

Overview:

Internet2's Dynamic Circuit Network



The Internet2 Network

The Internet2 Network is a high performance, hybrid optical and packet network infrastructure that provides advanced capabilities to the U.S. research and education community. The infrastructure supports an enhanced IP Network and a new Dynamic Circuit Network (DCN) that enables the automated set up and connection of short-term, point-to-point circuits providing dedicated bandwidth between connectors.

DCN is a switching service that creates short-term circuits between end-users that require dedicated bandwidth, including reliable connections lasting from minutes to days.

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The DCN enables users to create point-to-point circuits across the Internet2 infrastructure using control plane software that automates the set up and tear down of the circuits. While the network is currently in development, Internet2 Connectors and members are encouraged to begin exploring the DCN's unique capabilities during 2008. The goal is to provide an automated reservation system to enable users to request circuits either on-demand or as a schedulable resource.

An Internet2 member connects to the DCN through an Internet2 Connector. The Connector's physical connection to the Internet2 infrastructure may be used both for the DCN and for longer-term point-to-point static circuits provided through WaveCo. Connection to the DCN provides dynamic circuits across the Internet2 infrastructure to regional optical networks that are Internet2 Connectors, and to other national and global research networks like ESnet in the United States or GÉANT2 in Europe.

Seamlessly setting-up optical circuits across independently operated networks requires the coordination of multiple administrative domains. This is achieved through control plane software enabling provisioning across domain

boundaries with the appropriate authentication and authorization. Control plane software is under development through several on-going projects, including the NSF-funded DRAGON project, the ESnet OSCARS program, and the GEANT2 AutoBAHN project. Other participants include the University of Southern California/Information Sciences Institute East (USC/ISI-East), Mid-Atlantic Crossroads (MAX), and other regional and international networks. In the future, this collaboration will result in the ability to create circuits on demand and on a global scale.

The Internet2 DCN currently uses an experimental open source version of the DRAGON-developed control plane software as well as internationally developed inter-domain communications schemas, allowing circuits to be created seamlessly and directly by the applications themselves.

How to connect to DCN?

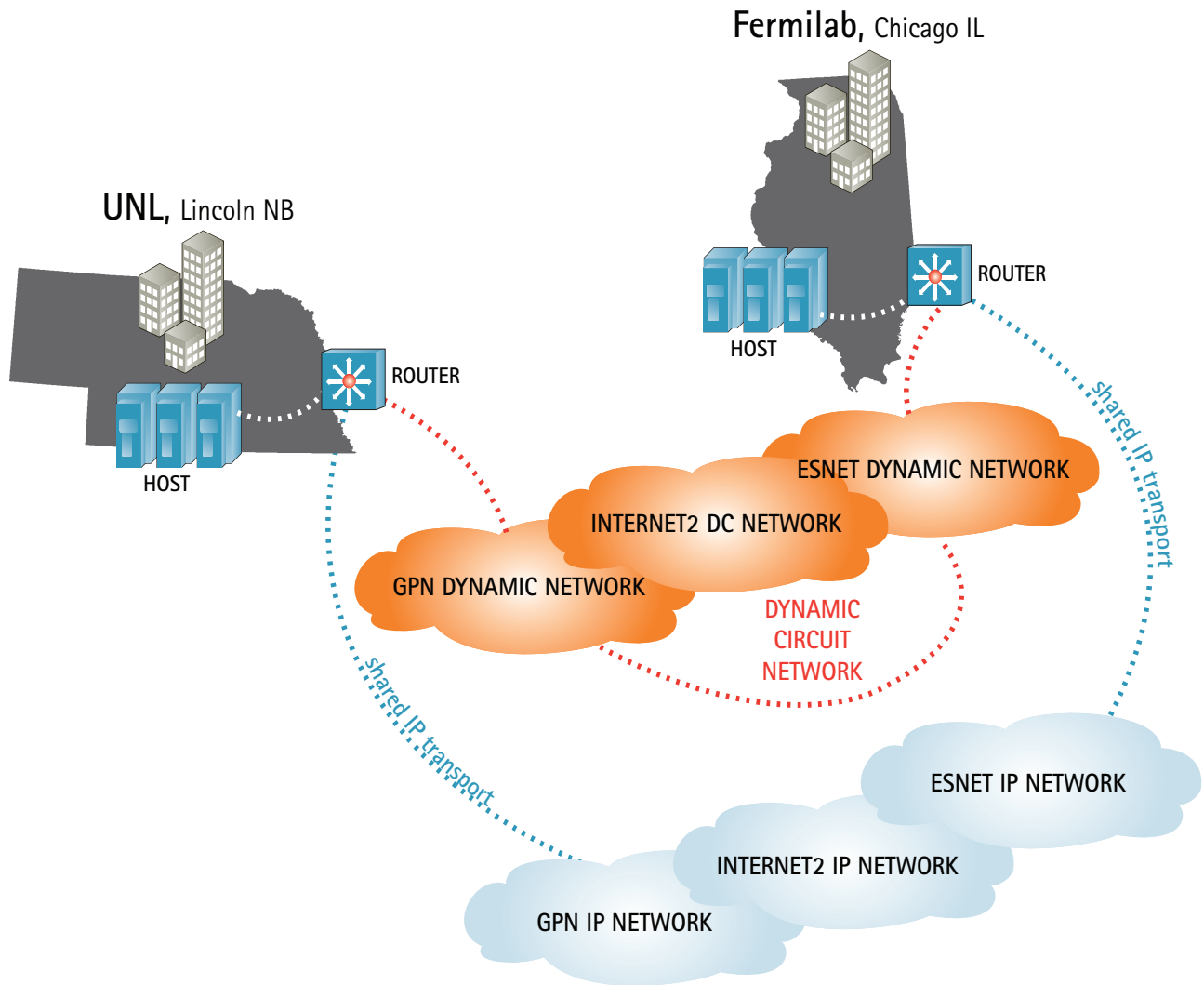
Internet2 Connectors

To connect to the DCN, current Internet2 IP Connectors should send a request to network@internet2.edu.

An Internet2 project manager will be assigned to this request, and work with the connector and the Internet2 Network Operations Center (NOC) to implement the required network connections and implementation of the software to ensure delivery of the service.

Internet2 Universities

Researchers at Internet2 universities wishing to collaborate using the DCN should first contact their campus network organization for support. The campus network team can then determine if their institution has an appropriate connection to an Internet2 Connector, or other regional network. If their Internet2 Connector has not yet established a physical connection to the DCN, a request for that connection should be made to the connector.



Internet2's Dynamic Circuit Network in Action

This figure provides a high level view of how a connection might be made using the Internet2 DCN in combination with the circuit infrastructures of an Internet2 Connector, the Great Plains Network (GPN), and the ESnet network. In this scenario, a researcher at the University of Nebraska-Lincoln (UNL), a Tier2 site for CERN's Large Hadron Collider (LHC), is receiving periodic 8.5 Gigabit per second (Gbps) downloads from Fermilab in Batavia, Illinois, a Tier1 LHC site.

Rather than congesting the University of Nebraska's IP network with these large periodic data flows, a short-term, dedicated, dynamic circuit is established across the UNL, GPN, Internet2, and ESnet network domains to handle this specific traffic. The data is dynamically switched from the shared IP path onto the dedicated circuit, a 10 Gbps path devoted to this application.

www.internet2.edu/network/dc