COMPUTER NETWORKS

Sivaraman Eswaran Ph.D.
Department of Computer Science and Engineering

COMPUTER NETWORKS

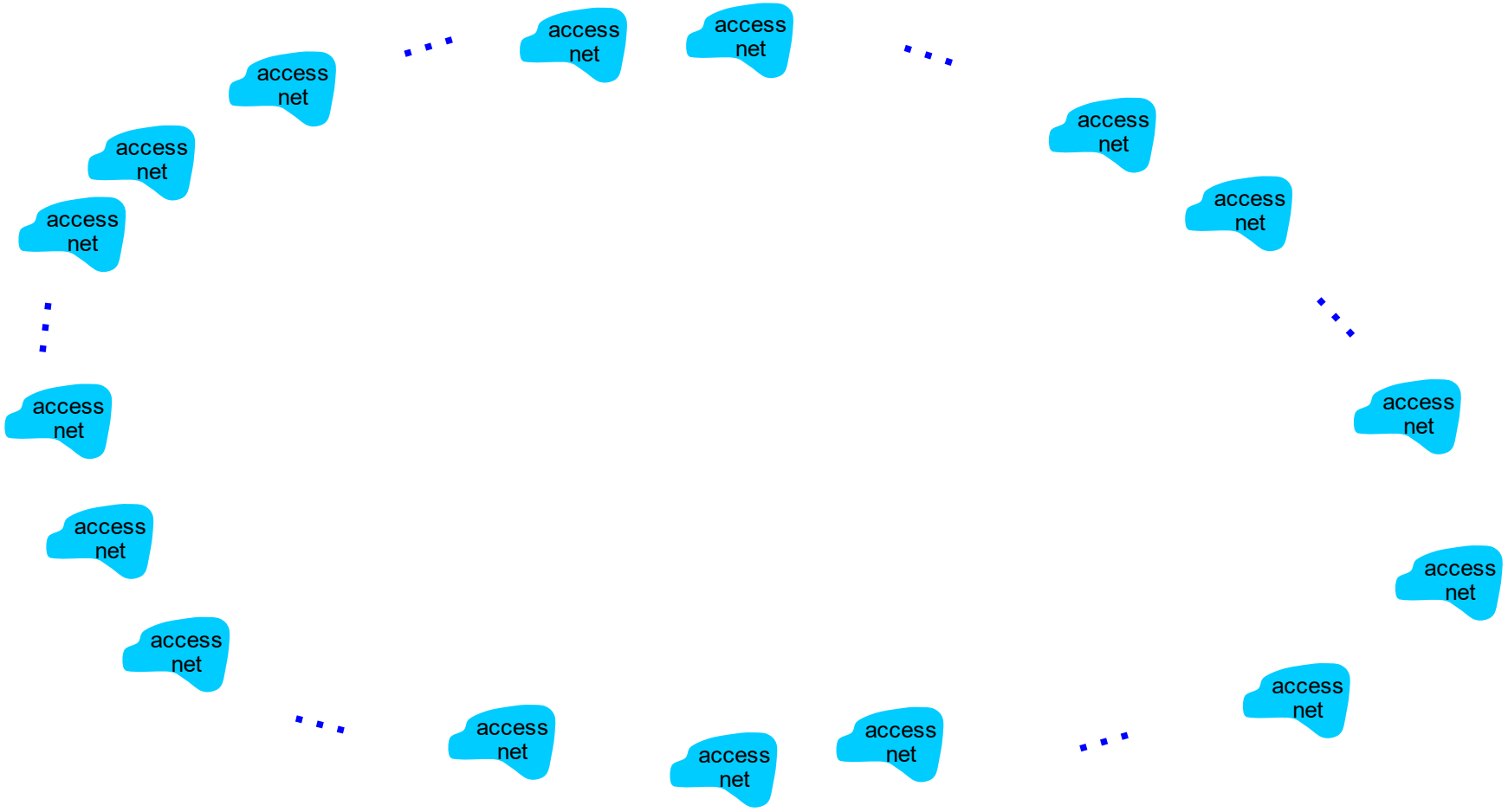
Computer Networks and the Internet

Sivaraman Eswaran Ph.D.
Department of Computer Science and Engineering

COMPUTER NETWORKS

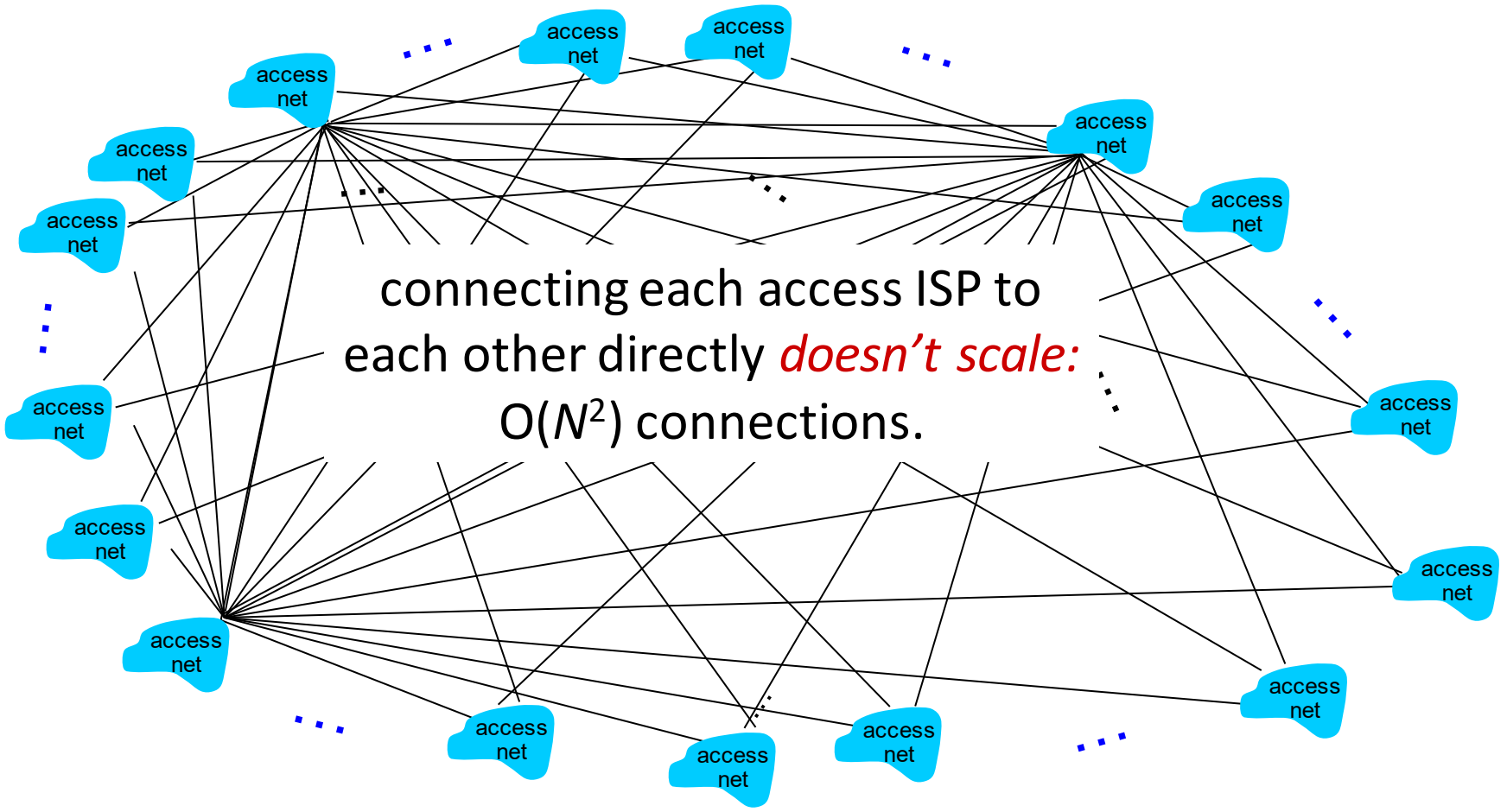
Internet Structure: a “network of networks”

Question: given *millions* of access ISPs, how to connect them together?



Internet Structure: a "network of networks"

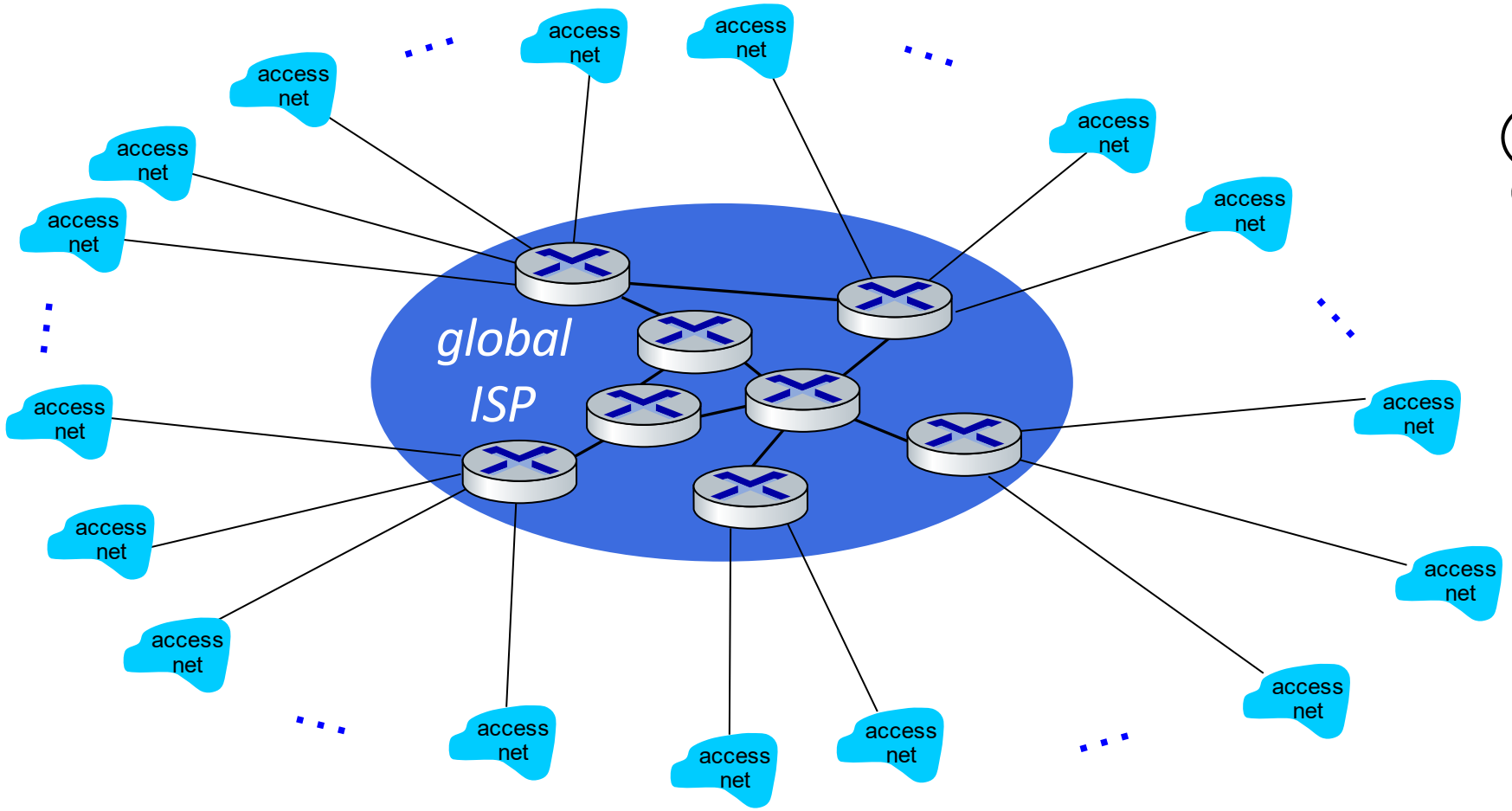
Question: given *millions* of access ISPs, how to connect them together?

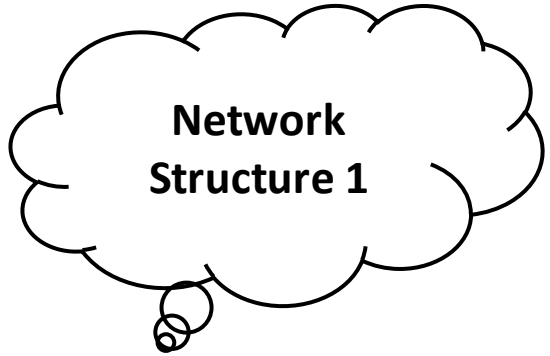


Internet Structure: a "network of networks"

Option: connect each access ISP to one global transit ISP?

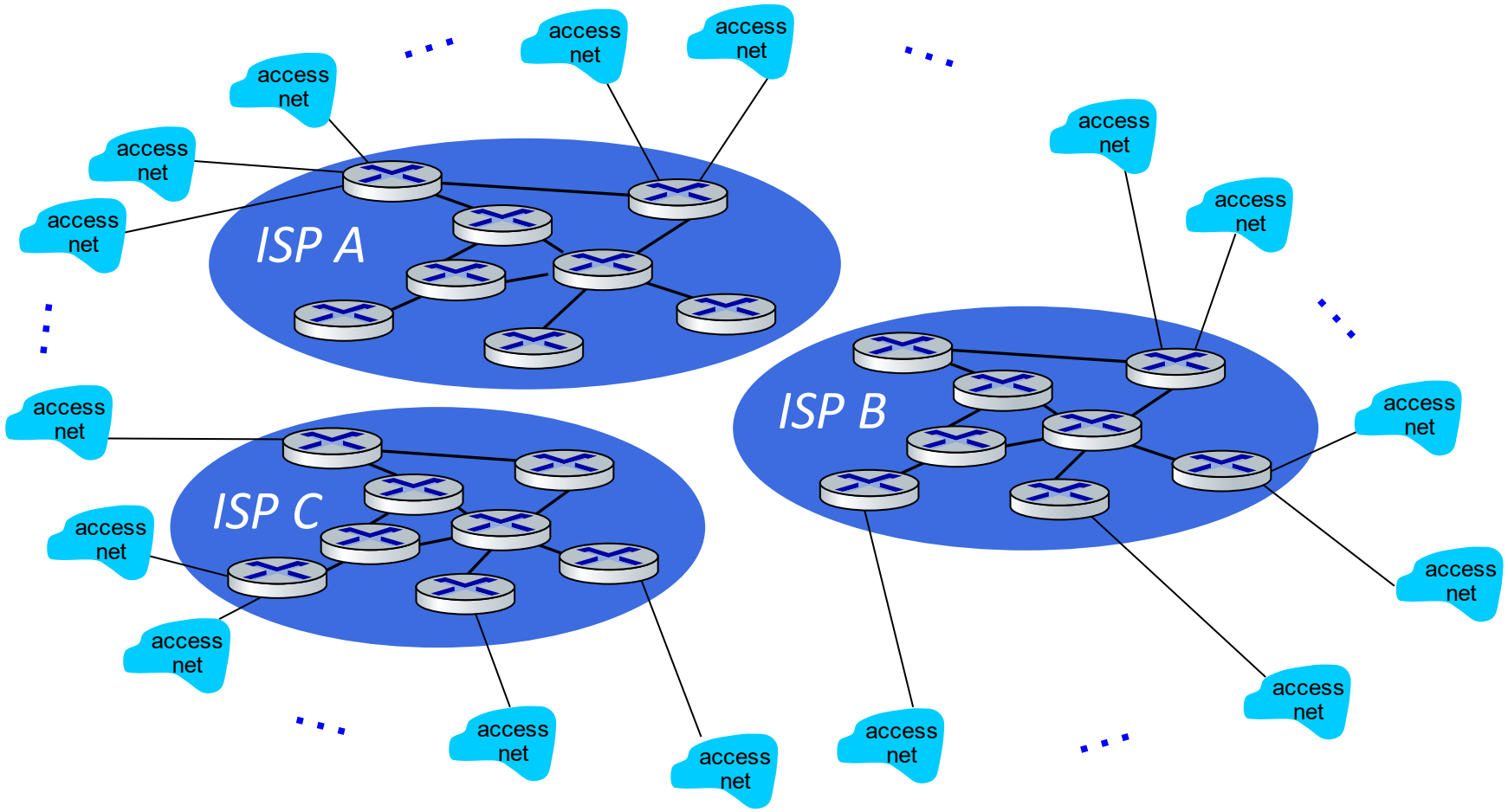
Customer and provider ISPs have economic agreement.





Internet Structure: a "network of networks"

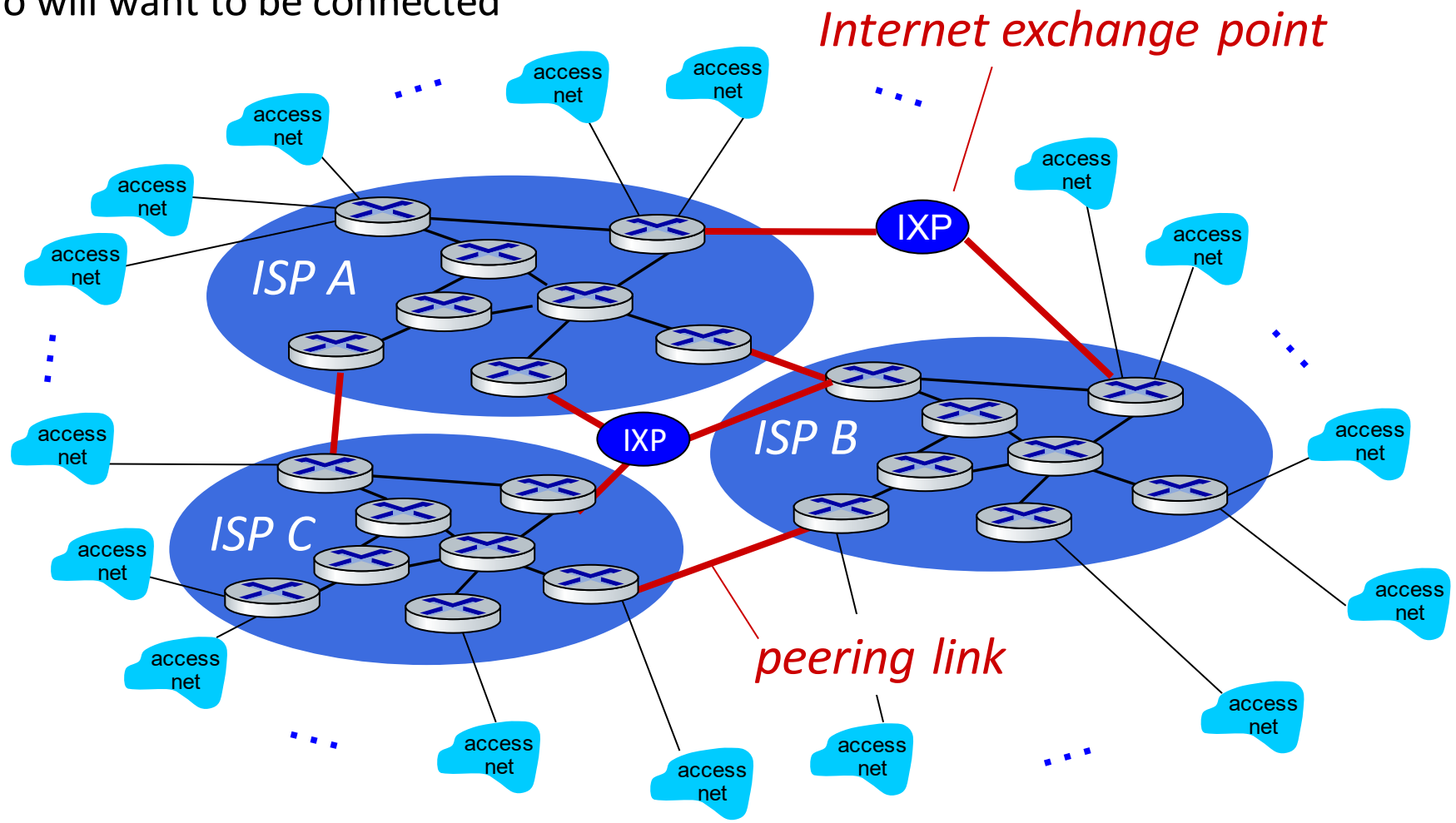
But if one global ISP is viable business, there will be competitors ….



Network Structure 2

Internet Structure: a "network of networks"

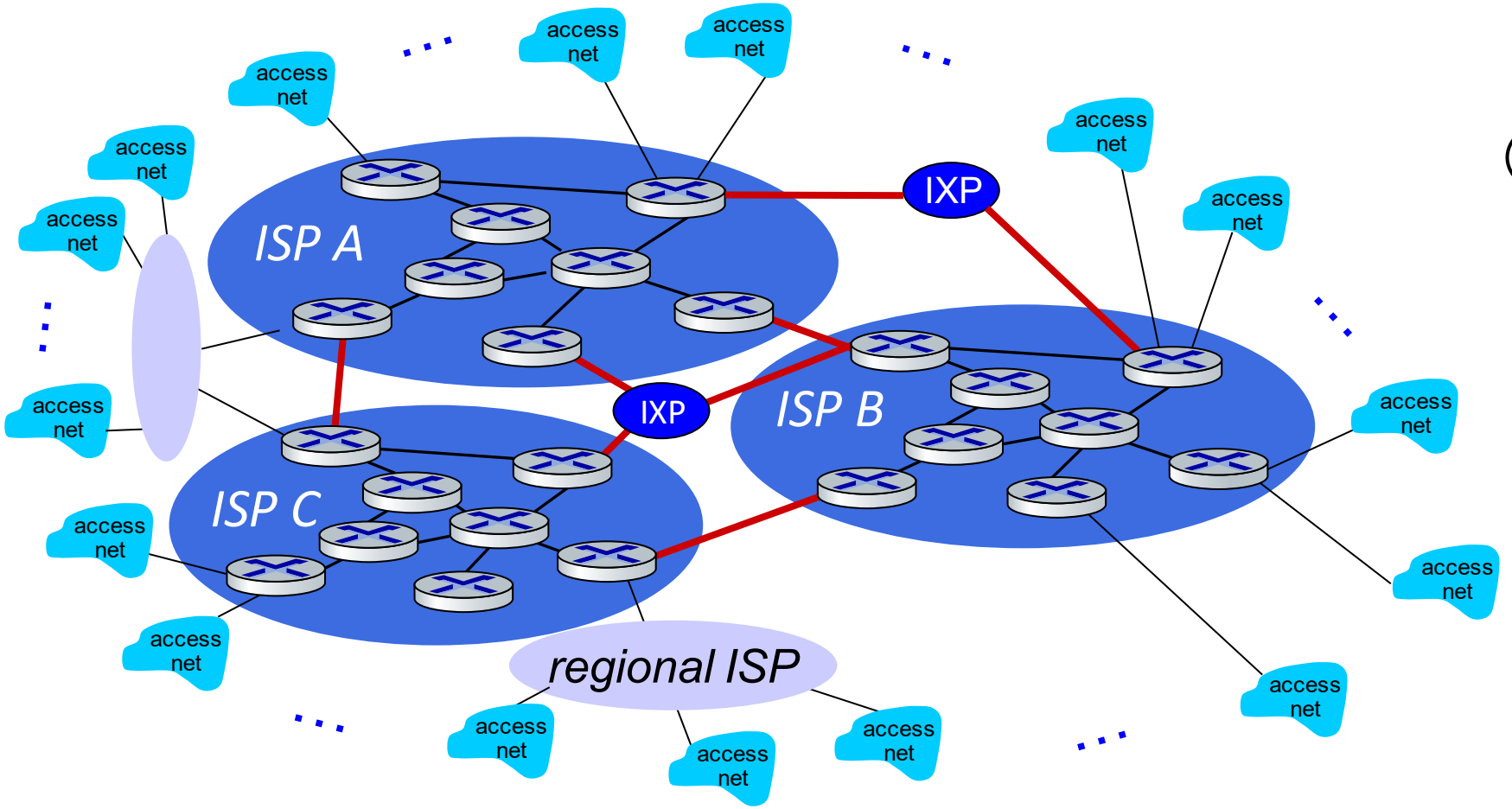
But if one global ISP is viable business, there will be competitors ….
who will want to be connected



Network Structure 3

Internet Structure: a “network of networks”

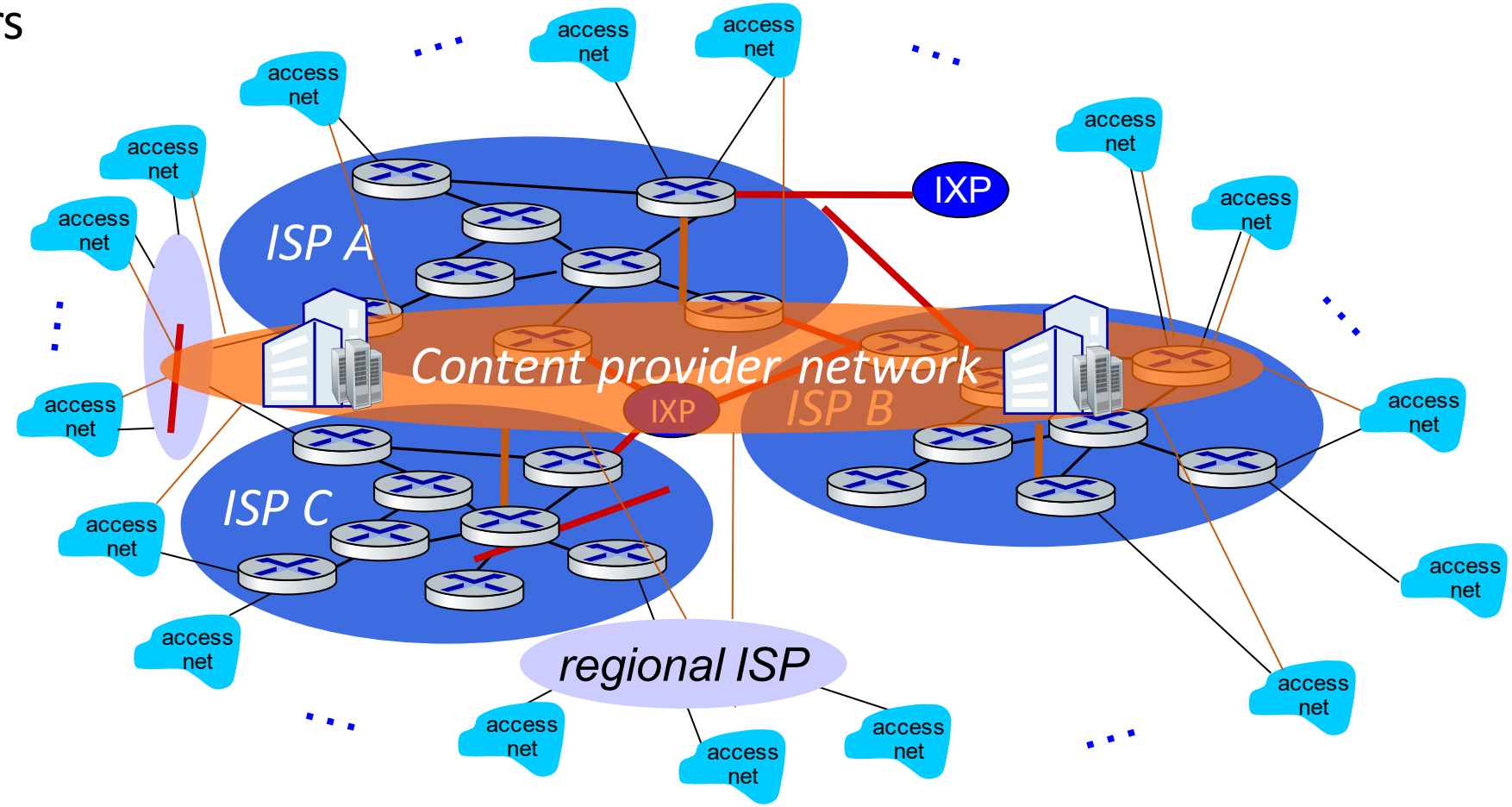
… and regional networks may arise to connect access nets to ISPs



Network Structure 4

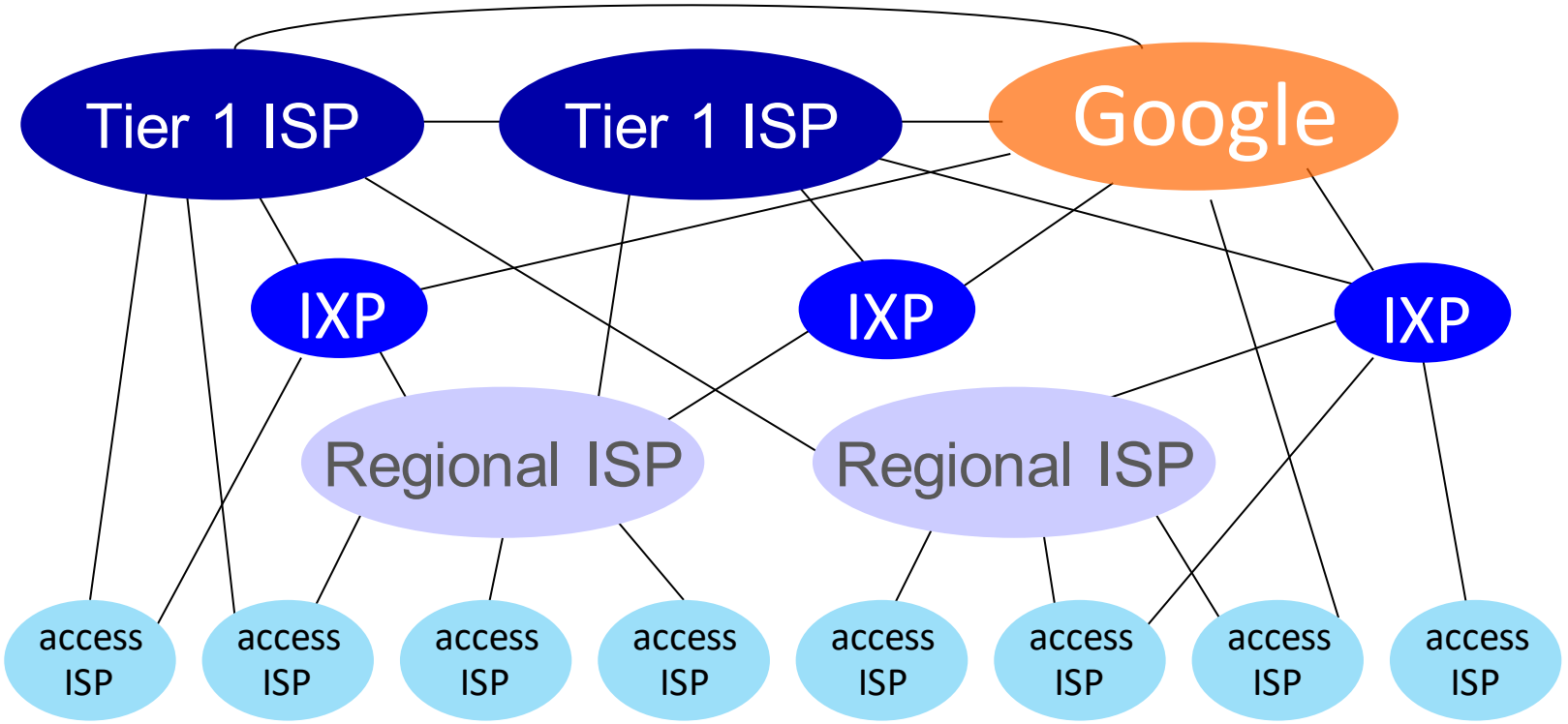
Internet Structure: a "network of networks"

… and content provider networks (e.g., Google, Microsoft, Akamai) may run their own network, to bring services, content close to end users



Network Structure 5

Internet Structure: a "network of networks"

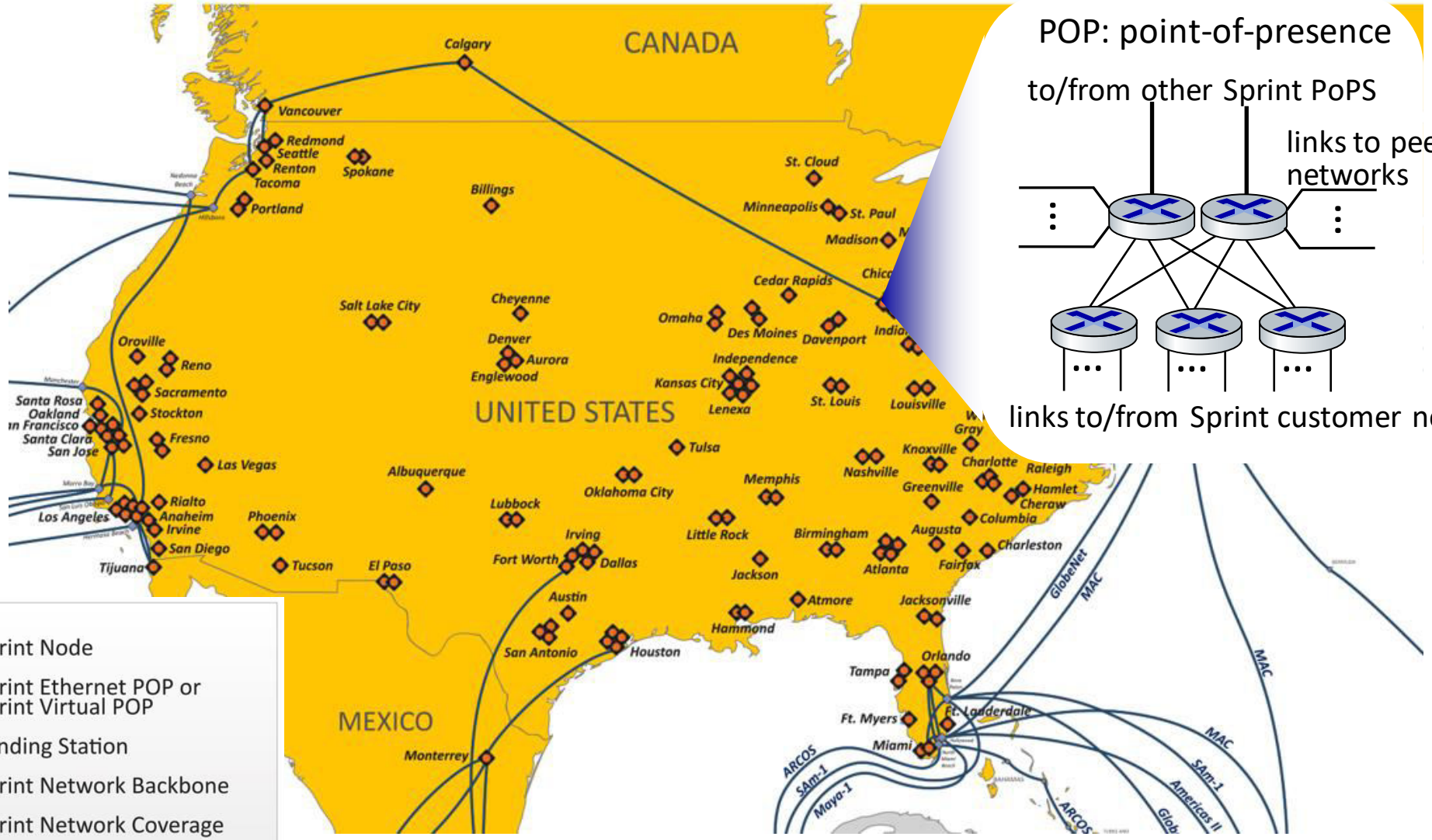


At "center": small # of well-connected large networks

- "tier-1" commercial ISPs (e.g., Level 3, Sprint, AT&T, NTT), national & international coverage
- content provider networks (e.g., Google, Facebook): private network that connects its data centers to Internet, often bypassing tier-1, regional ISPs

COMPUTER NETWORKS

Network Core: Tier 1 ISP Network Map: Sprint 2019



Queries

PES UNIVERSITY ONLINE

Thank You
For Your Attention

THANK YOU

Sivaraman Eswaran Ph.D.
Department of Computer Science and Engineering

sivaramane@pes.edu

+91 80 6666 3333 Extn 834