IDC: Inter-Domain Controller API

GLIF Control Plane WG
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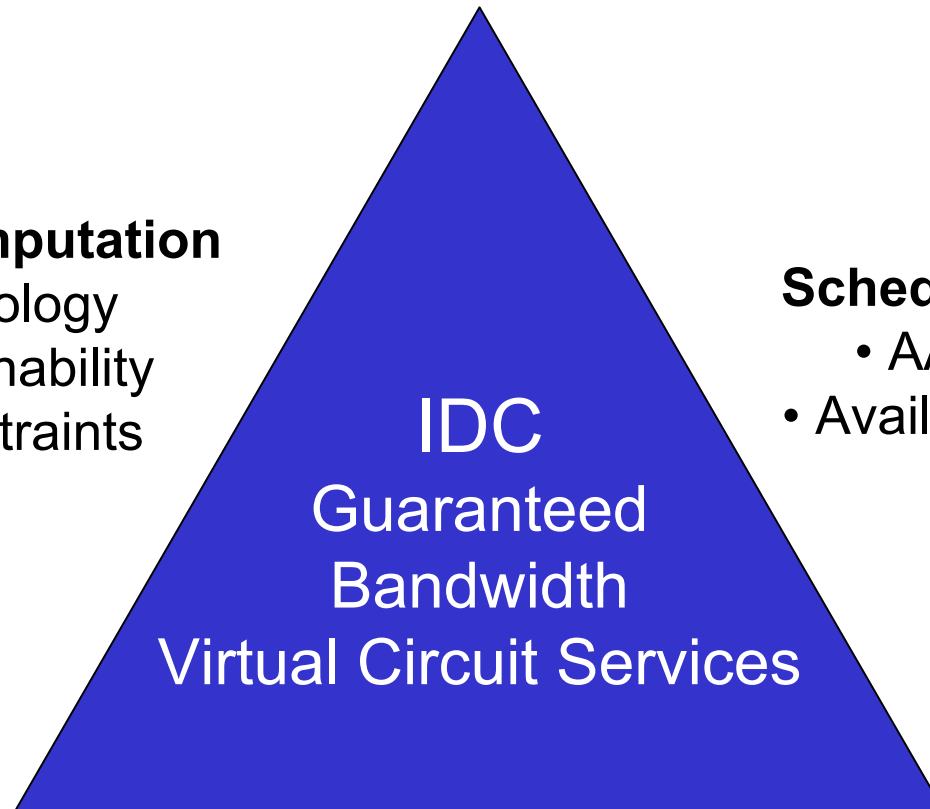
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Path Computation
- Topology
- Reachability
- Constraints

Scheduling
- AAA
- Availability

IDC
Guaranteed
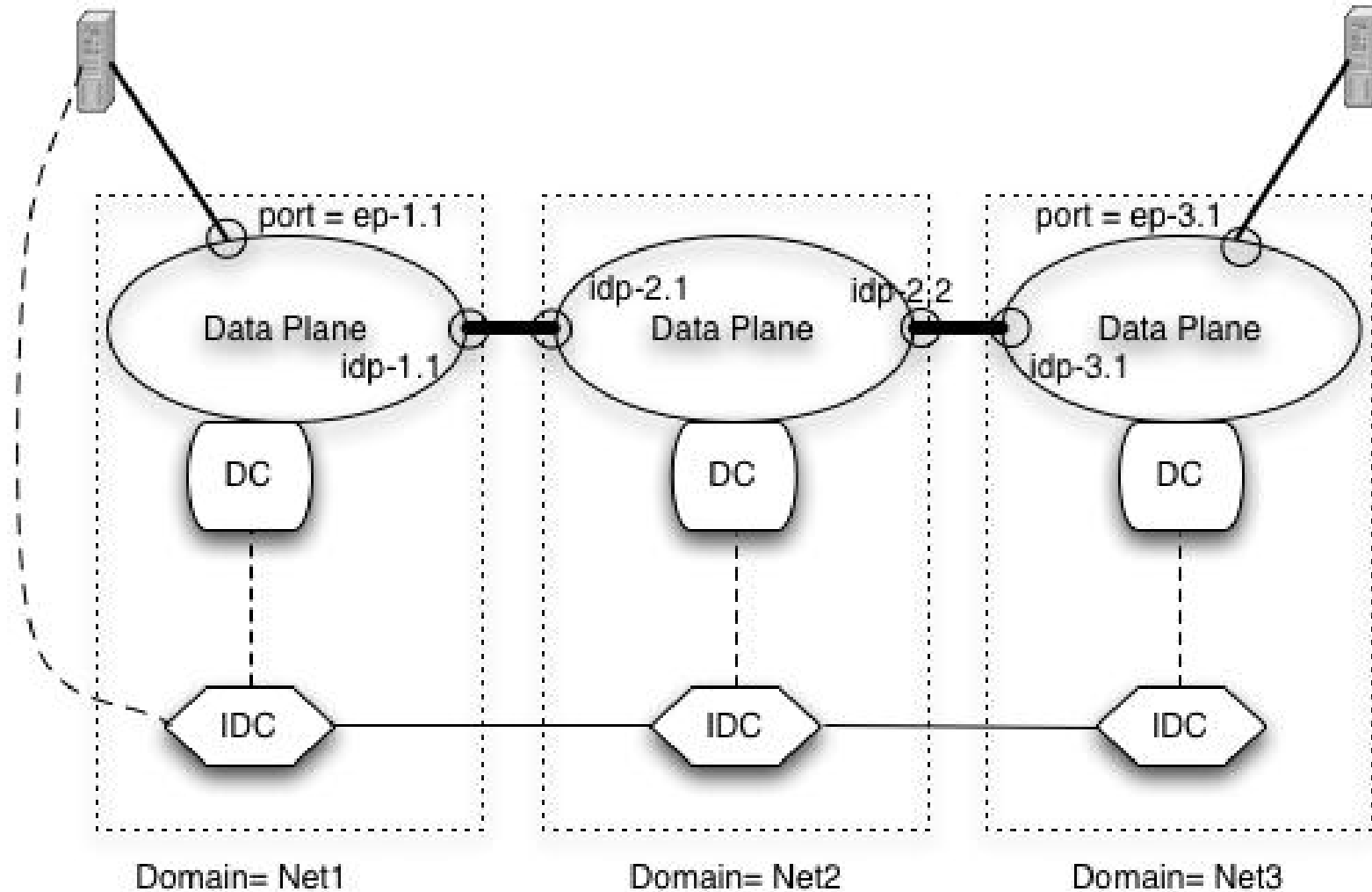Bandwidth
Virtual Circuit Services

Provisioning
- Signalling
- Security
- Resiliency/Redundancy

➤IDC Role

host1 -> Server1.schoolA.edu
-> domain=schoolA; node=Server1

host1 -> Server1.schoolB.edu
-> domain=schoolB; node=Server1

port = ep-1.1

Data Plane
idp-1.1

idp-2.1   idp-2;2
Data Plane

port = ep-3.1

Data Plane
idp-3.1

DC

DC

DC

IDC

IDC

IDC

Domain= Net1

Domain= Net2

Domain= Net3

- **Design and implementation partners:**
  - DICE (DANTE, Internet2, CANARIE, ESnet)
    - HOPI / DRAGON (Internet2/ISI East)
    - OSCARS / Science Data Network (ESnet)
    - AutoBAHN (GEANT)
    - Network Management Working Group (NMWG)
  - Dynamic Resource Allocation Controller (Nortel)
  - Phosphorus (University of Amsterdam)
  - TeraPaths (BNL)
  - LambdaStation (FNAL)

- **The service has been deployed and is in pre-production**
  - Internet2, DRAGON and ESnet SDN infrastructure managed by IDC instances
  - More then 3000 reservation requests have been processed
  - Large scale interoperability demo at SC07
  - On-going work with TeraPaths, LS, DRAC, UvA interop

- **Core Technology: SOAP / WSDL**

  – Ensures wide compatibility and easy adoption

  – Message security guaranteed by SSL

  – Data types conform to NMWG schema

- **Typical usage scenario**

  – User performs a SOAP call at their local IDC instance,

  – SOAP call is locally processed and forwarded downstream to peer IDC instance as needed,

  – Message keeps going downstream until last IDC on path reached,

  – SOAP responses start coming back upstream,

  – Local IDC returns appropriate SOAP response.

➢IDC API methods

- **Resource scheduling:**
  - Create new reservation (immediate / <u>in advance</u>)
  - Cancel existing reservation
  - Query status
  - List all / by criteria
- **Data plane:**
  - Path setup and teardown (synchronous)
  - Path refresh (end-to-end data plane status check request, implicit teardown on failure)
- **Topology exchange (IDC-to-IDC only):**
  - Retrieve local IDC's view of the network topology
  - Signal IDC to initiate topology pull

➤API Issues

- **Reservations:**

  - Creating a reservation is very opaque to the user. Little information on what they can do, and limited feedback.

  - User can't change reservation parameters; must cancel or wait to expire then resubmit. Service is interrupted.

- **Data plane setup:**

  - Network operations are slow & expensive; devices may not be able to keep up. We often observe up to 3-4 mins of setup time. Requests would occasionally come in during SC07 at a higher frequency rate.

- **Topology exchange:**

  - Some domains will only want to expose an abstracted view of their local topology, and only to trusted peers.

  - How do we handle topology changes / maintenance / outages?

- **Operations:**

  - Difficult to debug reservations across multiple IDC instances

➢Proposed API changes

- **Reservations:**
  - Modify reservation parameters (duration, bandwidth…)
  - Detailed reservation history
  - Constraints checking

- **Data plane setup:**
  - Path setup / teardown: asynchronous, scheduled by user and/or IDC

- **Topology exchange**
  - A comprehensive model is being designed by the DICE group (lead by Mauro Campanella and Jerry Sobieski)

➢Other Design Issues

- **Technologies**

  - Considering RSVP for path setup and maintenance rather than SOAP messages; how do we tie this into AAA infrastructure? What if RSVP is rejected at the domain border?

  - Considering using SNMP to catch local network status changes and to then notify peer IDCs.

  - Topology exchange and interdomain pathfinding: At first look is similar to BGP functionality; could we leverage existing BGP implementations?

- **Policies**

  - Once the service goes in full production, issues like link costs and usage authorization will come into play. How will domains handle this information?

- **Schemas**

  - NMWG evolved to NML-WG. IDC engineers are participating. New standards may require changes to API.

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