OGF NSI: the Network as a Manageable Resource for Clouds and Grids

Science Agency Uses of Clouds and Grids

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Networks in Clouds & Grids

- Networks are often been taken for granted by Clouds and Grids

- Networks performance sensitive to distance and congestion

- Longer distances may require using more than one provider

Goals is to have networks as a manageable resource
Inter-DC connectivity challenge

(1) Request

(2) Provide

(3) Use

Inter-DC network

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Managing complex networks in Clouds

Requirements:

• A simple API to support connectivity management

• Network should be just another resource – easy integration with scheduling of computing resources

• Dynamic assignment of bandwidth, VLAN ids etc.

• Compatibility with monitoring systems for virtual infrastructures while keeping isolation

• Global reach: multi-provider enabled solution
Dynamic circuits – service rollout

- Research and education networks are rolling out dynamic service networks, but use a range of different technologies:
  - OSCARS (Esnet, Internet2, LHCnet, NORDUnet, several RONs)
  - AutoBAHN (GÉANT and several NRENs)
  - G-lambda (AIST, KDDI, NTT)
  - openDRAC (SURFnet)

- These systems are currently not interoperable

*Network services Interface (NSI) protocol will allow these systems to interoperate.*
Network Service Interface

- NSI is designed to allow Grid, Cloud and other applications to manage network connectivity.
- NSI also supports provider-to-provider circuit request
- NSI can also allow existing BoD systems to interoperate
- Oriented to creating and managing L1/L2 connection-oriented circuits: bandwidth guarantees.
NSI is a framework

- NSI provides a framework for multiple services:
  - Connection service
  - Topology exchange service
  - Negotiating monitoring

- The NSI Framework is available here:
  http://forge.gridforum.org/sf/go/doc16014?nav=1
Network Service Framework (NSF)

- Platform for many services
- Services sessions established between service instances
- NSI Requester-Provider session established between NSAs
Connections in NSI

- Connections have:
  - Source and Destination (point to point)
  - Performance characteristics (capacity, framing, etc)
  - Authorization policy (defined by domain)
  - Book-ahead schedule (“now” for on demand)

- Two part connection establishment:
  - Reservation- includes PathFinding and Resource allocation
  - Provisioning- includes re-configuration of the network elements along a pre-computed path
Connection lifecycle

- messages (primitives) manage connection lifecycle
  - Request a connection (creates a reservation)
  - Terminate the connection (removes the reservation)
  - Provision the connection (enable on transport plane)
  - Release the connection (releases connection)
Delivering Network Services

NSI Requester — NSI Provider

NSA = Network Services Agent
NRM = Network Resource Manager

NSI used to communication requests between Agents
Provider Agent delivers circuit via Network Resource Manager
NSF describes method for aggregating topology into ‘Networks’
NSI documents

GFD.173 Network Services Framework
- The NSF is a framework to support Network Services
- Supports many services – initial service is Connection Service
- Possible future services, e.g.: Network Topology Exchange Service
- Status – NSF v1.0 has been published

GFD.XXX Connection Service Protocol
- Allows an application or network provider to request and automatically reserve and provision circuits from other network providers
- Designed to support circuits that transit multiple service providers
- Status – protocol freeze this week to support NSI plugfest Sept 2011
NSI implementation timeline

- ION service (Esnet and Internet2), AutoBAHN (GÉANT), G-lambda (AIST, KDDI, NTT), openDRAC (SURFnet), openNSA (NORDUnet) are all developing NSI compliant interfaces.

- NSI plugfest will take place at GLIF meeting in Rio September this year

- Aiming to demonstrate first protocol implementations at SuperComputing in November 2011
Summary

• Inter data center connectivity not trivial

• NSI is an open interface request connectivity

• R&E networks around world rolling out dynamic services

• Commitment by these providers to become NSI compliant
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