

Internet2, CalREN-2, & International Connectivity

David L. Wasley
University of California

Advancing Internet Technology

- Internet2
 - » a Project of UCAID
- CalREN-2
 - » a project of CENIC
- International connectivity model
 - » STAR TAP
 - » maybe also gigaPOPs

Internet2

- University Corporation for Advanced Internet Development –UCAID
- Internet2 is the first project of UCAID
 - » to promote development of advanced Internet applications
 - » to ensure availability of a testbed for these applications
- Abilene is the current testbed

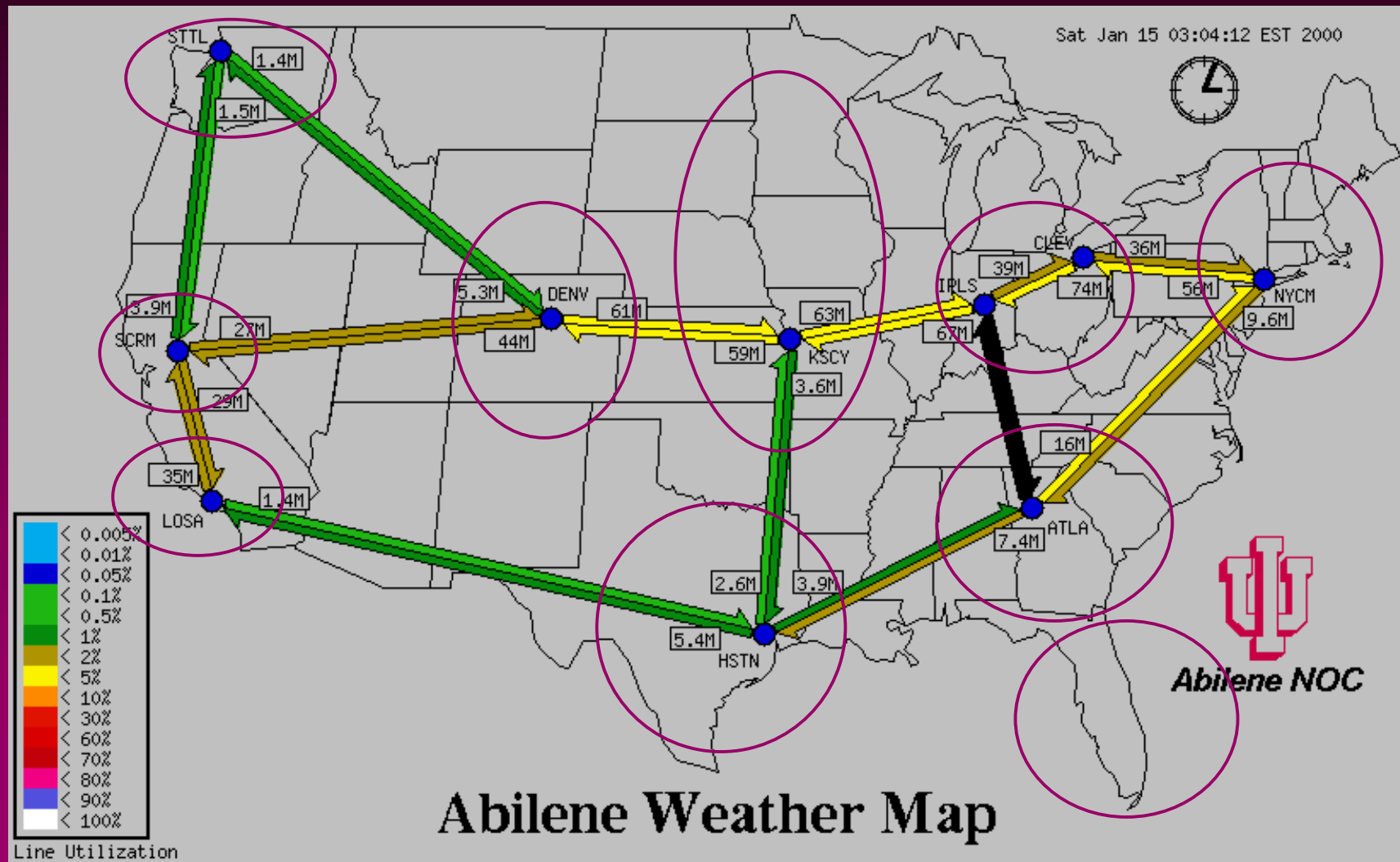
Advanced Applications

- One-to-many broadcast, e.g. lectures
 - » requires Internet “multicast”
- Many-to-many multicast
 - » e.g. collaboration environments
- Differentiated data transport services
 - » “real time” applications, e.g. video
 - » telescience
 - » telemedicine

The Abilene network

- IP only – IPv4 now; IPv6 soon
- Interconnects “gigaPOPs”
 - » regional aggregation networks
- Very high capacity – OC-48 +
- Multicast is supported
- QoS later this year
- Peers with ESNET, NREN, STAR-TAP, etc.

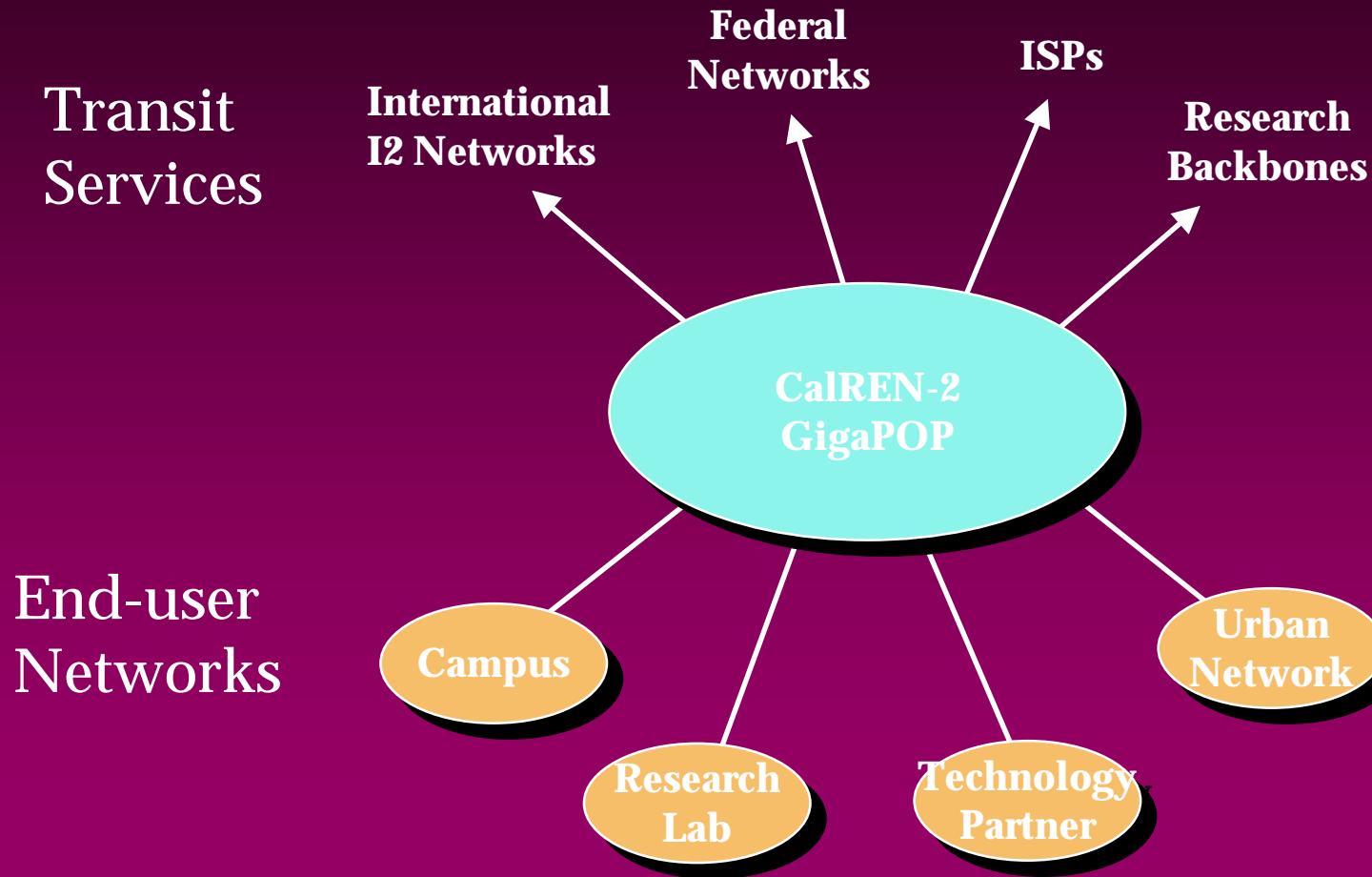
Abilene Topology



GigaPOPs

- Regional aggregation networks
- Supports access to a variety of services for its members
 - » commodity Internet access
 - » research backbone access
 - » possibly international connectivity
- Supports advanced Internet services

Conceptual GigaPOP



CalREN-2

- Corporation for Education Network Initiatives in California – CENIC
 - » UC, Stanford, Caltech, USC, CSU
- CalREN-2 is a project of CENIC
- Advanced services
 - » multicast, QoS (soon)
 - » OC-12 (622 Mb/s) to each campus
- Two gigaPOPs

CalREN-2 Topology

Corporation for Education Network Initiatives in California
CalREN-2 Network



International Connectivity

- STAR TAP is the focal point
 - » coordinates installation & operation
 - » supports transit among all networks
- GigaPOPs can play a role too
 - » Access to local/regional networks
 - » coordinates with local carriers
- Transit is the major problem
 - » constrained by current financial model

STAR TAP

- Science, Technology, And Research – Transit Access Point
 - » at the Ameritech NAP in Chicago
- Funded by National Science Foundation
 - » run by University of Illinois at Chicago
- Supports peering among all international member networks, research backbone networks, and regional networks

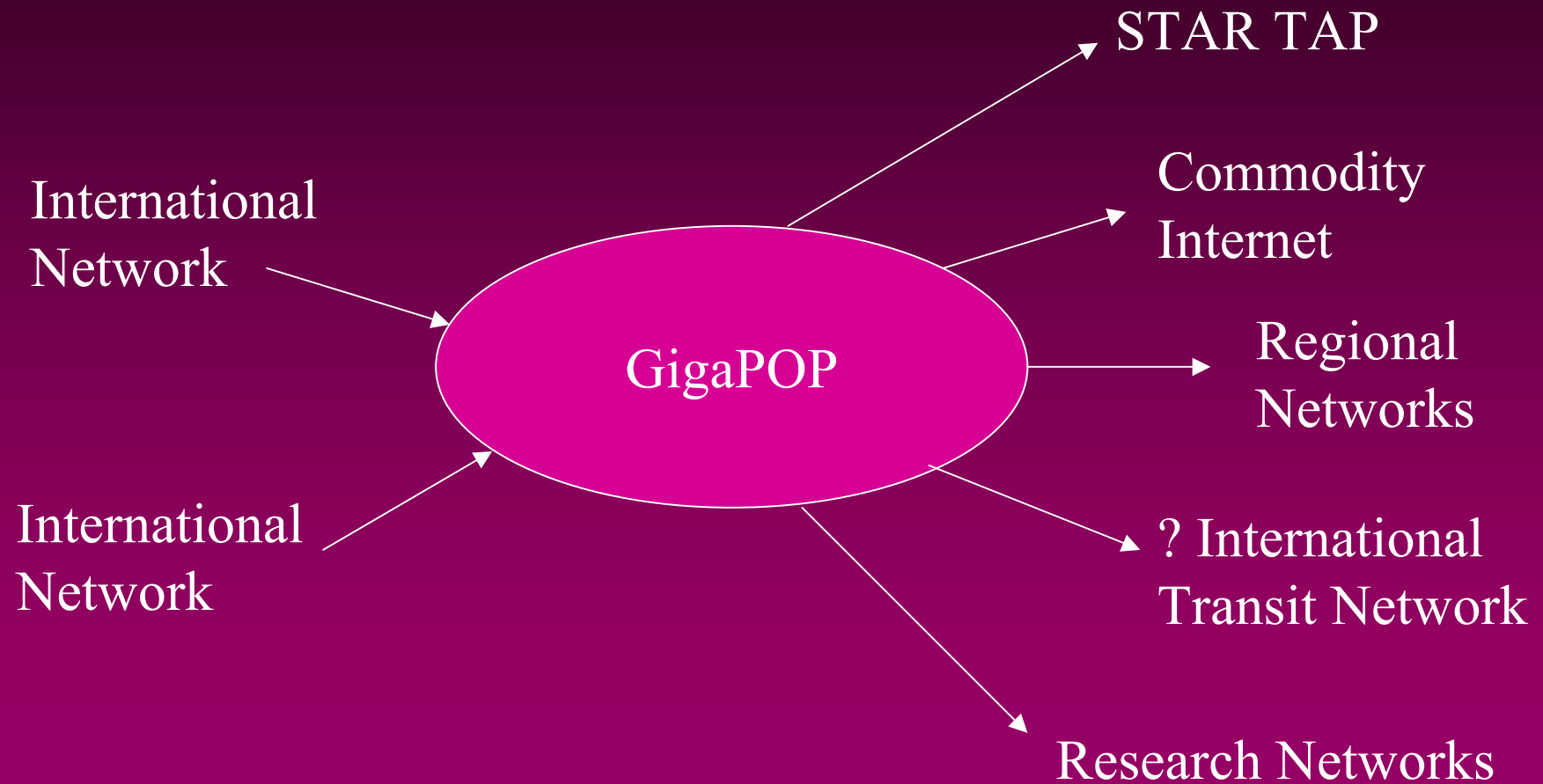
“Transit” v.s. “Peering”

- Peering allows traffic flow between members of cooperating networks
- Transit allows traffic to pass through an adjacent network to reach other networks
- Current financial models don't encourage “transit”
 - » they do encourage “peering”

GigaPOP International Connectivity Services

- A NEW IDEA UNDER DISCUSSION
- Would support international peering as well as access to local or regional networks
- Could be cost effective if enough international networks join
- Would require a specific “international transit national network”

GPICS Model



Comments? Questions?

- Does the GPICS model address a real need of international advanced networks?
- Is it the right model?
- Are there additional issues that need to be considered?
- How would you like to be involved?
- . . .

Further information

- www.ucaid.org
- www.cenic.org
- www.startap.net
- David L. Wasley
 - » david.wasley@ucop.edu