

Internet2

High Performance Internet Service at the University of Michigan

These slides are available from the U-M I2 Web page:

<http://www.itcom.itd.umich.edu/i2/>

April 2000

What do we mean by high speed?

Type	Speed	Time to Transfer 680M bytes
Modem	28.8 Kbps	54 hours
ISDN (1 channel)	64 Kbps	24 hours
ISDN (2 channels)	128 Kbps	12 hours
T1	1.544 Mbps	1 hour
T3	45 Mbps	2 minutes
OC-3c	155 Mbps	40 seconds
OC-12c	622 Mbps	9 seconds
OC-48c	2.5 Gbps	2.2 seconds
OC-192c	9.5 Gbps	0.5 seconds

What is Internet2?

- A network protocol and software development initiative of the university community
- Goal to make it possible for whole new kinds of network applications to be built
 - Enhancing existing applications with new features
 - Creating new applications that weren't possible before
- Maintain leading edge network capability for the research and education community
- Transfer the resulting functions and capability so that they become available to everyone - not to just the research and education community

Example Internet2 Applications

- Remove control of scientific instruments
 - Telescopes, Electron microscopes, Accelerators
- Access to supercomputing centers
- Distributed processing at widely separated sites
- Distributed storage
- High quality, full motion, large image, interactive video
- Collaboration
 - Scientific
 - Performance and fine arts
- Medical imaging and collaboration

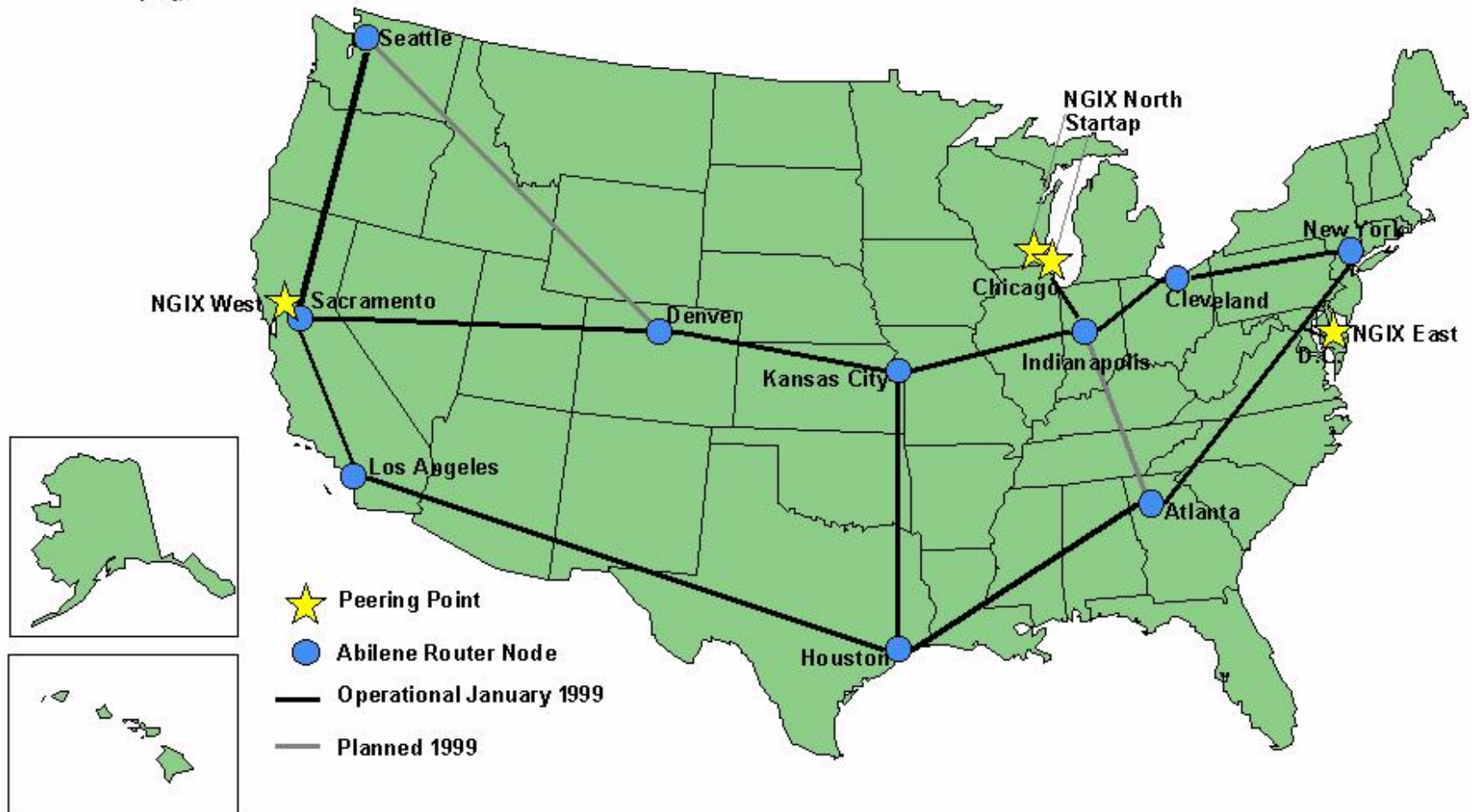
What is Abilene?

- One of the high performance Internet2 networks
- Operated by UCAID in partnership with Qwest, Cisco, Nortel and the University of Indiana
- Currently supported by an OC-48c (2.5G bps) national backbone
- Links GigaPoPs to each other and to the vBNS, federal agency and international high performance networks
- Directly supports 140 participants
- Supports native IP multicast
- Will support differentiated Quality of Service



Abilene Network

February 1999

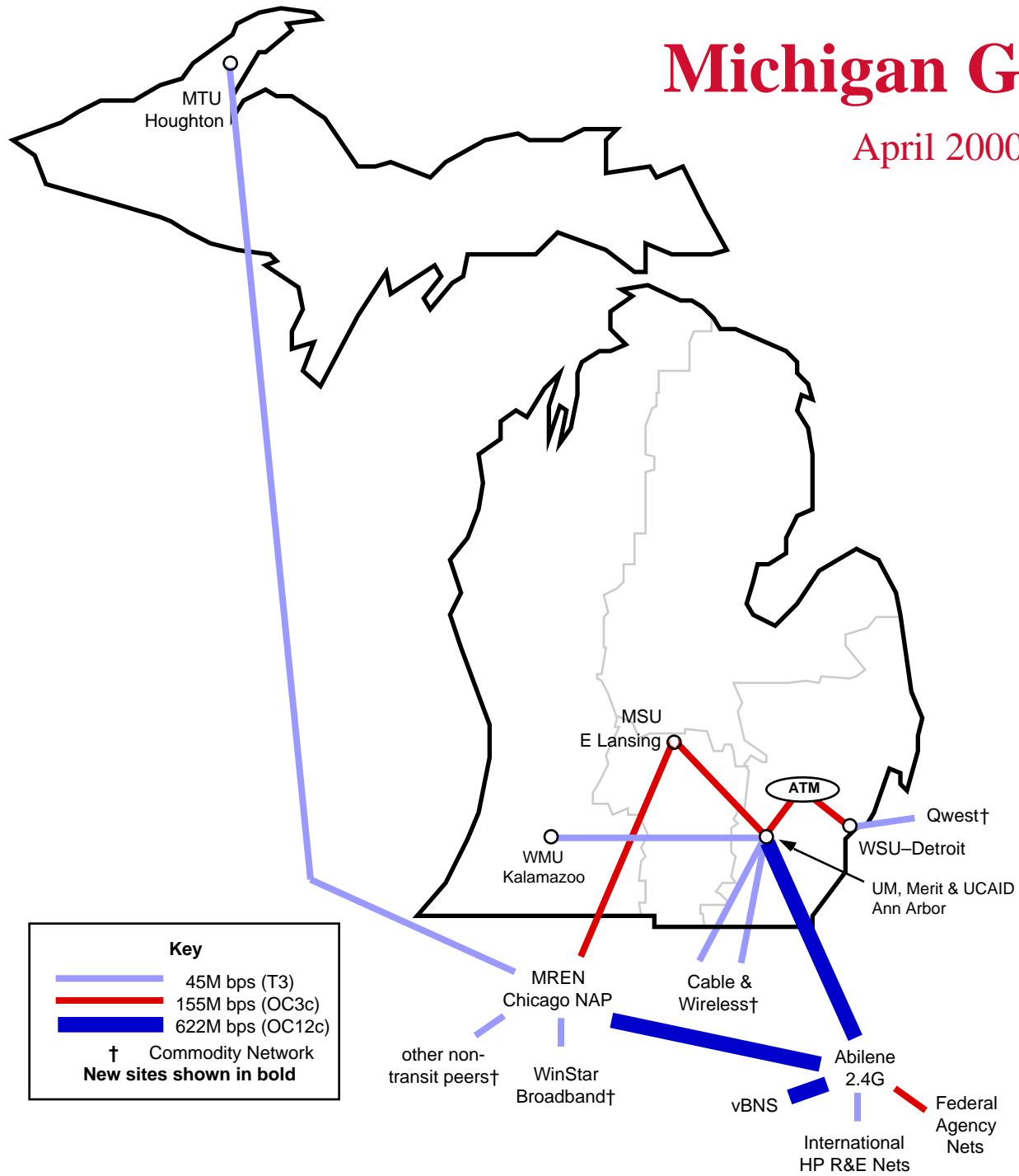


What is the Michigan GigaPoP?

- GigaPoPs are the regional aggregation points that connect Internet2 participants to each other and the Internet2 networks
- The Michigan GigaPoP:
 - is managed and operated by Merit
 - has 622M bps (OC-12c) and 155M bps (OC-3c) links to Abilene
 - provides service to MSU (155M), U-M (622M), WSU (155M), MTU (45M), WMU (45M) and UCAID (155M)
 - attachments are available to educational, governmental, non-profit and for-profit organizations
 - some participants must be sponsored by a university participant
 - no longer has a direct attachment to the vBNS

Michigan GigaPoP

April 2000



UCAID: University Corporation for Advanced Internet Development

- A non-profit membership corporation
 - offices in Ann Arbor, New York and Washington, D.C.
- Mission: Provide leadership and direction for advanced networking development within the research and education community
- Both Internet2 and Abilene are UCAID projects
- 180+ university members
 - Plus affiliates and corporate partners
- Primary Abilene participants must be UCAID members
 - Secondary Abilene participants must be sponsored by a primary Abilene participant, but do not need to be members themselves

Current U-M Status

- 622M bps Abilene access delivered to Arbor Lakes
 - Shared with MSU, WSU, WMU, UCAID and Merit
- CAEN backbone upgraded to 622M bps ATM core
 - 622M bps attachment at Arbor Lakes
 - Bottleneck limiting access to 155M bps will be removed soon
- MCIT backbone upgraded to gigabit ethernet
 - 622M bps attachment at Arbor Lakes
- ITD backbone upgraded to 622M bps ATM core
 - Bottleneck between ITD backbone and Abilene limiting access to 100M bps will be removed by the end of April 2000
- Many departmental network attachments must be upgraded from 10M bps to 100M bps or faster

U-M's Current Status

- U-M has had access to high performance networks since August 1997
- Everyone at U-M has access to Internet2 networks now, but the quality/speed of that access is uneven
- Traffic is routed to Internet2 sites automatically
 - Based on the sites involved
 - Not based on the type of traffic
- ATM, like fast and gigabit ethernet, is a networking technology that may be used to achieve high performance access, but Internet2 networks are TCP/IP networks and not ATM networks

What Next?

- Multicast
- Differentiated Quality of Service (QoS)
- Middleware
 - Identification
 - Authentication
 - Authorization
- New application development/deployment
 - including high quality interactive video
- A U-M Internet2 day
 - probably in early fall

Want More Information?

- U-M's I2 Web page
<http://www.itcom.itd.umich.edu/i2/>
- Internet2-interest@umich.edu e-mail list
 - To join send e-mail to internet2-interest-request@umich.edu with the word "join" without the quotes as the only word in the subject
- Merit's I2 Web page (info about Merit, Internet2, and Abilene):
<http://www.merit.edu/i2/>
- The official Internet2 Project Web site:
<http://www.internet2.edu>
- Contact Jeff Ogden, U-M's I2 Coordinator:
 - E-mail: jco@umich.edu, Phone: 734-936-2025, FAX: 734-647-3185

The End