able to negotiate peering with the dominant regional Tier 1 ISPs, with the argument that it did not represent a serious threat to their home market, and that the free access to its international customers would be beneficial. Once established in that region, the international ISP obtained transit contracts with a few customers within the region, and that traffic traversed the peering connection.

**Telecom Italia.** One exception to the Regional Tier 1 ISPs doesn't peer rule exists in Italy. Telecom Italia is a formerly state-owned telephone company and Regional Tier 1 ISP in Italy. They peer openly in the region, preferring one interconnect point, but accepting multiple if the peer prefers. This is exactly the opposite of every story heard elsewhere in the world.

# Tier 2 ISPs

Tier 2 ISPs need to purchase Transit to access some part of the internet regions.

## Peering Motivation

- Tier 2 ISPs motivate to peer in region to reduce the transits cost.

## Peering Policy

- “Open” Peering or “Selective” Peering Policy

Reference

Example of Open Peering Policies

CAIW Netwerken - <http://www.as15435.net/pp/>

WISCNet - <http://www.eng.wiscnet.net/peering/>

NetAccess : <http://www.nac.net/eng/peering.asp>

Example of Selective Peering Policies

peer1 - <http://www.peer1.com/infrastructure/peering.php>

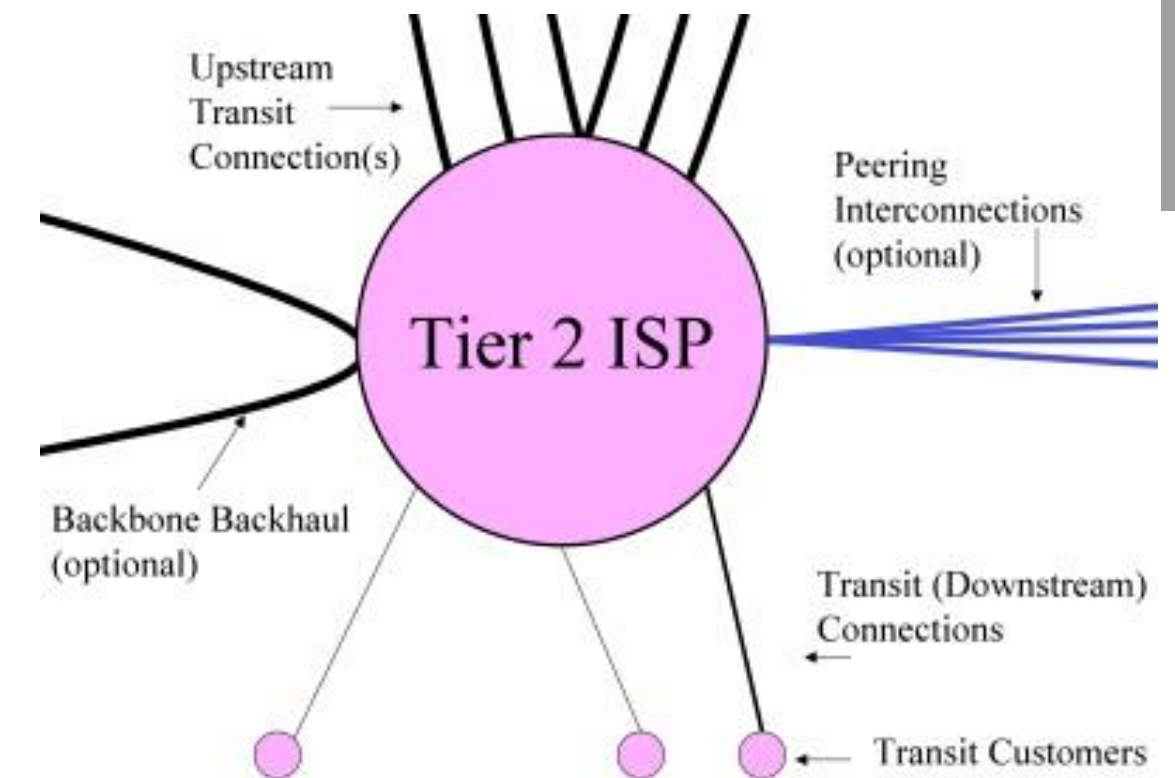
Bouygues Telecom - <http://peering.as5410.net/>

BT - <http://www.bt.net/info/peering.shtml>

EasyNet - <http://www.noc.easynet.net/network/public/peering.php>

AboveNet - <http://www.abovenet.com/peering/>

Comcast - <http://www.comcast.com/peering/>



Tier 2 ISP Model

# Content Provider

**Traditional content Provider :** focuses on content development and does not Sell access the Internet.

## Peering Motivation

- SLAs w/well known ISP

## Peering Policy

- “No Peering” Policy

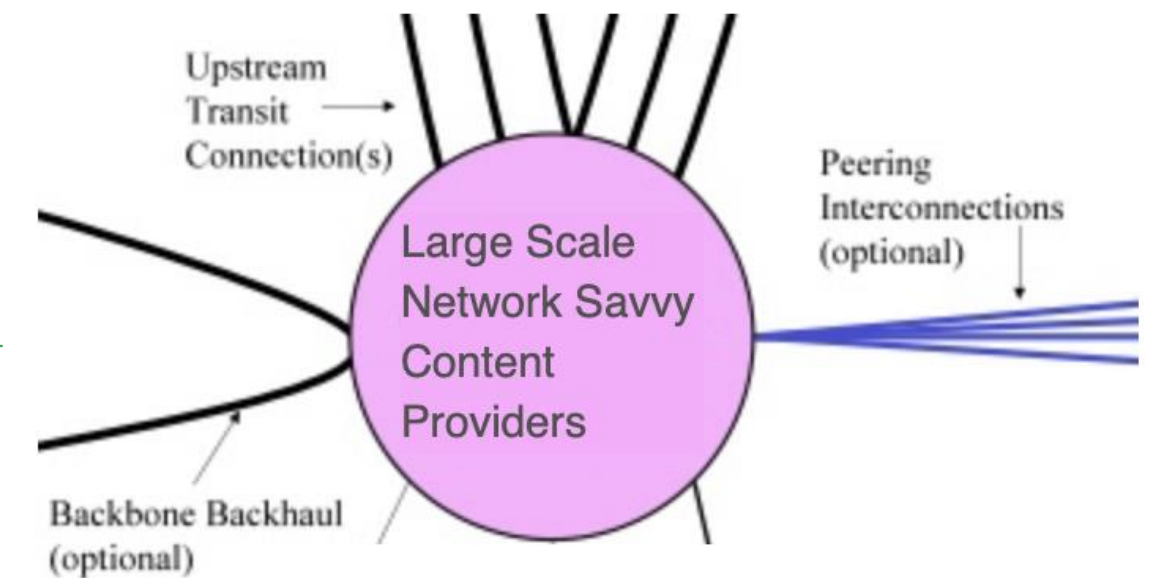
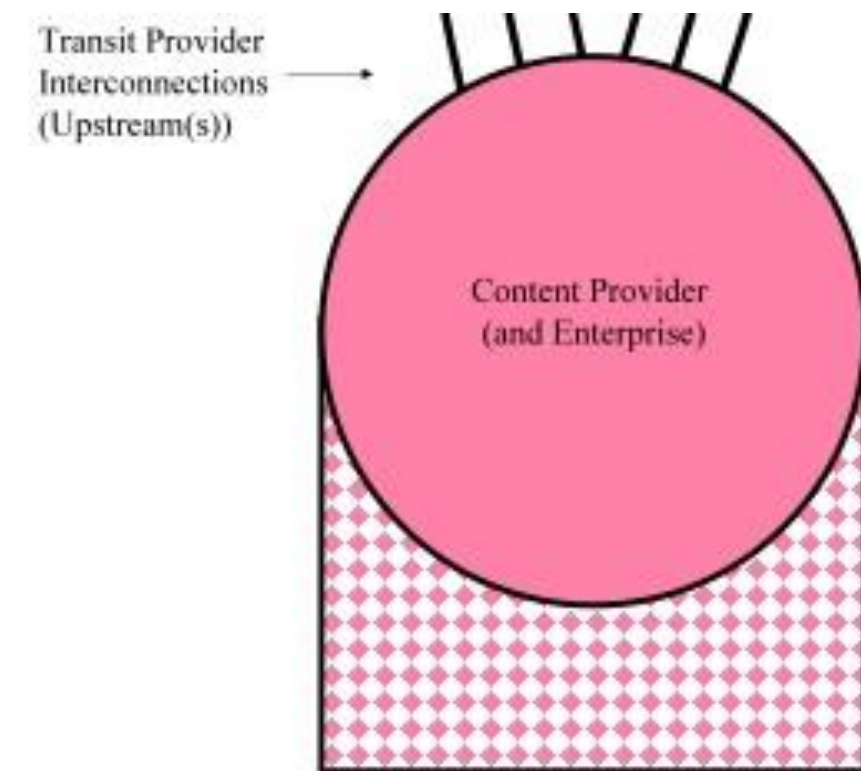
**Large Scale Network Savvy Content Providers :** are the group of Content Providers that have adopted Peering as a strategy for lowering traffic expenses, increasing their ability to control and improve the end-user experience.

## Peering Motivation

- Similar motivations to peer with Regional Tier 2 ISPs

## Peering Policy

- “Open Peering” Policy





# Cable Companies , aka Broadband Internet Service Provider

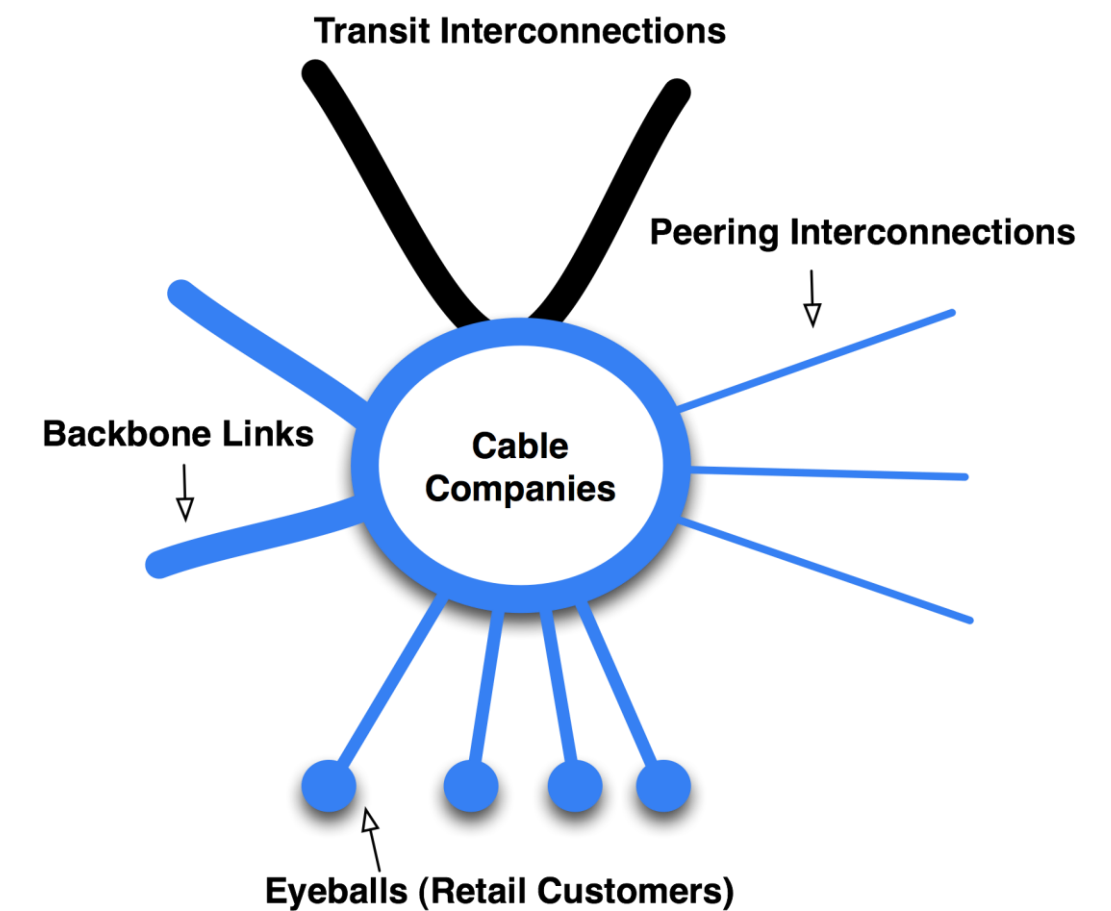
The cable companies are regional and don't tend to compete in overlapping areas, and they tend to pull enormous volumes of traffic.

## Peering Motivation

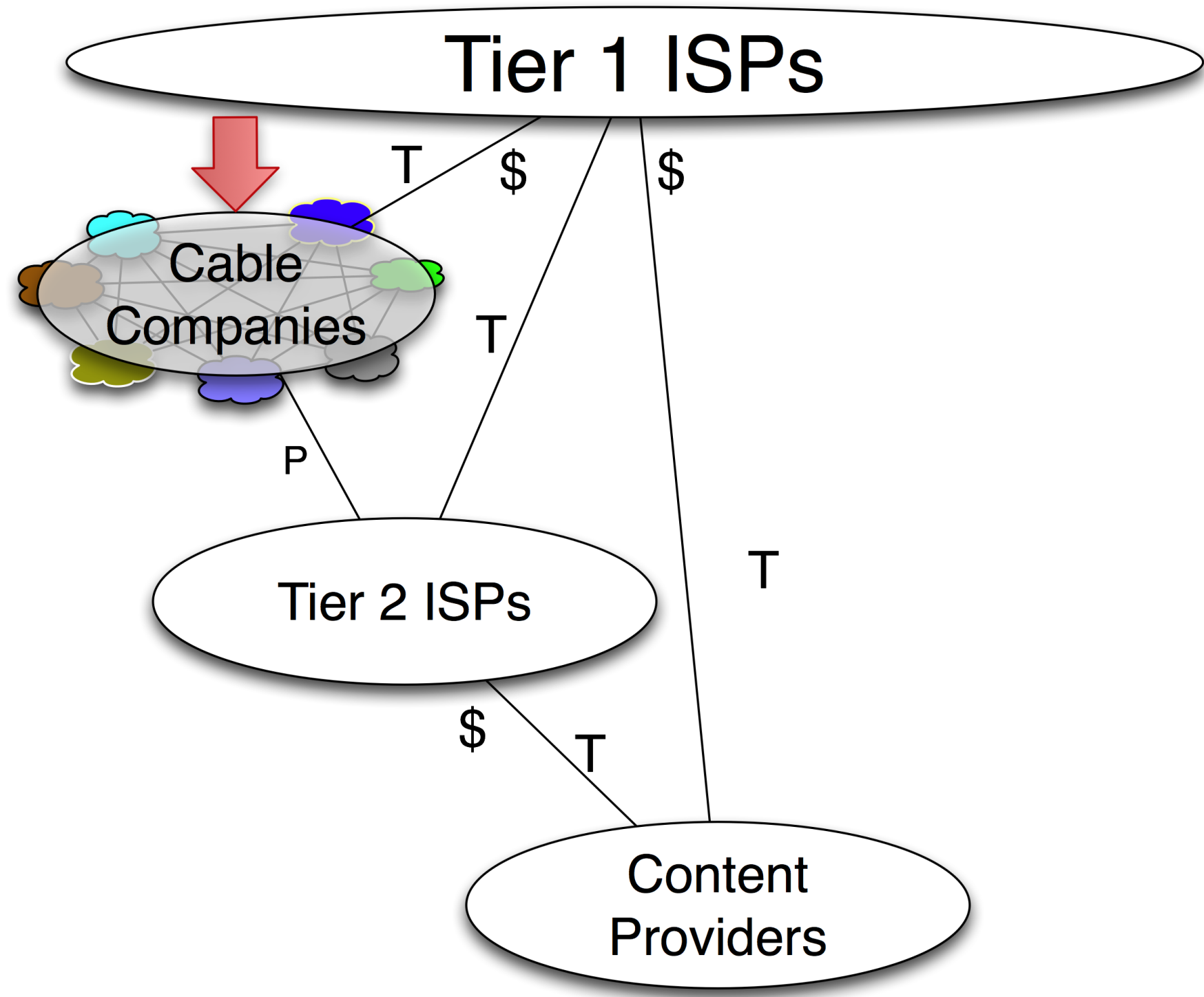
- Similar to Tier 2 ISPs, motivate to peer to reduce transits cost, avoid Internet transits traffic congestion, better customer experience

## Peering Policy

- “Open Peering” Policy

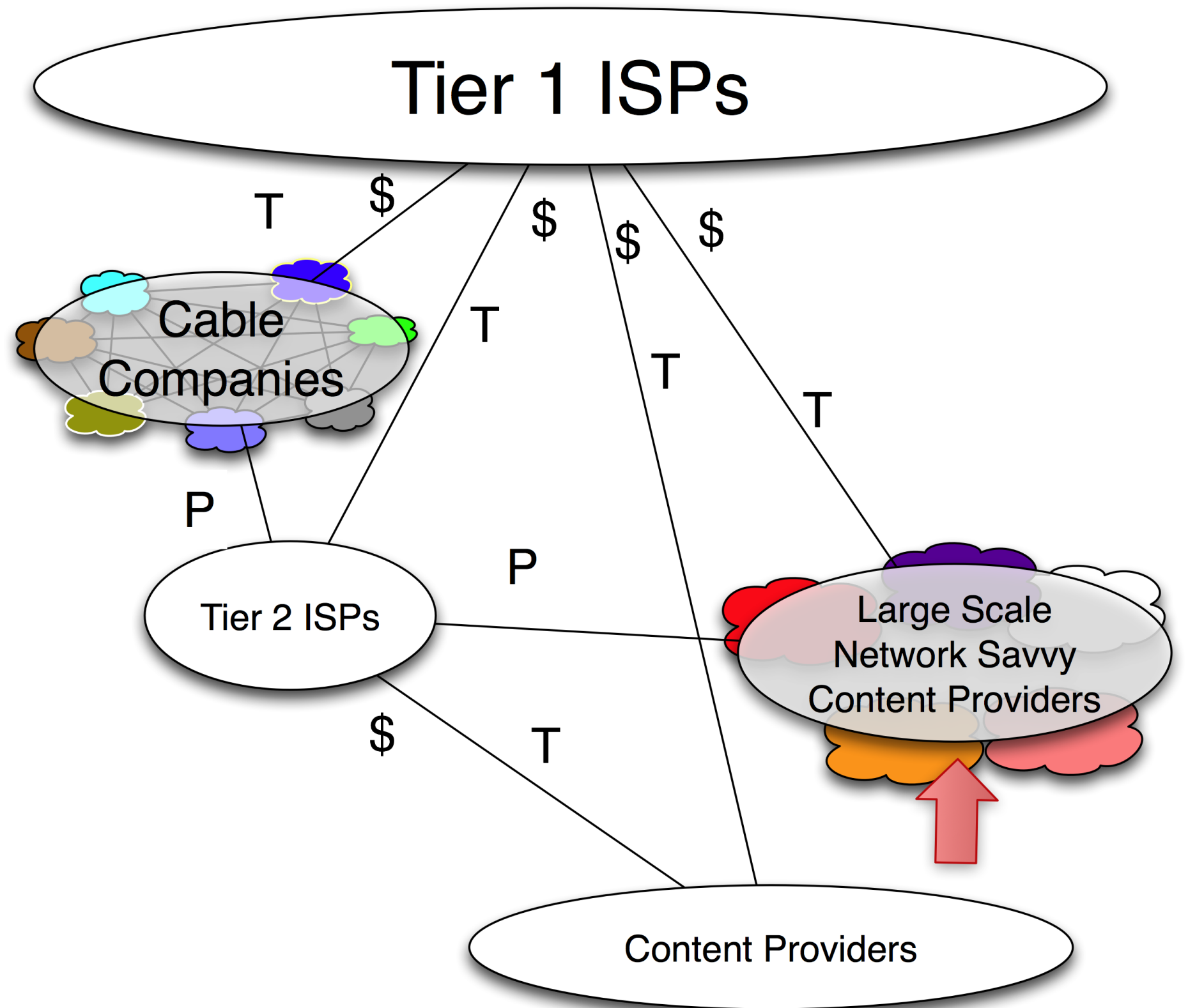
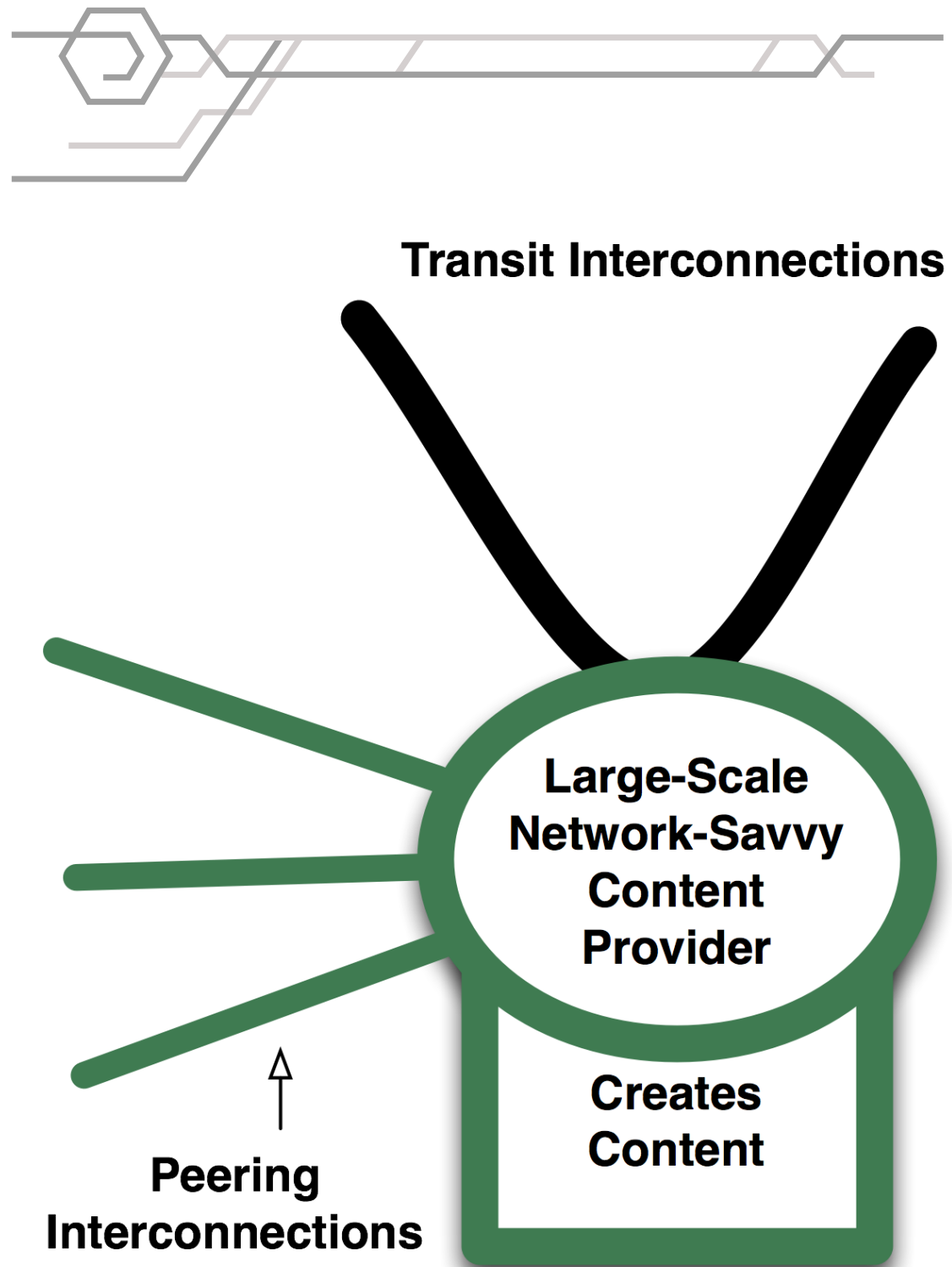


Cable Company Model

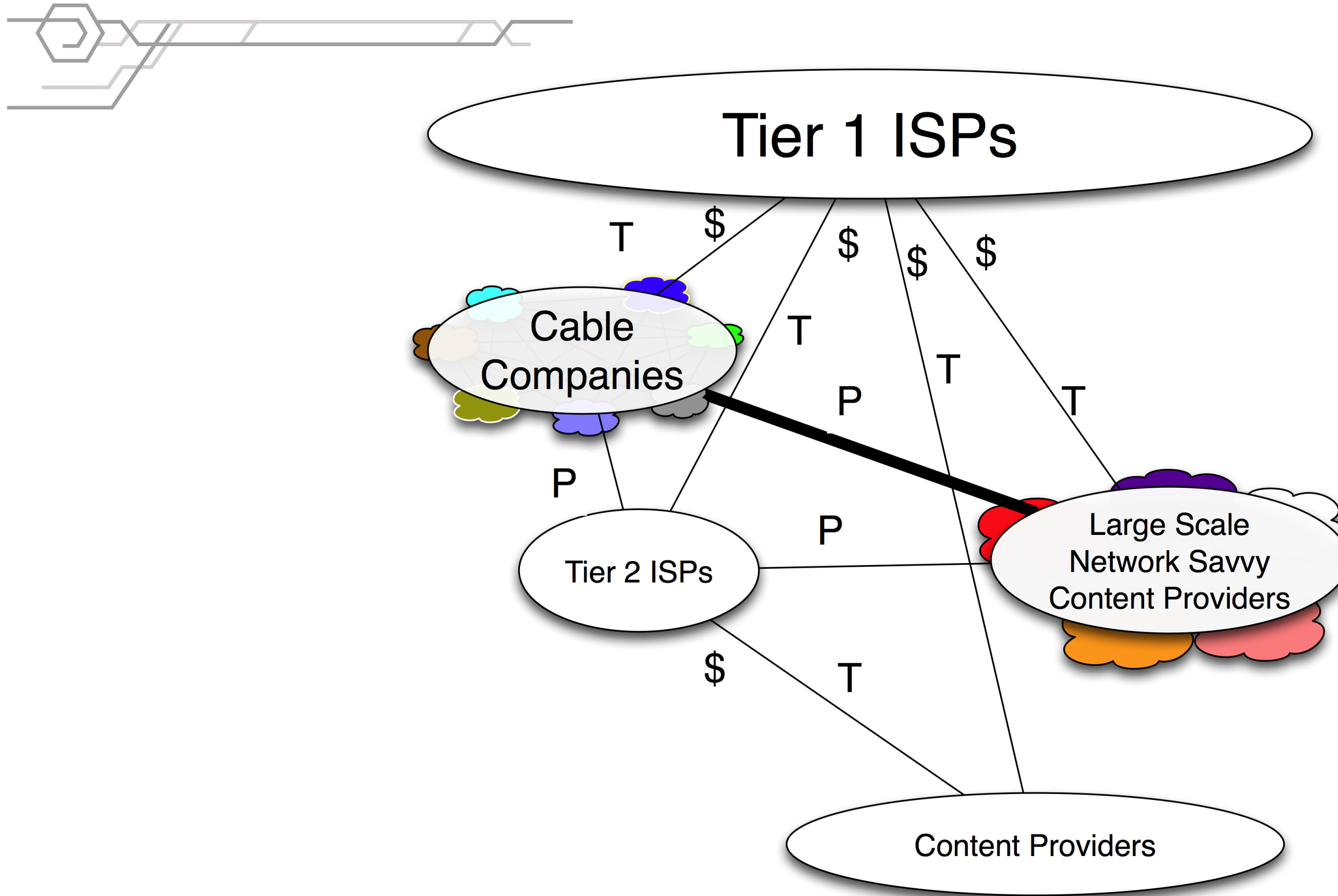


**The cable companies emerge as independent players.**

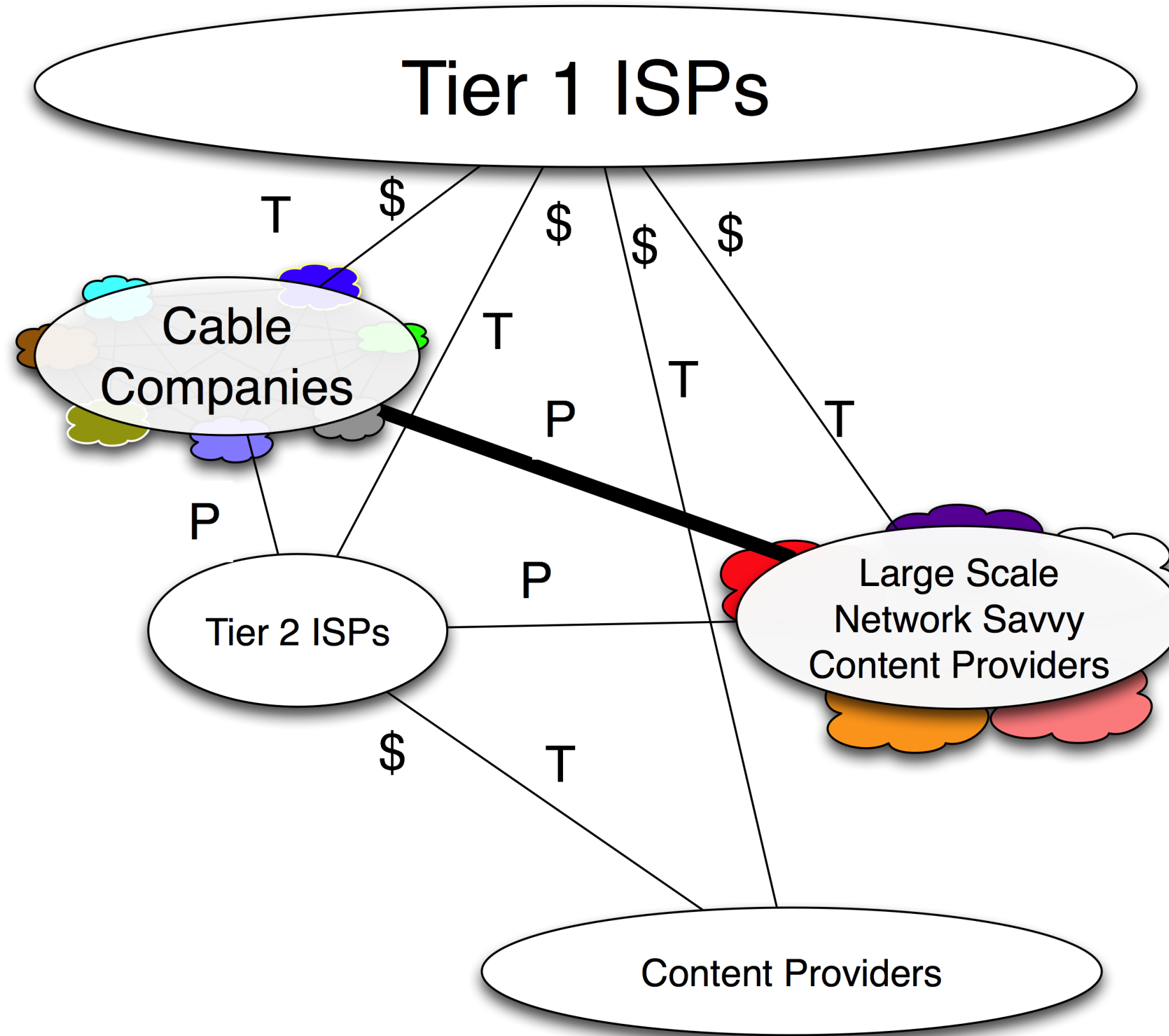




**The Large-Scale Network-Savvy Content Providers peer openly.**



**Content peers with eyeballs. The Tier 2 ISPs and the cable companies peer with the content**



**Content peers with eyeballs. The Tier 2 ISPs and the cable companies peer with the content**



# Global Internet Transit Price Trend

Transit price dropped an average of 30% per year.

Internet traffic has historically grown by 40–50% per year.

*“Internet Transit is so inexpensive, why do we need anything else?”*

<b>Internet Transit Pricing (1998-2015)</b>			
Source: <a href="http://DrPeering.net">http://DrPeering.net</a>			
<b>Year</b>	<b>Internet Transit Price</b>		<b>% decline</b>
1998	\$1,200.00	per Mbps	
1999	\$800.00	per Mbps	33%
2000	\$675.00	per Mbps	16%
2001	\$400.00	per Mbps	41%
2002	\$200.00	per Mbps	50%
2003	\$120.00	per Mbps	40%
2004	\$90.00	per Mbps	25%
2005	\$75.00	per Mbps	17%
2006	\$50.00	per Mbps	33%
2007	\$25.00	per Mbps	50%
2008	\$12.00	per Mbps	52%
2009	\$9.00	per Mbps	25%
2010	\$5.00	per Mbps	44%
2011	\$3.25	per Mbps	35%
2012	\$2.34	per Mbps	28%
2013	\$1.57	per Mbps	33%
2014	\$0.94	per Mbps	40%
2015	\$0.63	per Mbps	33%



*“Internet Transit is so inexpensive, why do we need anything else?”*

***Without Peering, Packets will travel the Ocean. Twice!***





# Advantages of Peering

- Peering is significantly cheaper than IP Transit and will help you to reduce IP Transit costs.
- Peering will give you direct access to many Content and Eyeball networks.
- Peering leads to shorter AS paths and helps to improve your profile in a competitive market environment.
- Peering allows direct control over the traffic flows.
- Peering make the Internet robust and reliable.
- Peering is where the Internet lives.







# Peering Rollout

- Connect to Reginal IX
- Define your own peering policy
- Do not stop to explain to difficult to peer targets why Peering does make sense



# Peering Policies

## ”Open” Policy

- Peer with everyone, regardless of type of provider
- Mainly used by all kinds of Content Providers/Content Delivery Networks and many Tier 2, and Tier 3 Provider



# Peering Policies

## ”Selective” Policy

- ISP will only peer with another ISP that does meet the prerequisites listed in a Peering Policy ( Example: Minimum traffic , Coverage, Number of routes announced)
- Mainly used by bigger Tier 2 providers





# Peering Policies

## ”Restrictive” Policy

- Peer with a very limited number of networks.
- Typically don't want to add more Peers



Thank You

