2018 ACE SCHOOL & RUS SYMPOSIUM
TERMINUS
CONNECTING POINTS OF OPPORTUNITY

ISP Edge Bandwidth Evolution

Speaker:

- Bryan Hicks, Systems Integration Manager, N-Com, Inc.

What’s using the bandwidth?

- Video Video and Video
  - HDR and 4k Video
  - Netflix, Amazon, YouTube, Hulu
  - OTT TV – DirectTV Now, Playstation Vue, Google TV, SlingTV
  - According to research, there were 16.7 million cord-cutters by 2016, and there will be 40.1 million by 2021
  - 32.5 million cord-nevers in 2016 growing to 41 million by 2021
- Internet Gaming will grow tenfold between 2016 and 2021
  - Shift from PC/Console based to cloud based gaming
- VR and AR is expected to grow 20-fold by 2021
- Immersive video (360 degrees)
  - 3-10 times higher bit rates
- Video surveillance – estimated to be 13% of all video traffic by 2021

2015 Projection– IP Traffic per Month

- Cisco VNI 2015 – PB per Month

	2015	2016	2017	2018
North America	23,557	28,228	33,649	41,465
Content Delivery Networks	7,162	9,518	12,951	23,922
CDN % of Total	30.4%	33.7%	38.4%	57.69%

- Total year over year growth - 20.7%
- CDN year over year growth – 49.5%

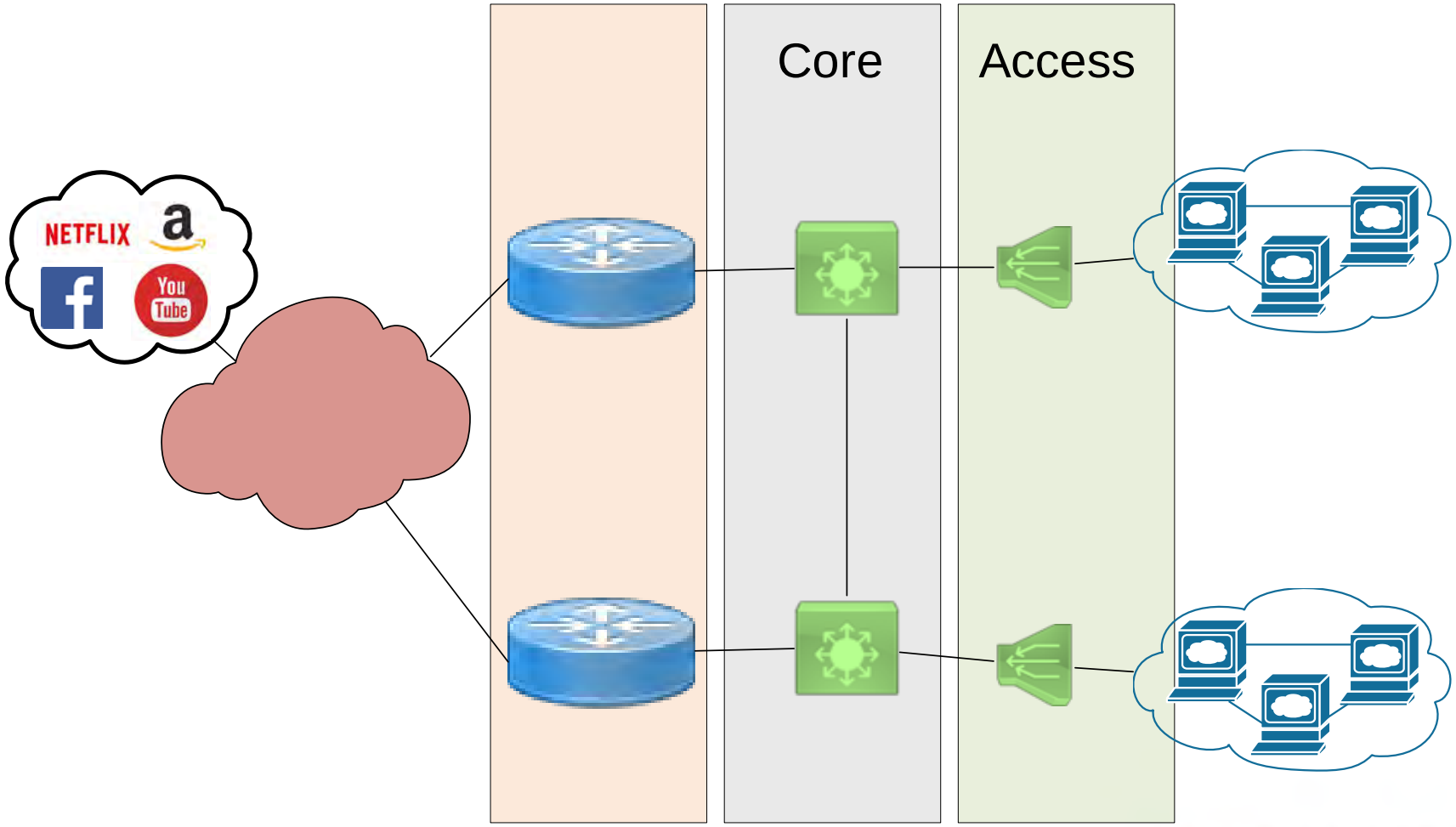
2017 Projection– IP Traffic per Month

- Cisco VNI 2017 – PB per Month

	2017	2018	2019	2020
North America	42,267	51,722	62,330	73,741
Content Delivery Networks	24,545	32,795	42,976	53,141
CDN % of Total	58.1%	63.4%	68.9%	72.1%

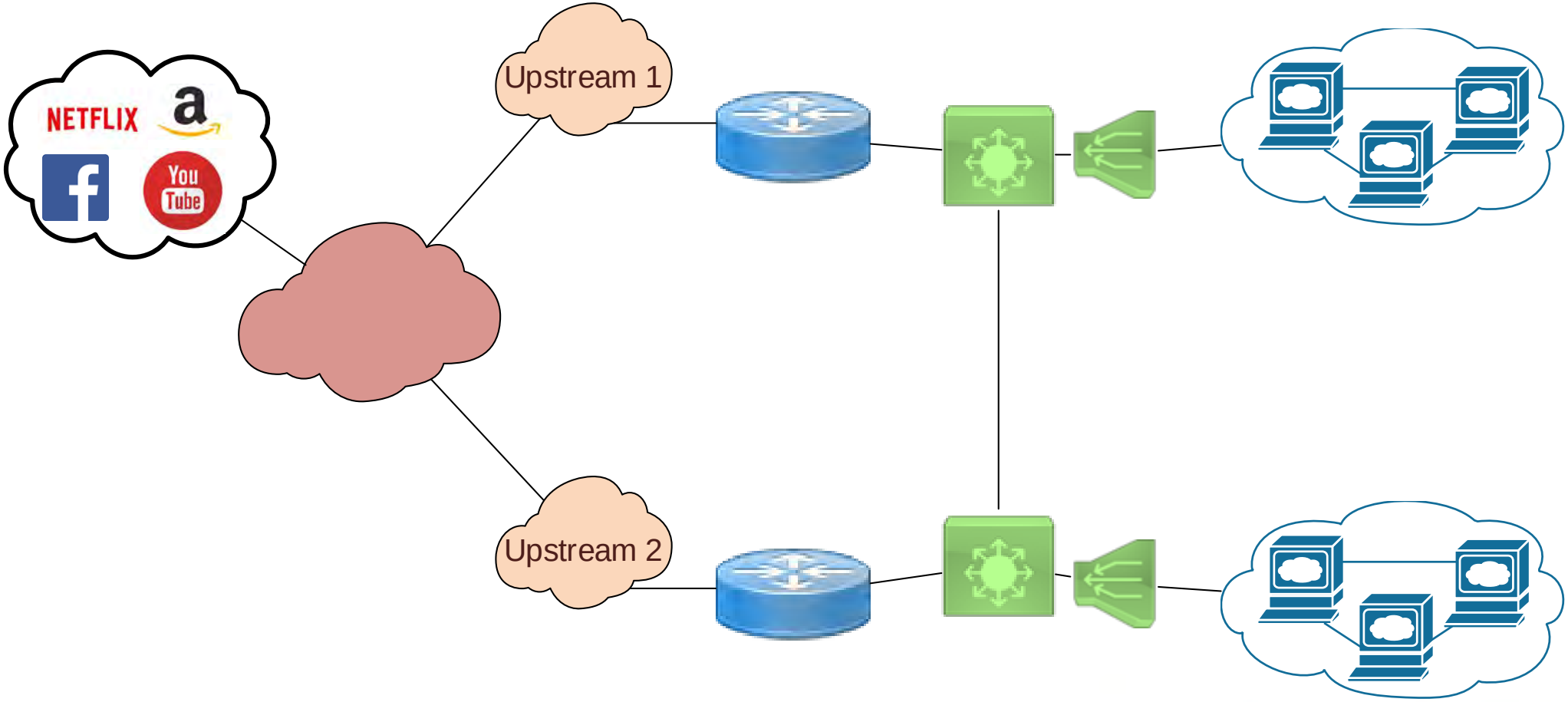
- Cisco increased projected total growth for 2018 by 19% and CDN growth by 27%

Typical Network – User to Edge



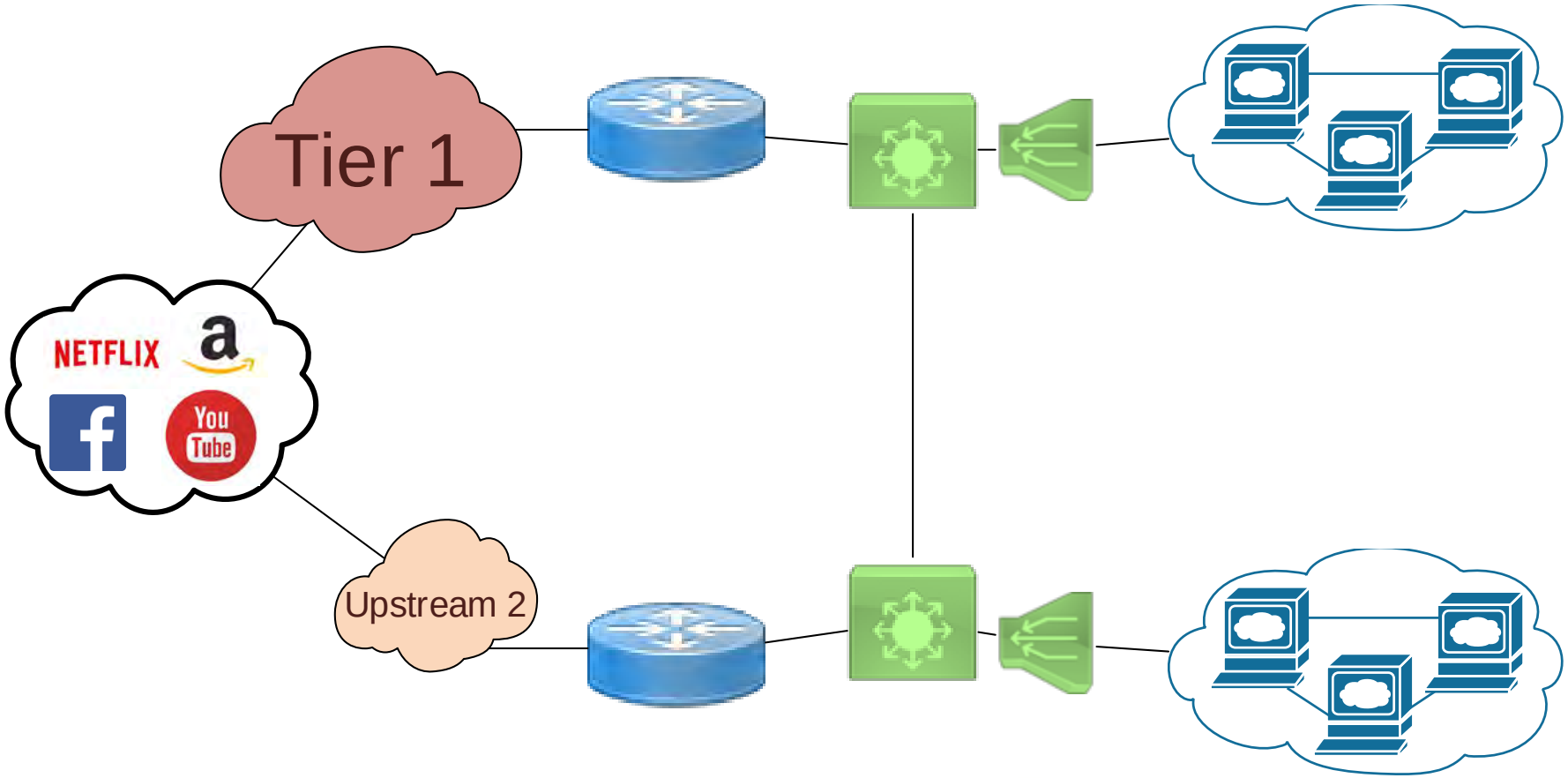
2018 ACE SCHOOL & RUS SYMPOSIUM
TERMINUS ATLANTA
CONNECTING POINTS OF OPPORTUNITY
Association of Communication Engineers
ACE

In the beginning…



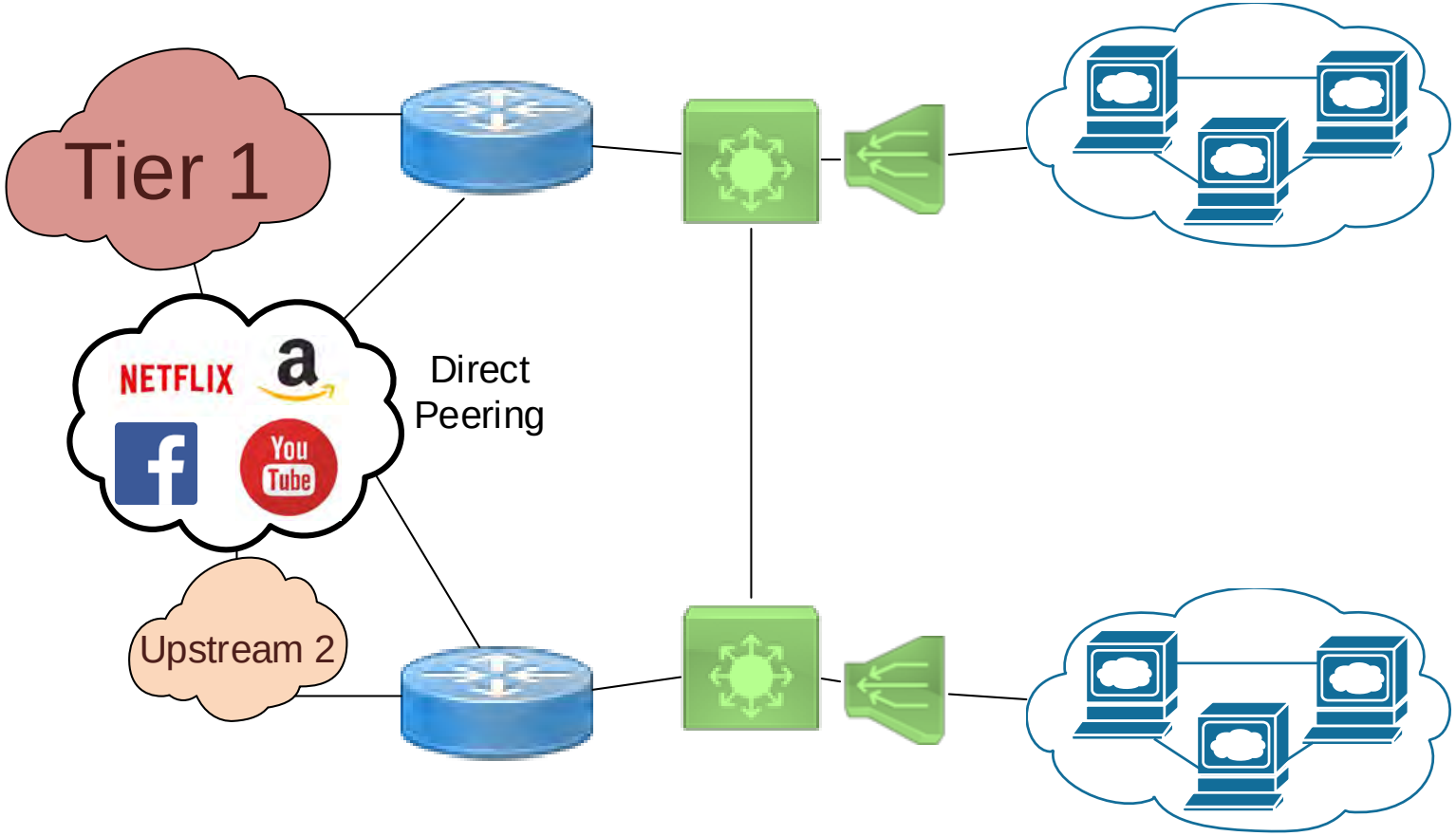
2018 ACE SCHOOL & RUS SYMPOSIUM
TERMINUS ATLANTA
CONNECTING POINTS OF OPPORTUNITY
Association of Communication Engineers
ACE

Getting better…

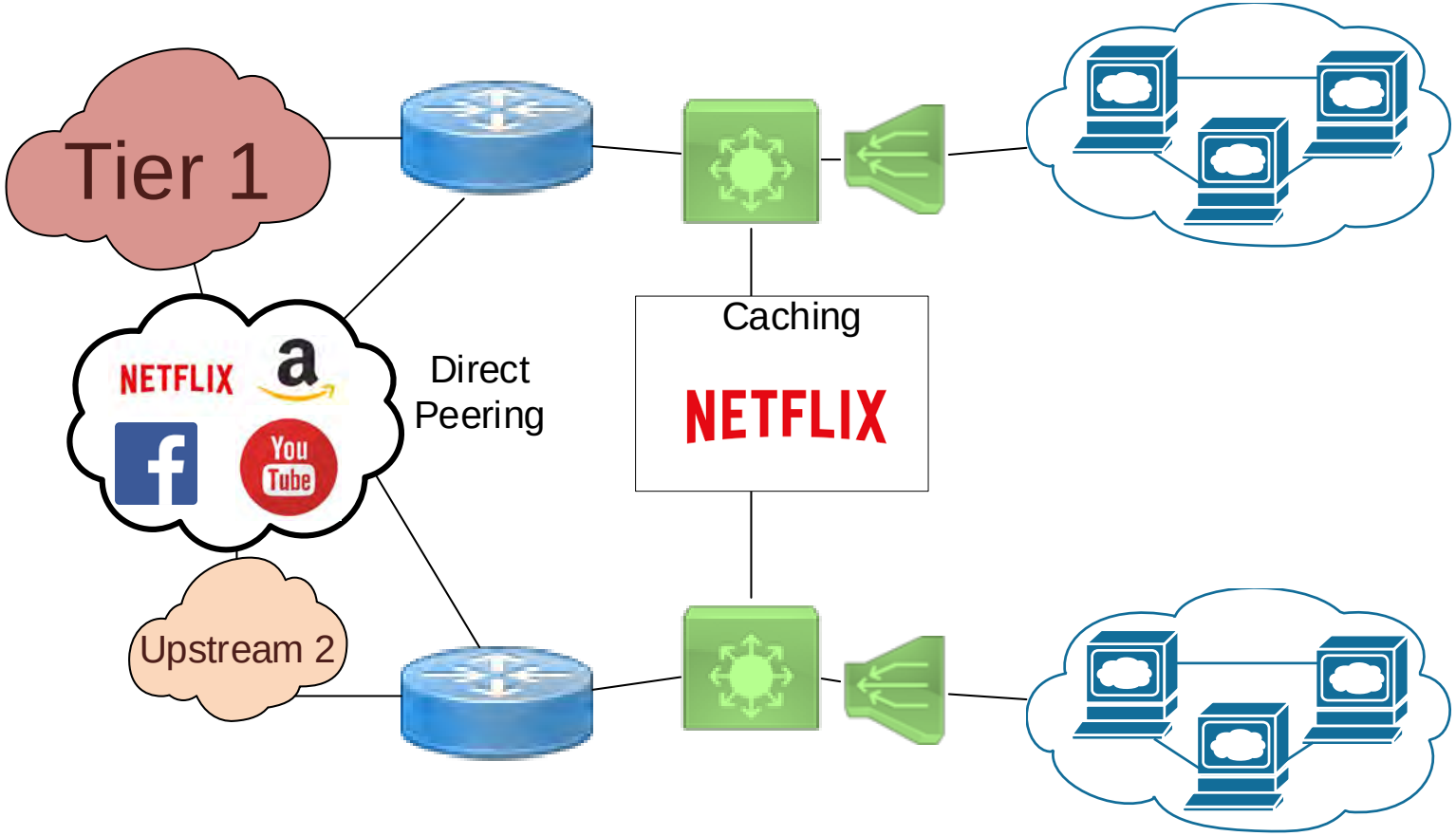


2018 ACE SCHOOL & RUS SYMPOSIUM
TERMINUS ATLANTA
CONNECTING POINTS OF OPPORTUNITY
Association of Communication Engineers
ACE

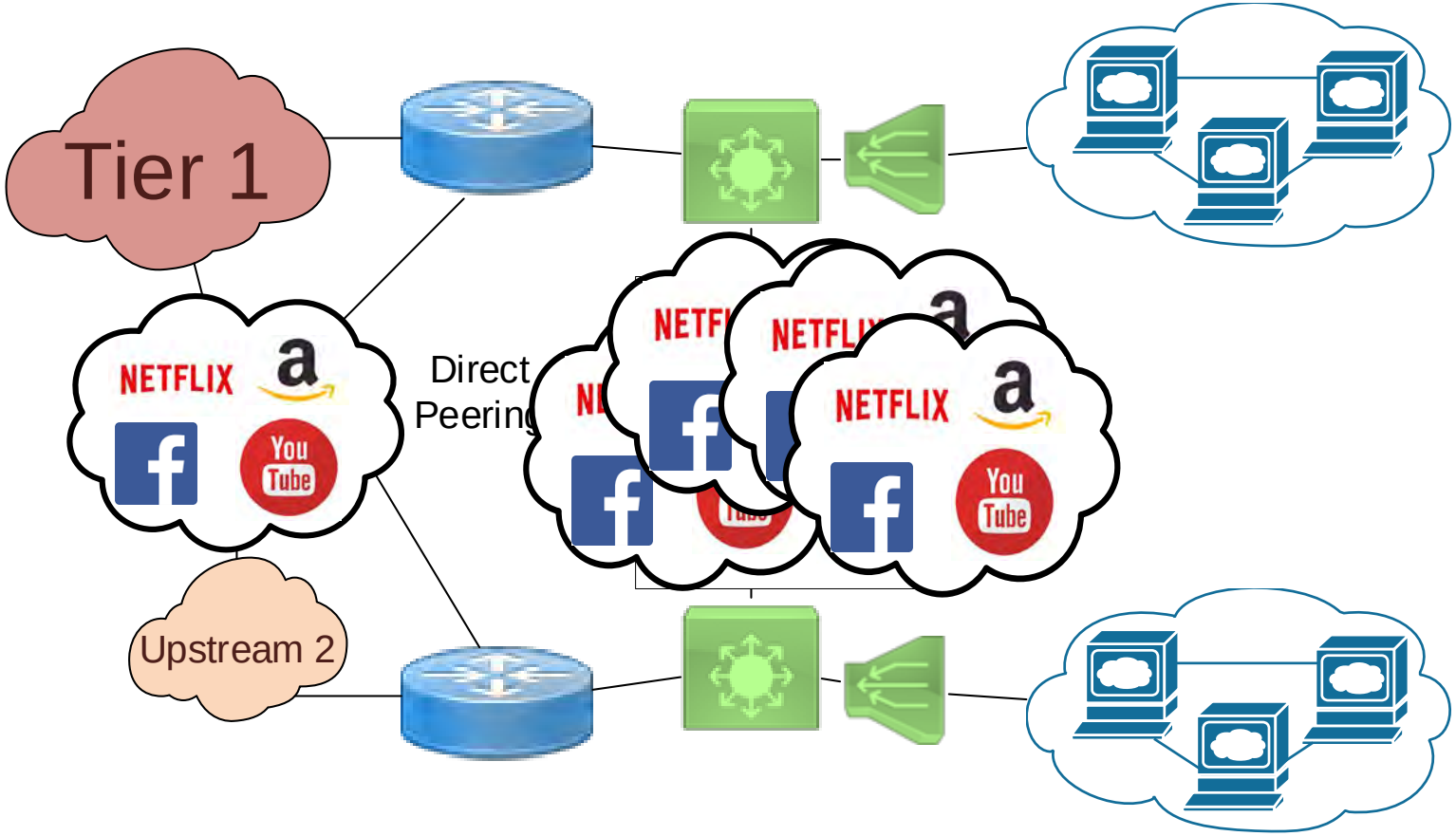
Peering gets us closer



Caching brings it all the way in



Open Caching - the future



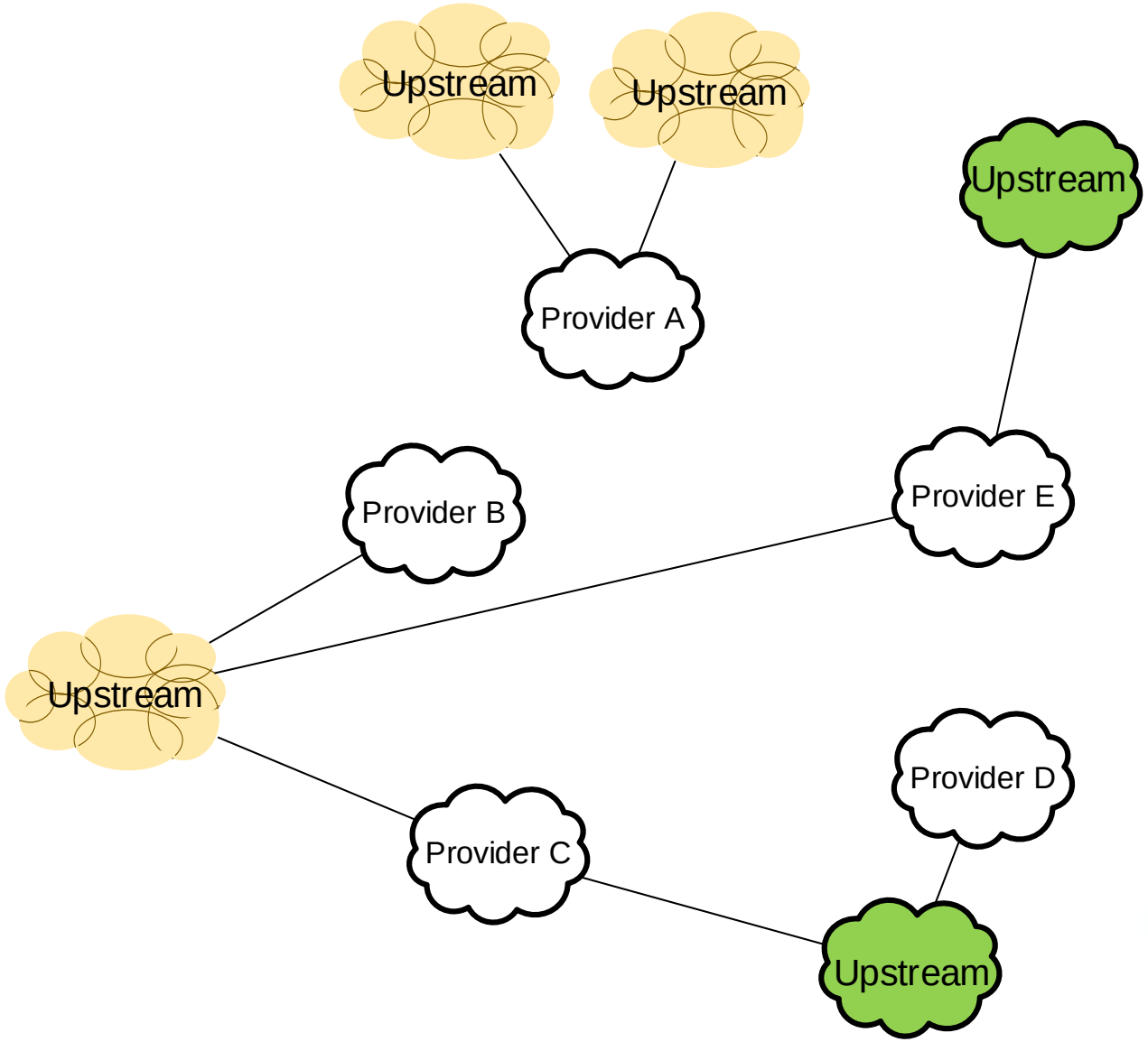
Rural Connectivity Issues

- Cost of DIA to rural areas is still too expensive too often
- Not always an option of a redundant path or provider
- Total usage not enough to qualify for free caching

Case study

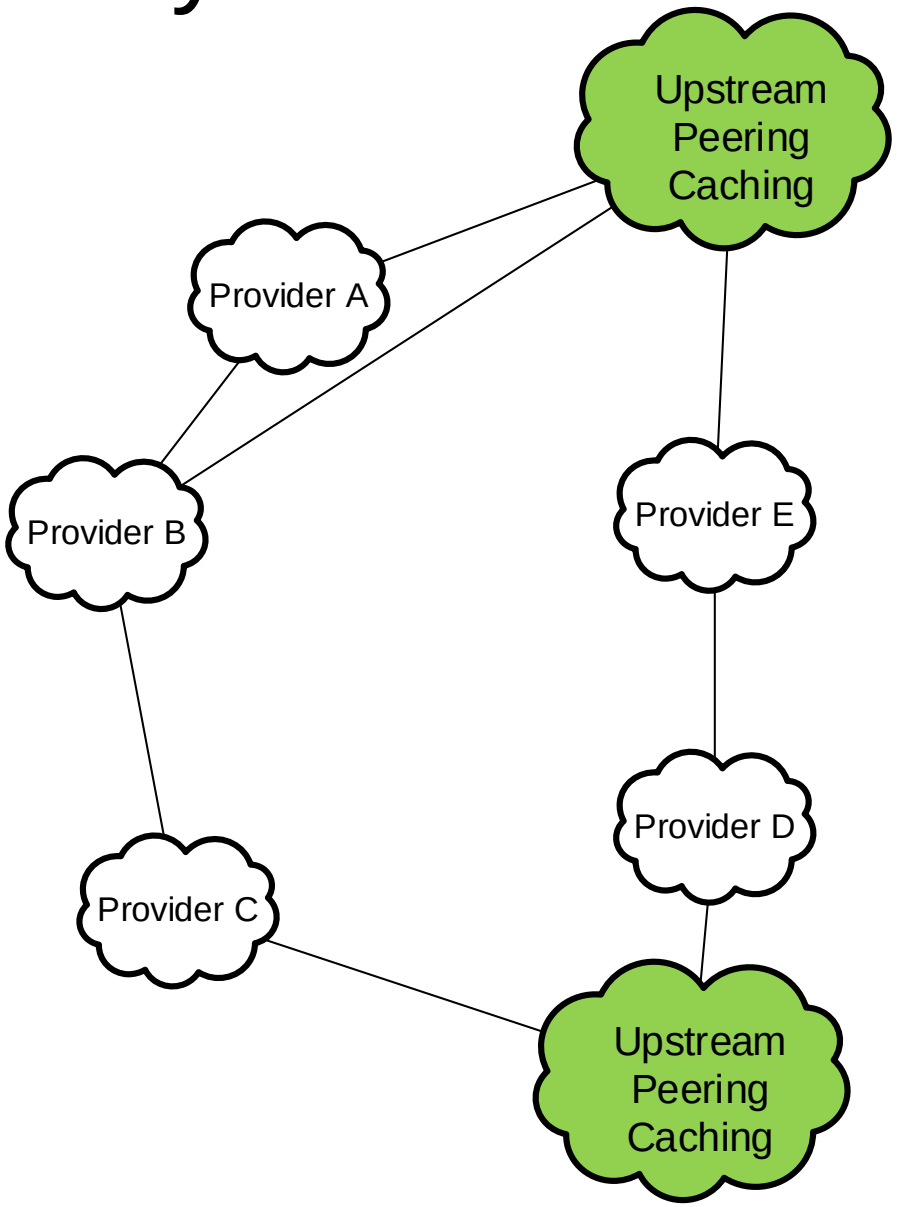
- 2015 – 5 rural Service Providers
- 2015 – Total usage among 5 providers – 4.8Gb
- 2015 – Individually none of the 5 providers would qualify for free caching
- 2015 – 3 providers had fiber to a city with better but still limited DIA access
- 2015 – Each provider could connect to either two other providers or one provider and a city location
- 2015 – Average cost per MB - ~ $3.78
- 2015 – Total bandwidth purchased – 8.2Gb

Case study – Independent Providers



2018 ACE SCHOOL & RUS SYMPOSIUM
TERMINUS ATLANTA
CONNECTING POINTS OF OPPORTUNITY
Association of Communication Engineers
ACE

Case study – Partner Providers



2018 ACE SCHOOL & RUS SYMPOSIUM
TERMINUS ATLANTA
CONNECTING POINTS OF OPPORTUNITY
Association of Communication Engineers
ACE

Case Study - Conclusion

- 2018 – Total usage among 5 providers – >15Gb
- 2018 – Diverse connections to two different peering exchanges
- 2018 – Diverse connections to open Internet
- 2018 – Share two Netflix caching servers
- 2018 – 100Gb of edge bandwidth (DIA, Peering, Caching)
- 2018 – 67% traffic from Peering/Caching (CDNs)
- 2018 – Monthly cost savings compared to buying N*2 DIA…

- ~75% MONTHLY COST SAVINGS!

Closing

- Traffic is only increasing and will continue to do so
- Required traffic load from CDNs will have high costs from traditional DIA sources
- Peering and caching will be required to keep up with the demand and deliver content and services to users