

Making Progress

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Issues and potential solutions

- No standard



Clear requirements for DTOX
Simplifying assumptions

- No Time



Collaborate and share

- No Tools



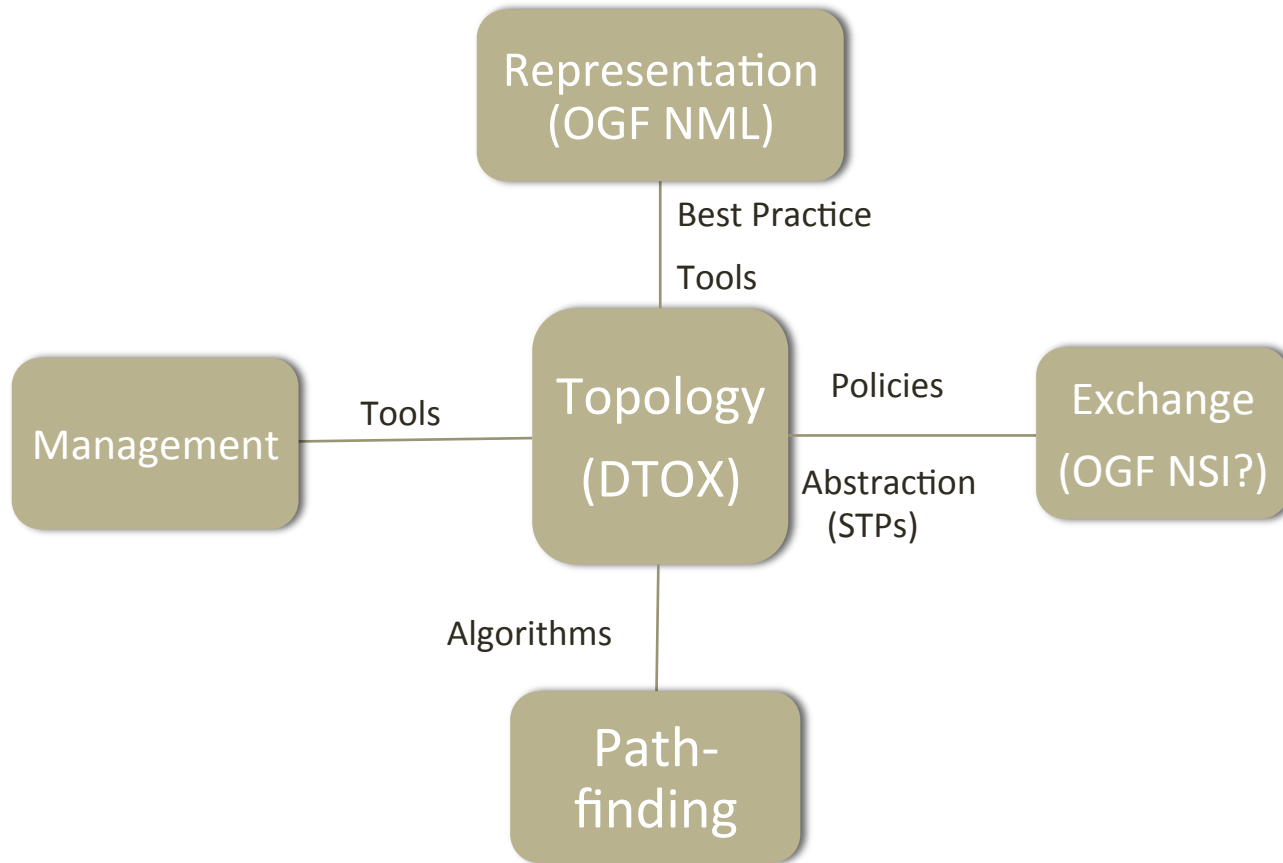
Open-source efforts

- Skepticism

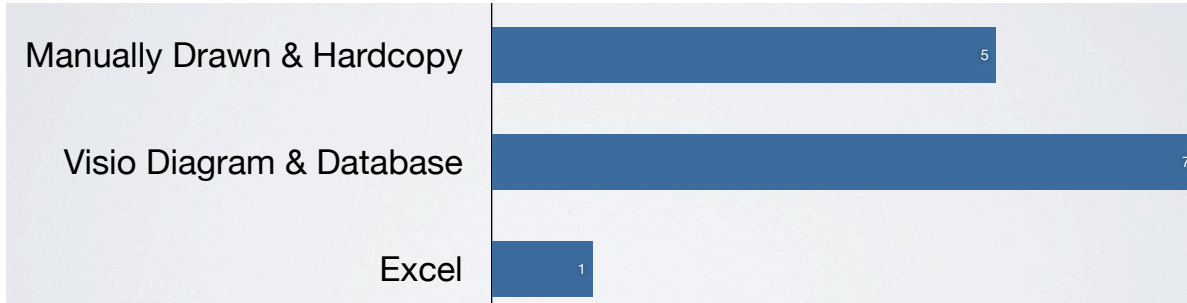


GLIF Prototypes

Elements of DTOX



Representation



- Solution – tools to visually draw and represent topology
- Not in NML format yet, is there a subset of standard needed?

Courtesy: Bharat Ramaprasad, U Mass Dartmouth with ESNnet mentorship

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 Details Pane

Network Element Properties

port5 Properties:

PortID port.

Capacity 1000000000

maxResCap 1000000000

minResCap 1000000

Granularity 1000000

Topology Properties

Title: #NodeTopology

Description: This is a sample #node topology

Multi-Layered Topology

Category: ExperimentalTopology

Topology Format: NMWG Format

Topology Viewport

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: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>100000000</CtrlPlane:capacity>
<CtrlPlane:maximumReservableCapacity>100000000</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=links">
<CtrlPlane:remoteLinkIdurn:ogf:network:testdomain-1:node-1-2:port-4:link4</CtrlPlane:remoteLink
<CtrlPlane:switchingCapability>100</CtrlPlane:switchingCapability>
<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:remoteLinkIdurn:ogf:network:domain:testdomain-1:node-1:port-1:link1</CtrlPlane:remoteLink
</CtrlPlane:link>
</CtrlPlane:node>
</CtrlPlane:domain>
</CtrlPlane:topology>
```

Topology Control Pane

Network Topology Wizard

New Load Save Export Import Help Delete

Welcome User | ESNnet

11-09-2011 19:38

Exchange

- Question: Is it fine for the NSI to specify the topology exchange mechanism?
- Question: Is it exchange or publish?
- Question: What role does policy play?

- Clear requirements needed with operational and security considerations

- Internal representation of the STP abstraction needs to be specified and maintained
 - Tools to create STP representations of internal topology?
 - Resolution of STP to an internal topology representation

Path-finding

- May be an implementation question
- Interoperability needs to be tested
 - Given the same constraints, do multiple implementations come up with the same answer?
 - Multiple constraint optimization?
- Open-source implementation of a path-finding algorithm that works with NML
- More efficient mechanisms a research problem?
 - OSCARS framework for chaining multiple PCE's

Management

- Topology needs to be maintained and updated
 - What frequency?
 - How are maintenance events handled? Fiber cuts?
 - How frequent is the exchange?
 - New interfaces/cross connects
- Process and tools for updating topology and pushing it to be “exchanged”
 - Is it a manual process?
 - What automation can be achieved?
- This area requires discussion, research and tools development

What does GLIF work on?

- Proposals
 - Focus on NSI application
 - Near term:
 - Tools to allow network engineers to easily draw the external topology and create a NML topology description
 - Identify one person from your organization to do it for you
 - Demo?
 - Mid-term
 - Topology databases and updates (processes, tools requirements)
 - Path-finding across multiple domains using above topologies and NSI STPs
 - NSI + DETOX over Auto-GOLE: Demonstration
 - Longer-term
 - Topology management best practices
 - Policy filter specification and demonstration

Volunteer