Dynamic Circuit Networks Around the World / AutoBAHN-Internet2-ESnet

Internet2 Dynamic Circuit Network (DCN)

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Internet2 DCN Provisioning
DCN Software Suite

• OSCARS (IDC)
  • Open source project maintained by Internet2 and ESNet

• DRAGON (DC)
  • NSF-funded
  • Open source project maintained by MAX, USC ISI EAST, and George Mason University

• Version 0.3 of DCNSS released April 18, 2008
  • https://wiki.internet2.edu/confluence/display/DCNSS
DRAGON Control Plane - Key Elements

• Virtual Label Switching Router – VLSR
  • Open source protocols running on PC act as GMPLS network element (OSPF-TE, RSVP-TE)
  • Control PCs participate in protocol exchanges and provisions covered switch according to protocol events (PATH setup, PATH tear down, state query, etc)

• Network Aware Resource Broker – NARB
  • Intradomain listener, Path Computation, Interdomain Routing and Path Computation

• More information: dragon.east.isi.edu
OSCARS Project

- On-demand Secure Circuits and Advance Reservation System (OSCARS)
- DOE Office of Science and ESnet project
- Collaboration with Internet2 BRUW project
- Web Service infrastructure modified to enable DCN client provisioning request and inter-domain web service based peering
Heterogeneous Network Environment
multi-technology, multi-level, multi-domain, multi-vendor, multi-provision system network environments

- DRAGON is used as the DOMAIN Controller for I2 DCN Ciena Core Directors
- DRAGON allows for incorporation of non-GMPLS equipment and vendor proprietary provisioning methods into the overall GMPLS environment
Internet2 DCN Web Services

- Web Service Definitions
  - https://wiki.internet2.edu/confluence/display/CPD/OSCARS+Web+Service+Definition
  - wsdl - web service definition of message types and formats
  - xsd – definition of schemas used for network topology descriptions and path definitions
  - implementation document – defines details of messaging
  - Extension of the OGF Network Measurement Working Group (NMWG) schemas (also used by PerfSonar)
Hybrid Networks Control Plane

- Four Primary Web Services Areas:
  - Topology Exchange, Resource Scheduling, Signaling, User Request
• Meta-Scheduler Approach
• Same set of Web Services used for linear instantiation model can be used by a high level process to build services:
  • Topology Exchange, Resource Scheduling, Signaling, User Request
• A key issue is that this requires a trust relationship between the “meta-scheduler” and all the domains with which it needs to talk.
Internet2 DCN Control Plane

IntraDomain

Circuit Request
- Source Address
- Destination Address
- Bandwidth
- VLAN TAG (None | Any | Number)
- User Identification (certificate)
- Schedule

Dynamically Provisioned Dedicated Resource Path (“Circuit”)

Internet2 IDC

DRAGON Enabled Control Plane

Actual Network Path

Client A

Client B

internet2 DCN Service

Ethernet Mapped SONET or SONET Circuits

api can run on the client, or in a separate machine, or from a web browser

XML

USER API
### Internet2 DCN Control Plane

#### InterDomain

- No difference from a client (user) perspective for InterDomain vs IntraDomain

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**A. Abstracted topology exchange**

1. Client Service Request
2. Resource Scheduling
5. Service Instantiation (as a result of Signaling)

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**USER API**

- XML

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**Multi-Domain Dynamically Provisioned Circuit**

- RON Dynamic Infrastructure Ethernet VLAN
- Internet2 DCS Ethernet Mapped SONET
- RON Dynamic Infrastructure Ethernet VLAN
DCN – Global Network
DCN Provisioning
Web Page or API

Web Page Based Provisioning

```
java createReservation https://dcn.internet2.edu:axis2/services/dcn reservation.properties
```
DCN – Circuit Status Description

![Image of a DCN circuit status description interface]

### Reservation Details

To return to the reservations list, click on the Reservations tab.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRL</td>
<td>dcn.internet2.edu-7015</td>
</tr>
<tr>
<td>User Description</td>
<td>lambda station</td>
</tr>
<tr>
<td>Start time</td>
<td>2008-04-21 23:37</td>
</tr>
<tr>
<td>End time</td>
<td>2008-04-21 23:53</td>
</tr>
<tr>
<td>Created time</td>
<td>2008-04-21 23:37</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>20000000000</td>
</tr>
<tr>
<td>Status</td>
<td>ACTIVE</td>
</tr>
<tr>
<td>Source</td>
<td>um:ogf.network:domain=don.internet2.edu.node=LDSA:port=527391:link=10.100.100.13</td>
</tr>
<tr>
<td>Destination</td>
<td>3160</td>
</tr>
<tr>
<td>VLAN</td>
<td></td>
</tr>
<tr>
<td>Intradomain nodes</td>
<td>um:ogf.network:domain=don.internet2.edu.node=LDSA:port=527391:link=10.100.100.13</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Interdomain nodes</td>
<td></td>
</tr>
</tbody>
</table>
DCN – Circuit Status Description
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Over 300 circuits provisioned for 24 hour period – April 21, Monday
Thank You