# Internet Exchange Case Study

The Midwest Internet Cooperative Exchange (MICE) partnered with Cologix to scale significantly within the 511 Building, the region's carrier hotel

The Midwest Internet Cooperative Exchange (MICE) facilitates an open IP exchange among members to improve Internet connectivity, increase performance, and reduce costs by keeping traffic local in the upper Midwest rather than public peering through Chicago. Starting from just a few early participants like Hurricane Electric, the University of Minnesota, ipHouse, Cooperative Network Services, and Mankato Networks, MICE rapidly picked up 50+ peering participants, including Akamai, Google and Netflix, among others. Since its inception, MICE has experienced tremendous growth, offering increased network availability and speed in the Midwest.
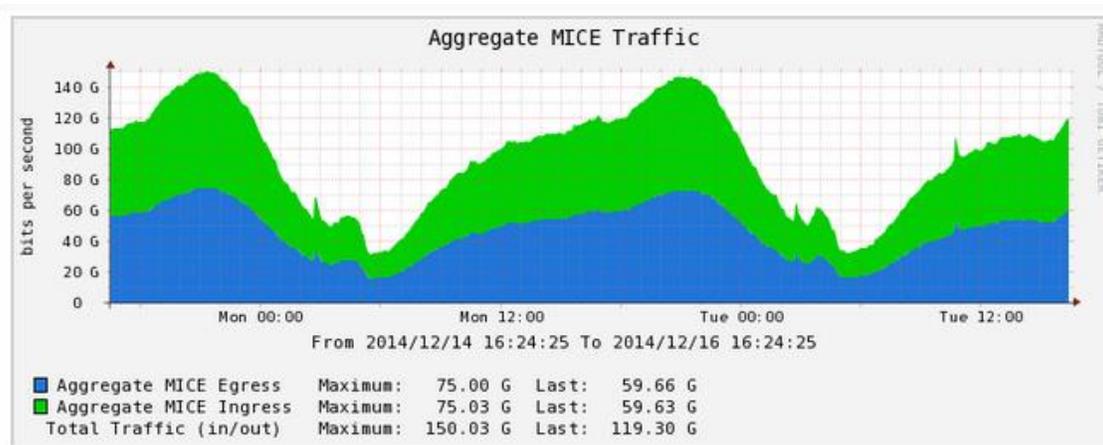
Above: *The onboarding of Google and Netflix in Oct. 2014 drove a significant hike in peering traffic. At that time, MICE traffic accelerated from around 10 gigabytes/second to peak at 75+ Gbps in Dec. 2014 – increasing more than sevenfold. Source:* http://micemn.net/

Beginning

- 0 Gbps start in December 2011
- MICE core switch in Cologix's facility at 511 11th Avenue South in downtown Minneapolis
- Alternative to latent peering & backhaul/bandwidth costs through Chicago
- Non-profit driven by donations & volunteers
- Carrier neutral
- Aimed at reducing MICE participants' networking costs
- Eliminates routing changes
- Dense connectivity in the Cologix Meet-Me-Room (MMR)

Today

- Peaking over 75 Gbps in 2014
- Cologix provides space, power & direct connectivity to 70+ unique networks for MICE open IP exchange members
- 50+ participants include Internet service providers (ISPs), application service providers (ASPs), carriers, cable companies, VoIP providers, government entities, higher education institutions & content providers
- Continuing to experience increased traffic & interest

24 Network Neutral Data Centers Throughout North America

Columbus - **Dallas** - **Jacksonville** - **Lakeland** - **Minneapolis** - **Montreal** - **New Jersey** - **Toronto** - **Vancouver**

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MICE Peering Participants

- 702 Communications
- Acentek
- Advanced Integrated Tech
- Airstream Communications
- Akamai
- Arvig
- Atomic Data
- Broadband Visions
- CDW/Berbee Information Networks Corporation
- Charter Communications
- ClaimLynx, Inc.
- Code 42
- Compudyne
- Cooperative Network Services
- Dakota Carrier Network
- Emergent Networks
- Enventis
- Genesis Wireless/RevNetData
- Google
- Halstad Telephone Company
- Hennepin County Medical Center
- Hurricane Electric
- Implex
- Integra Telecom
- ipHouse
- Jaguar Communications
- Mammoth Networks
- Mankato Networks
- MDU Ethernet Solutions
- Minnesota VoIP
- Minnesota WiFi
- Monticello Fibernet (City of Monticello)
- MyTelepath
- Netflix
- New Core Wirless
- Nextera Communications
- Northern Lights GigaPOP (University of Minnesota)
- NU-Telecom
- Onvoy Voice Services
- Paul Bunyan Communications
- Radio Link Internet
- Savage Communications
- South Dakota Networks
- Stellar Association, LLC
- SupraNet Communications, Inc.
- TDS Telecom
- US Internet
- Vaultas
- VISI
- Wikstrom Telephone Company (Wiktel)
- Windomnet (City of Windom)
- WiscNet

Source:
http://www.micemn.net/participants.html
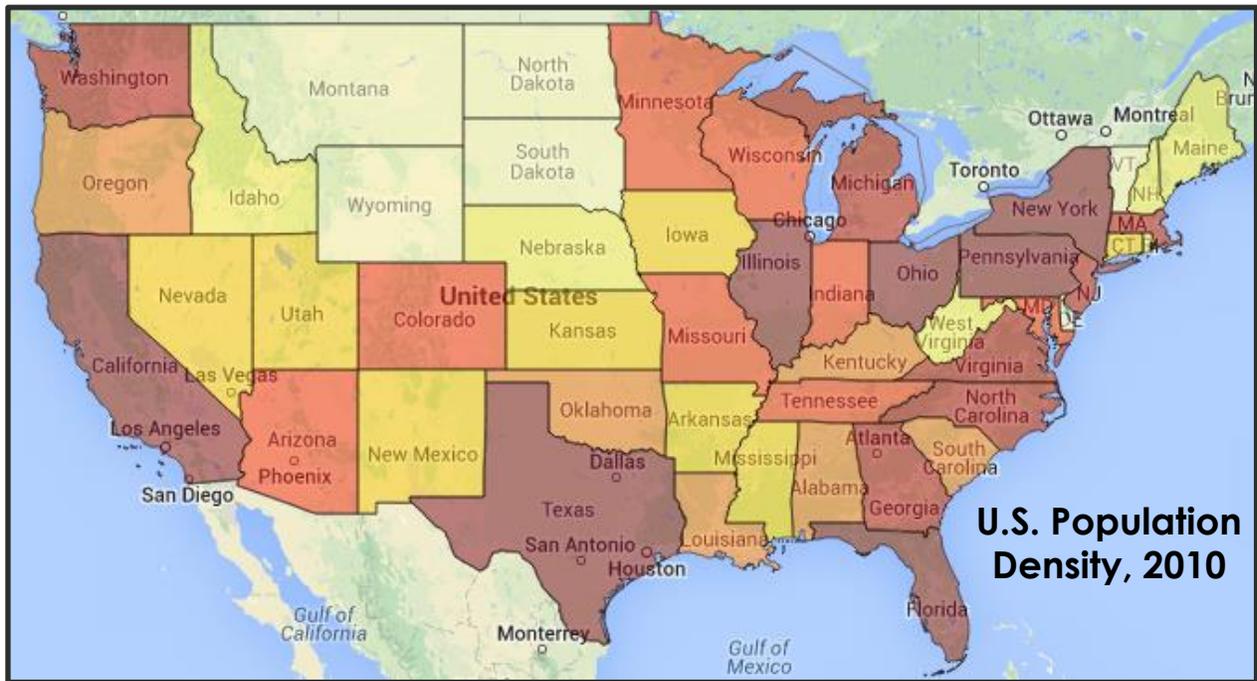
The Founding of MICE

It didn't make sense to the MICE founders that traffic between two Minnesota service providers was routed through Chicago, causing latency as traffic lost momentum in transit. In fact, the founding of MICE was prompted as a workaround to the "Chicago Problem": peering through the nearest network access point (NAP) in Chicago experienced latency and high networking costs. Widely known as points of the most Internet congestion, NAP web traffic was continuing to expand out of the major metro areas to the Internet's new edge in Tier 2 markets like Minneapolis. Peering through the Chicago NAP was particularly challenging, as the world's largest Internet exchange point measured by number of customers and traffic load according to the Packet Clearing House. The only viable alternative was to create an Internet exchange point in the upper Midwest, circumventing extra hops, or segments between a point of origin and the destination.

MICE found its beginnings in the 511 Building, widely hailed as the most connected facility in Minnesota. The first packet exchanged on MICE took place in December 2010, leveraging space and power donated by Cologix, as well as member-contributed switching hardware. Bilateral peering traffic is exchanged directly between two members of the exchange over the shared exchange fabric. MICE also facilitates multilateral peering, or traffic exchanged directly between members wishing to peer directly with any other member, such as a carrier or content delivery network (CDN).
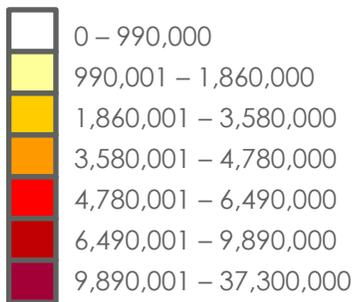
Today MICE brings together 50+ peering participants that exchange traffic to serve the Midwest U.S. According to Tech.MN, this reduces costs of delivery, improves efficiency of routing and increases fault-tolerance through shortcuts that reduce the portion of a service provider's traffic that must be delivered via upstream transit providers.

MICE Timeline

- **Dec. 2010:** First packet exchanged
- **July 2011:** First MICE meeting & appointment of a steering committee
- **March 2011:** 7 peering members plus connectivity to the Northern Lights GigaPOP
- **Oct. 2011:** 25+ peering members
- **Nov. 2014:** Peak traffic in excess of 75 Gbps with 50+ MICE participants

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U.S. Population Density, 2010

Total Population

- 0 – 990,000
- 990,001 – 1,860,000
- 1,860,001 – 3,580,000
- 3,580,001 – 4,780,000
- 4,780,001 – 6,490,000
- 6,490,001 – 9,890,000
- 9,890,001 – 37,300,000

Source: U.S. Census Bureau,
http://www.census.gov/2010census/popmap/

Rapidly Developing Network Demand in Tier 2 Markets

In 1970, the U.S. Census recorded a population of more than 200 million for the first time ever. Fast forward 40 years, and the United States population exceeds 300 million in 2010, breaking another record. Population growth brings an increasing dependence on networking capabilities as more people use the Internet on a daily basis. According to Statistica, the U.S. had more than 263 million Internet users in 2013, representing an 84.2% penetration rate among the U.S. population.

The population map above shows density in the traditional major markets: New York; Los Angeles; Chicago; Washington, D.C.; and San Francisco, among others. However, the map also shows an increasing concentration in Tier 2 markets like Minneapolis as the population continues to grow and expand out of the major metro areas. There are a number of network solutions meeting the needs of the Tier 1 cities, but Internet exchanges like MICE are key to cost-effectively and efficiently meeting the last mile peering needs at the Internet's new edge in Tier 2 markets (i.e., Minneapolis).

Minneapolis Benefits

- 16th largest U.S. market
- Home to 18 Fortune 500 headquarters
- Second largest economy in the Midwest

Content Advantages

- Ideal edge node for content owners based on the unique density of independent ILECs, local/regional CLECs, ISPs and fiber networks that content providers want to access

Cologix Minneapolis

Cologix encompasses nearly 50,000 SQF in the 511 Building, which is the network connectivity hub for the upper Midwest, enabling direct access to 70+ carriers, ISPs, and ASPs.

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