



GLIF 2010 @ CERN Challenge
(13-14th October 2010)

NSI demo next year

11 months later....



- OpenNSA
- AutoBAHN
- OpenDRAC
- GL/AIST
- GL/KDDI
- DynamicKL
- OSCARS

How do we make this grow?



Quick Recap



First NSI Service: Connection Service



Connection Service = creation, **management** and removal of Connections (“connection lifecycle”)

Connection Service Protocol = set of messages exchanged over the NSI interface to manage the connection service

Leverages the recursive architecture of Network Service Agents to setup an end-to-end connection

Connection Service Protocol

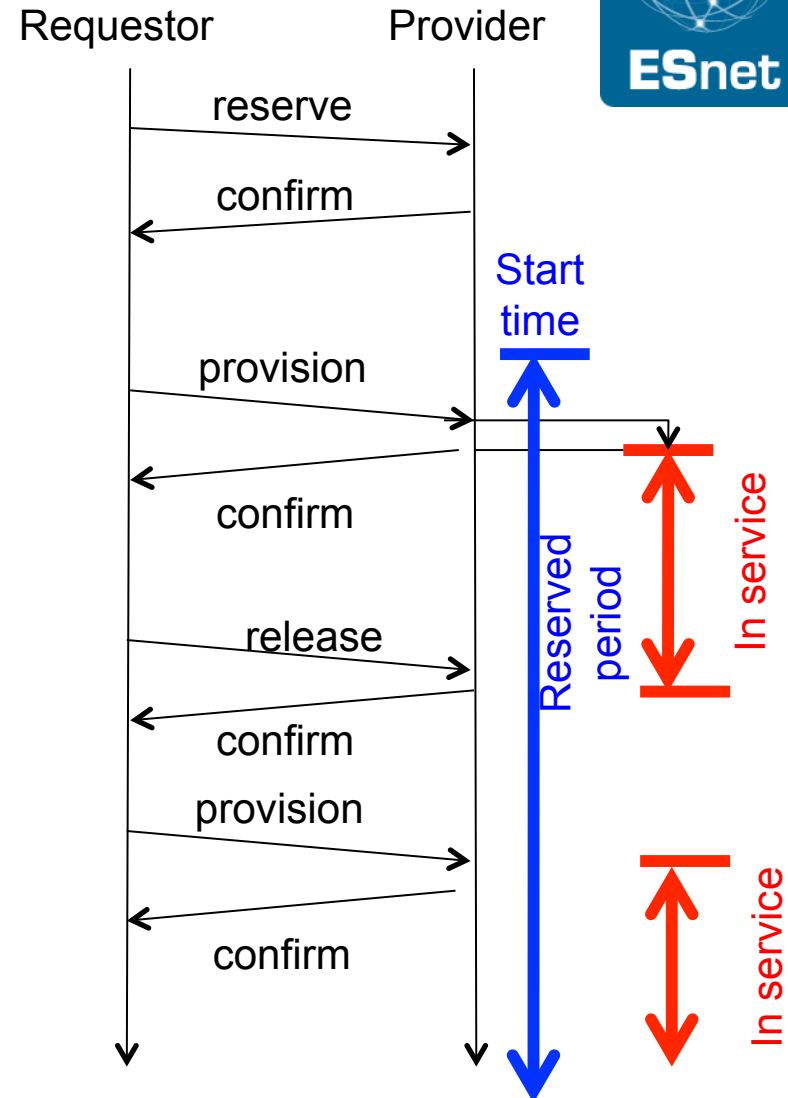


Behavior of the following set of messages nailed down:

- Reserve
- Provision
- Release
- Cancel
- Query

Major difference from existing protocols

- Explicit provision expected from Requestor
- Duration of reservation separated from “actual use” of resources



Three important concepts

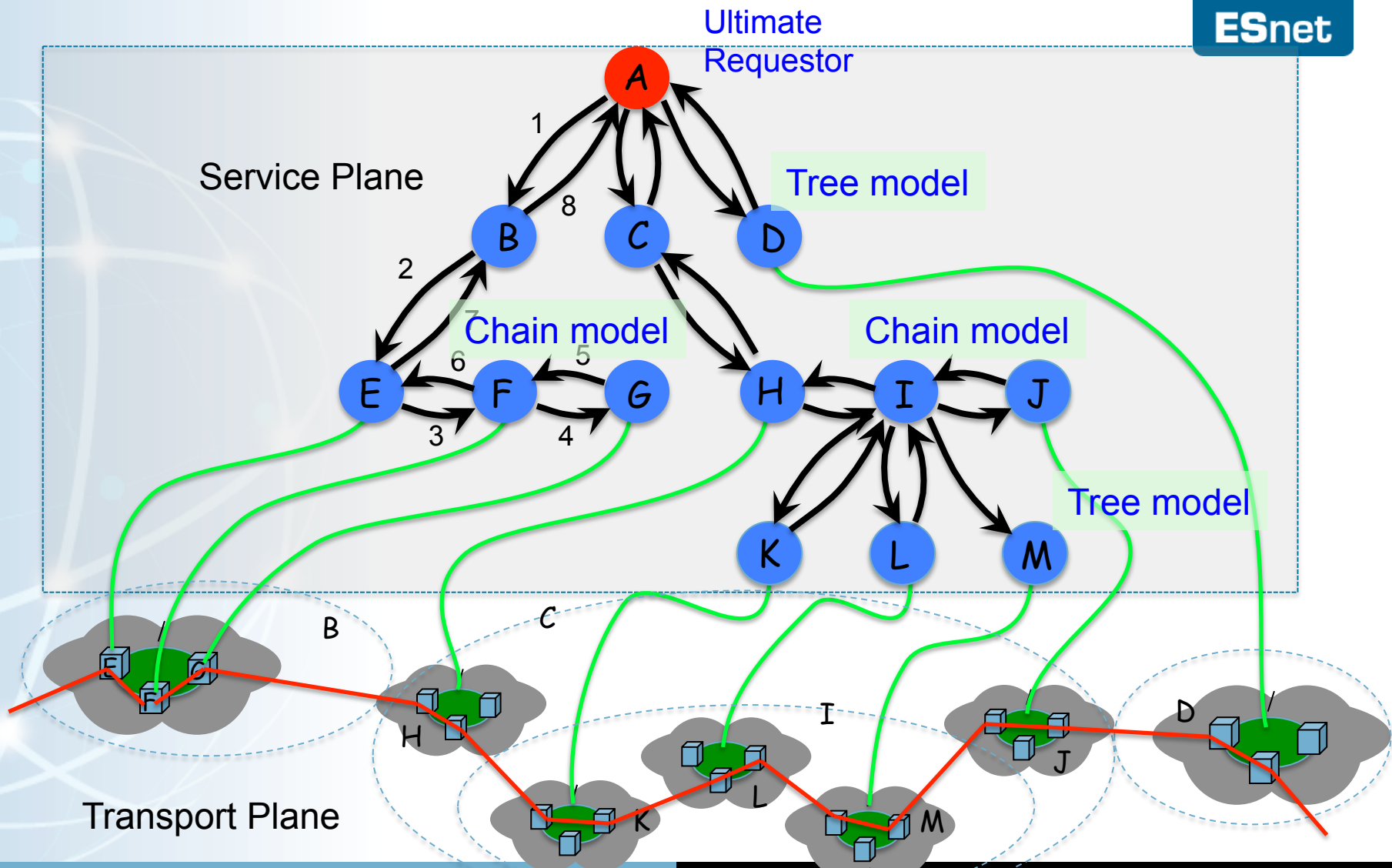


Recursive Framework of “requestor” and “provider” agents

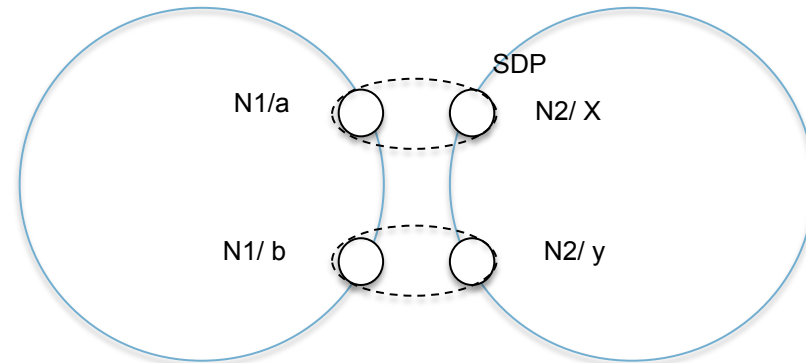
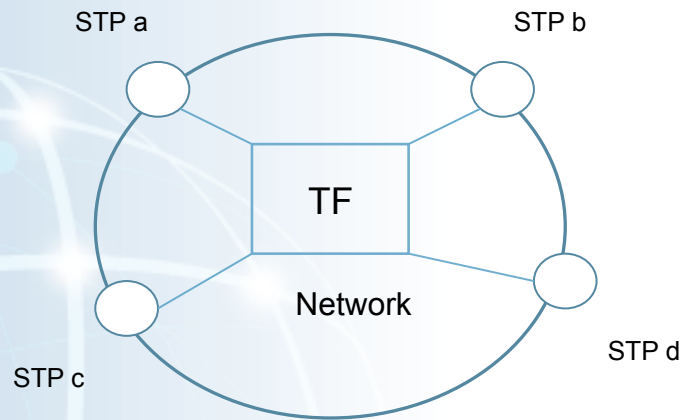
Abstraction of multi-layer physical topology into “service topology”

“Composable” Services Model

Recursive Framework scales over multiple Network Service Agents (NSA)



Service Termination Points (STP) and Service Demarcation Points (SDP)



STP a = Network + 'a' (local identifier)

STPs represent the **external** interfaces of the network domain

An STP is a **symbolic** reference:

- a Network identifier string in the higher order portion
- a local STP identifier in the lower order portion

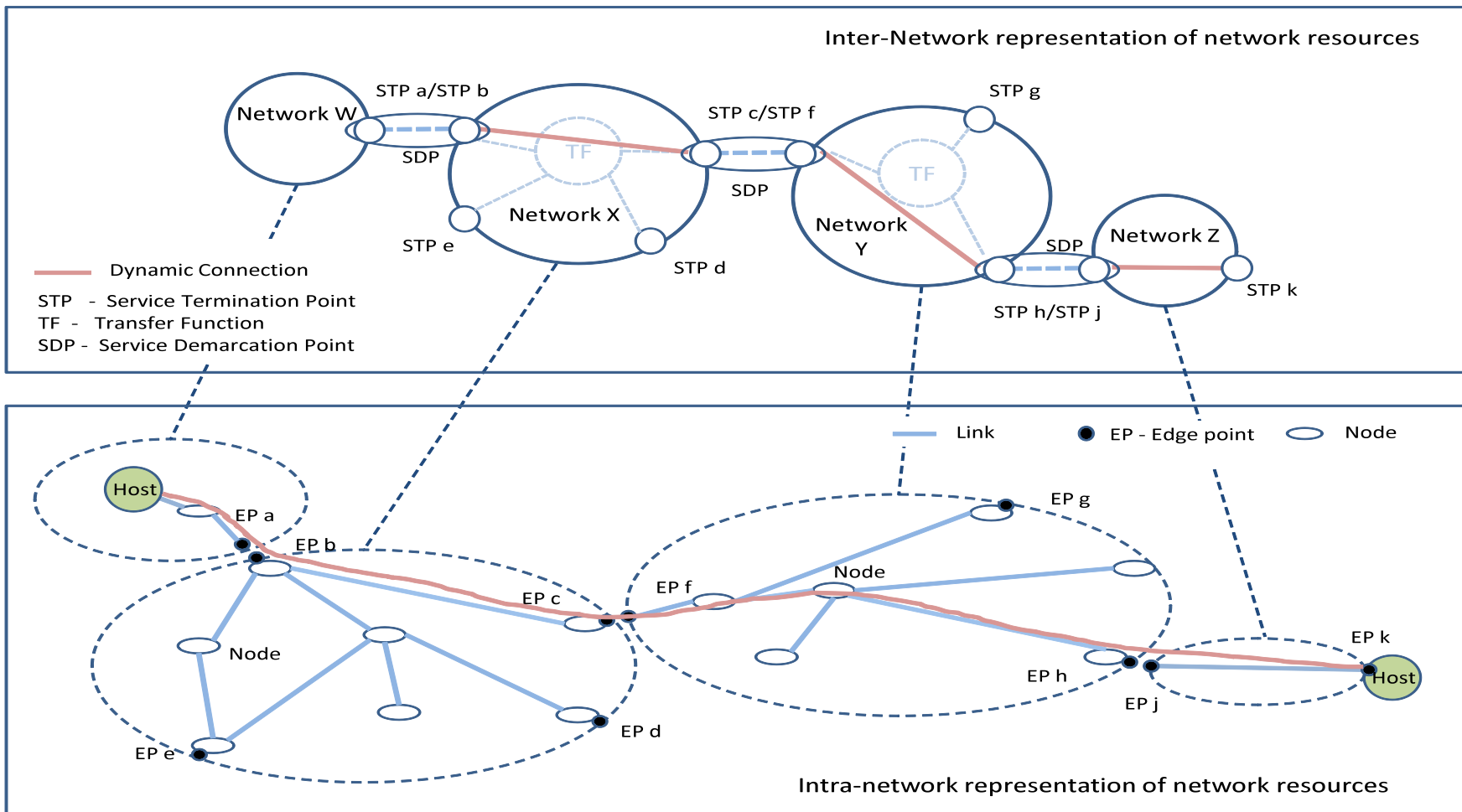
SDP = interconnected STPs

Abstracts the connectivity between two STPs

Transfer Function (TF) indicates the internal network capabilities

TF- Transfer Function

Service Plane Topology: Service Termination Points



Service Plane represents the topological interconnects with STPs

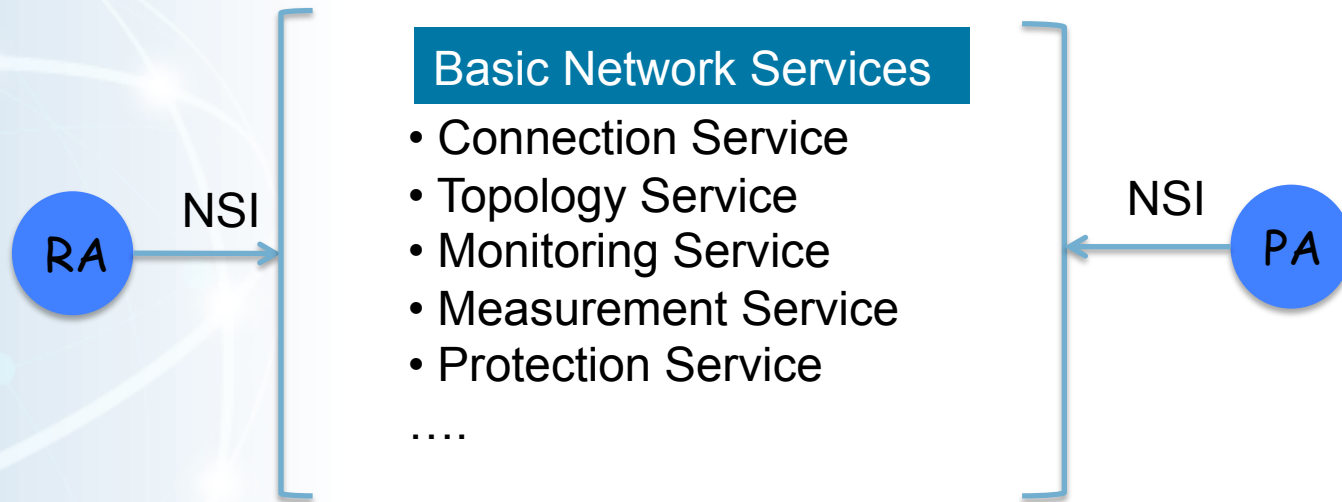
Multiple combinable services over the same interface (future)

Basis for composable application-network service interactions



Composable Service

Ex. Automated GOLE service = Connection + Verification + Topology + Monitoring



Congruent with the end-to-end networking vision, and bringing campus \leftrightarrow WAN together

The Base NSI protocol has the right elements to stir innovation at the service layer

Gaps that need standards



Security Profile

Service Definition

Topology

NSI Connection-service Gap Analysis

Security Profile



- Define the basic security profile for NSI
 - Ability for network operators to define their own profile?
- Fields in place within the NSI WSDL
- Need operator validation for this specification
 - Part of an organizations operational procedures
 - Should be well documented and communicated to end-users

Service Definition



R&E Networks will continue to innovate

- 100GE
- Carrier Ethernet
- NDDI/OpenFlow

How do we define consistent end-to-end services that users can “ask” for?

- Service Definition tackles all technology parameters of a service that can be requested
- Concept is simple, but requires community consensus and procedures to agree on services, document etc.

Topology



NSI needs go beyond whats being done within NML working group (or DeTox?)

Need standard mechanisms/agreements for independent networks to :

- Represent the external topology in STP format
- Protocols and procedures to publish/share the topology

The intra-domain format can be NML and mapping from STP to NML are best practices that a group like GLIF can work on

NSI CS 2.0?

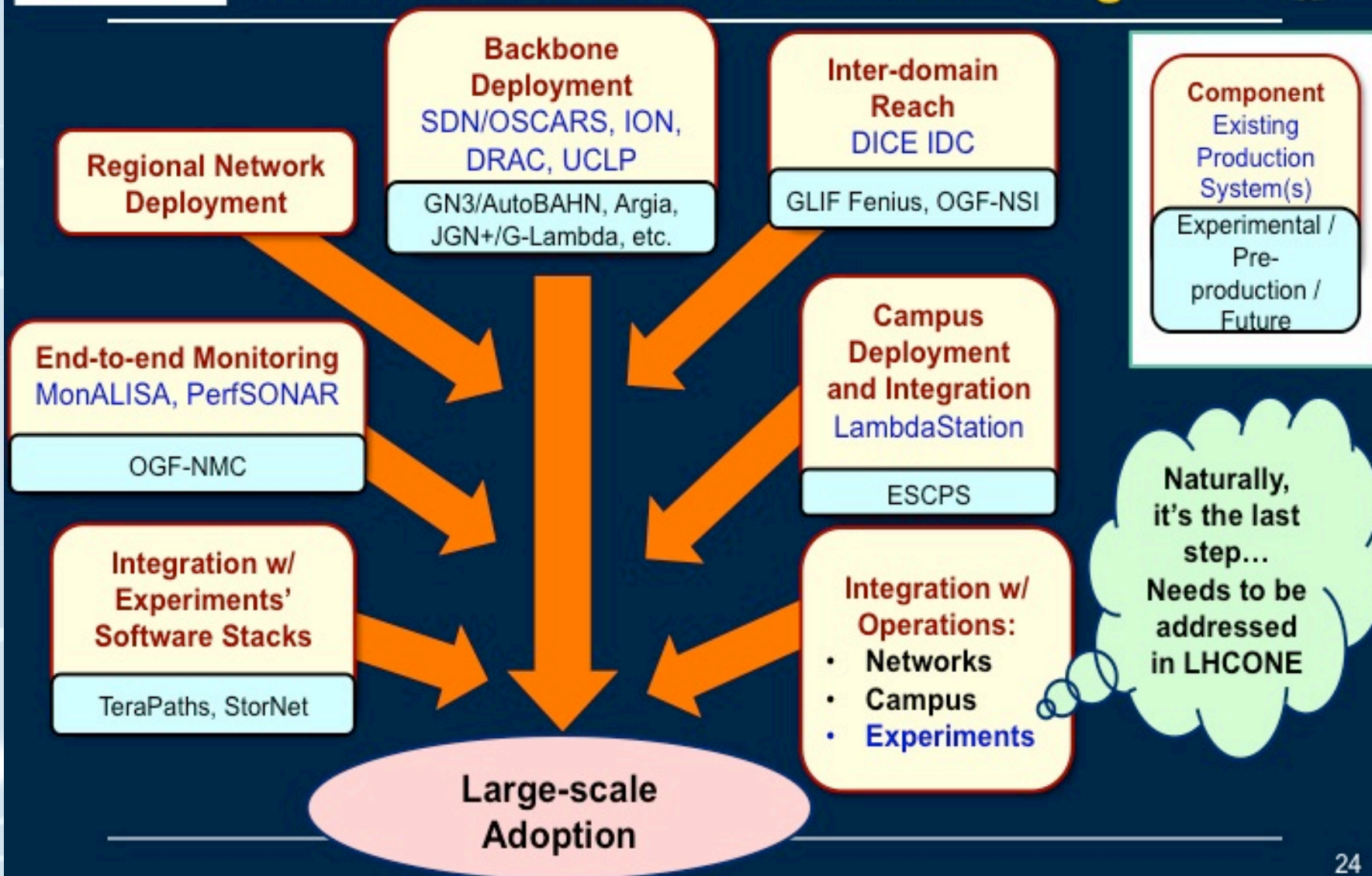


Request for enhancements to NSI Connection Service already there from experiments

- Point to multipoint
- Multipoint to multipoint
- Protection
- Performance measurement and management
- *Scavenger service (ability to burst beyond my requested bandwidth)*



Towards Large Scale Dynamic Circuits in LHC Data Processing





GLIF activity, not standards

Mapping use cases to NSI protocol

- Map existing dynamic circuit use cases to NSI
- Demonstrate new use cases like Automated GOLE
- Gap Analysis

Integration with Network Operations

- How and when to use the Query function be used to solve connection problems?
- Best way to debug a multi-domain connection failure - how do network engineers debug where the problem was?
 - Error notification needed in NSI?
- Data Plane errors get reported as a block - fine tuning in the management plane
 - Notification service?

Investment in tools




The protocols need to be wrapped with usable UI tools for users to adopt

Can GLIF form a vehicle for a common set of open-source tools that can be leveraged?

- Federated software development

MEICAN - Management Em x

meican.cipo.rnp.br/main.php?app=init&controller=gui



My settings | Help | About | Sign out (master) | 14/09/2011 00:06

Dashboard


- Circuits**
 - New reservation
 - Reservations
- Topologies**
 - MEICANs
 - Domains
 - Networks
 - Devices
 - URNs
- Users**
 - Users
 - Groups
 - Access control

Circuit reservation wizard

Reservation name: SPO->Caltech

Endpoints & Bandwidth | Timer | **Confirmation**

Select source and destination networks by clicking on the map markers with any button and then choosing an option from the pop-up menu. After selecting the endpoints, choose the device and port on the right pane.



	Source	Destination
Domain	Gpo	Caltech
Network	São Paulo	Caltech Network
Device	Switch SP	VLSR 7
Port	ge-2/3/4	1-0-21

Show VLAN configuration

VLAN Type	Source	Destination
Untagged	<input type="radio"/>	<input type="radio"/>
Tagged	<input checked="" type="radio"/>	<input checked="" type="radio"/>
VLAN	719	1781
	Value: 700 - 719	Value: 1700 - 1900

Bandwidth 800 Mbps

Cancel Clear Reset Zoom Next

Topology Tools Pane

Network Elements

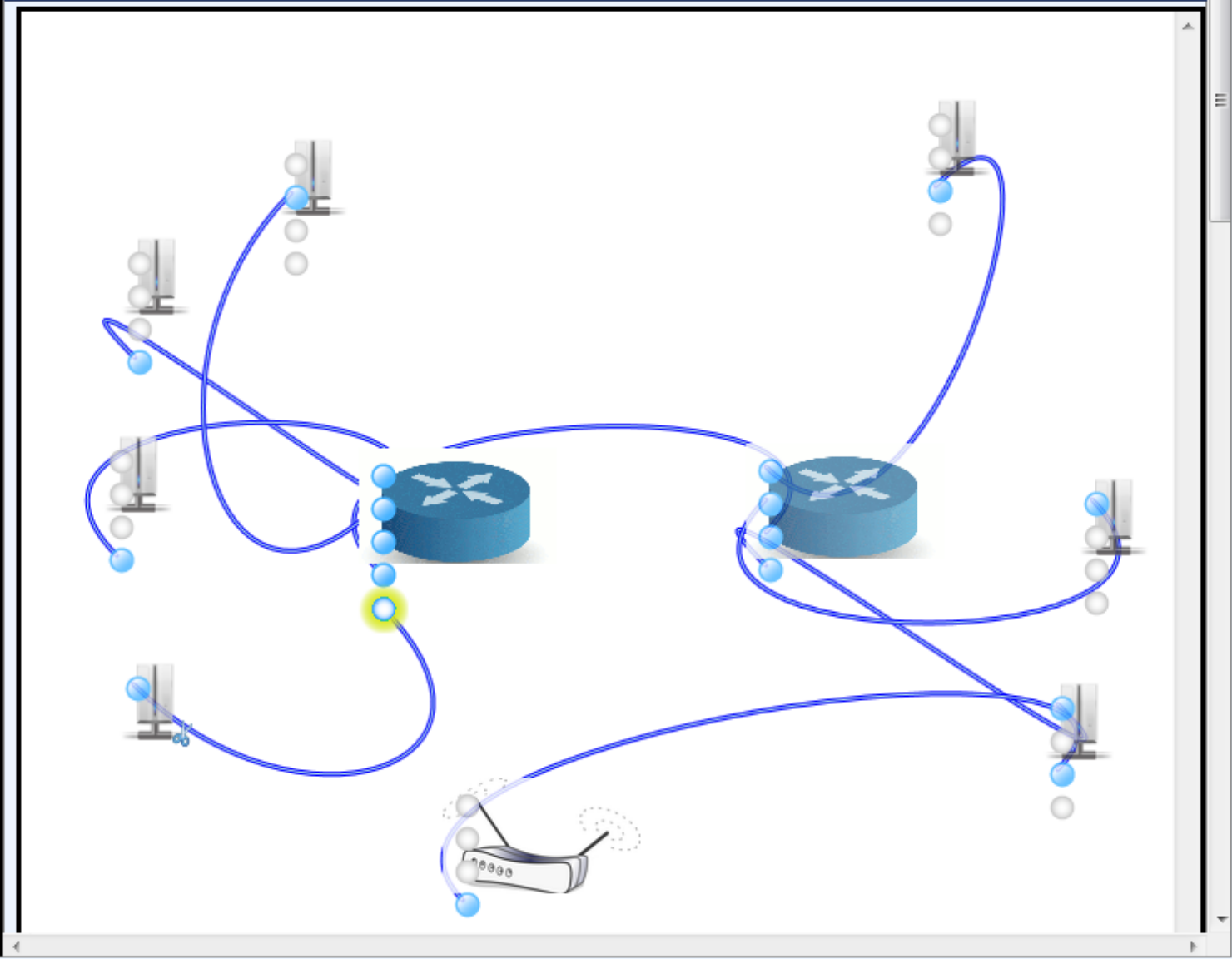
- 2C - Ring Topology
- Wireless Access Router
- Server Cluster
- 10GB-optical-switch
- host
- 8 x 8 optical switch
- Wireless Access Point
- client
- Network Router
- Server
- VLAN Router
- wireless Router

Network Element Actions

Add Port | Delete port

Multi Layer Actions

Topology View | Topology Format



Topology Control Pane
Network Topology Wizard

+ New | Load | Save | Export | Import | Help | Delete



Topology Tools Pane

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Network Element Actions

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Multi Layer Actions

Topology View Topology Format

```
Topology Description in NMWG Format for OSCARS
<?xml version="1.0" encoding="UTF-8"?>
<CtrlPlane:topology xmlns:CtrlPlane="http://ogf.org/schema/network/topology/ctrlPlane/20080828/"
<xsd:documentation xmlns:xsd="http://www.w3.org/2001/XMLSchema" lang="en">Topology Description:
<CtrlPlane:idxId>9NodeTopology</CtrlPlane:idxId>
<CtrlPlane:domain id="testdomain-1">
<CtrlPlane:node id="urn:ogf:network:domain=testdomain-1:node=node-1-4">
<CtrlPlane:address>10.1.1.4</CtrlPlane:address>
<CtrlPlane:port id="urn:ogf:network:domain=testdomain-1:node=node-1-4:port=port-1">
<CtrlPlane:capacity>1000000000</CtrlPlane:capacity>
<CtrlPlane:maximumReservableCapacity>1000000000</CtrlPlane:maximumReservableCapacity>
<CtrlPlane:minimumReservableCapacity>1000000</CtrlPlane:minimumReservableCapacity>
<CtrlPlane:granularity>1000000</CtrlPlane:granularity>
<CtrlPlane:link id="urn:ogf:network:domain=testdomain-1:node=node-1-4:port=port-1:link=link3">
<CtrlPlane:remoteLinkId>urn:ogf:network:domain=testdomain-1:node=node-1-2:port=port-4:link1</CtrlPlane:remoteLink
<CtrlPlane:trafficEngineeringMetric>100</CtrlPlane:trafficEngineeringMetric>
<CtrlPlane:SwitchingCapabilityDescriptors>
<CtrlPlane:switchingcapType/>
<CtrlPlane:encodingType>packet</CtrlPlane:encodingType>
<CtrlPlane:switchingCapabilitySpecificInfo>
<CtrlPlane:capability/>
<CtrlPlane:interfaceMTU>9000</CtrlPlane:interfaceMTU>
<CtrlPlane:vlanRangeAvailability>3000-4000</CtrlPlane:vlanRangeAvailability>
</CtrlPlane:switchingCapabilitySpecificInfo>
</CtrlPlane:SwitchingCapabilityDescriptors>
</CtrlPlane:link>
</CtrlPlane:port>
<CtrlPlane:port id="urn:ogf:network:domain=testdomain-1:node=node-1-4:port=port-2">
<CtrlPlane:capacity>1000000000</CtrlPlane:capacity>
<CtrlPlane:maximumReservableCapacity>1000000000</CtrlPlane:maximumReservableCapacity>
<CtrlPlane:minimumReservableCapacity>1000000</CtrlPlane:minimumReservableCapacity>
<CtrlPlane:granularity>1000000</CtrlPlane:granularity>
<CtrlPlane:link id="urn:ogf:network:domain=testdomain-1:node=node-1-4:port=port-2:link=link2">
<CtrlPlane:remoteLinkId>urn:ogf:network:domain=testdomain-1:node=node-1-1:port=port-2:link1</CtrlPlane:remoteLink
```

Topology Control Pane

New Load Save Export Import Help Delete

Topology Tools Pane

Network Elements

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Network Element Actions

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Multi Layer Actions

Topology View | Topology Format

Select file to upload by localhost

Look in: Desktop

Recent Places	File Name	File Type	Size
Desktop	multi-domain-sample2	NMVG File	17.3 KB
Desktop	multi-domain-sample3	NMVG File	17.3 KB
Desktop	sampleimporttopo1	NMVG File	12.9 KB
Desktop	sampleimporttopo2	NMVG File	12.9 KB
Desktop	testdomain-2	NMVG File	12.1 KB

File name: sampleimporttopo1

Files of type: NMVG Topologies

Open | Cancel



Other important issues

Authentication and Authorization framework

- Standards
- Best Practices

Service Verification

- Jerry (NORDUnet)/TERENA

More ideas?

In Conclusion



Tasks for the standard groups to tackle need to be prioritized

- NSI CS 1.0 the topmost priority
- Basic Security profile is equally important
- Topology a close second
- GLIF can help provide input to help prioritize other features

Best practices and tools leading towards operational deployment

- Open this for discussion
- GLIF Task force?

NSI presentation



Challenge at GLIF CERN

Birth of NSI

Painful, Guidance

Not ready for prime performance - but there is a lot of education required

What can it do today?

What does it need to do?

Gaps



Status of the specs (OGF Lyon)

Topology

Security profile

Operational

- Tools
- Policy/SLAs
- Performance
- Debugging
- Fed. Soft. Dev.