Progress update & demo

Li Xu, JP Velders, Hans Blom, Indan Zupancic
Paola Grosso, Cees de Laat

SNE group, UvA

11-06-2007

Outline

- Quick overview
  - Problems
  - Launching StarPlane
- Work in progress
  - Phase1 testbed
  - Management Plane Architecture
  - StarPlane/DAS-3 monitoring tool - rTPL
  - Dynamicity in StarPlane
  - Using NDL for StarPlane
- Live Demo
- Future work

Who provides the missing box

- How to let applications exploit the suitable network topology?
- How to enable applications to drive the topology changing?
- How to provision the network resource on-demand in real-time scale?
- ...

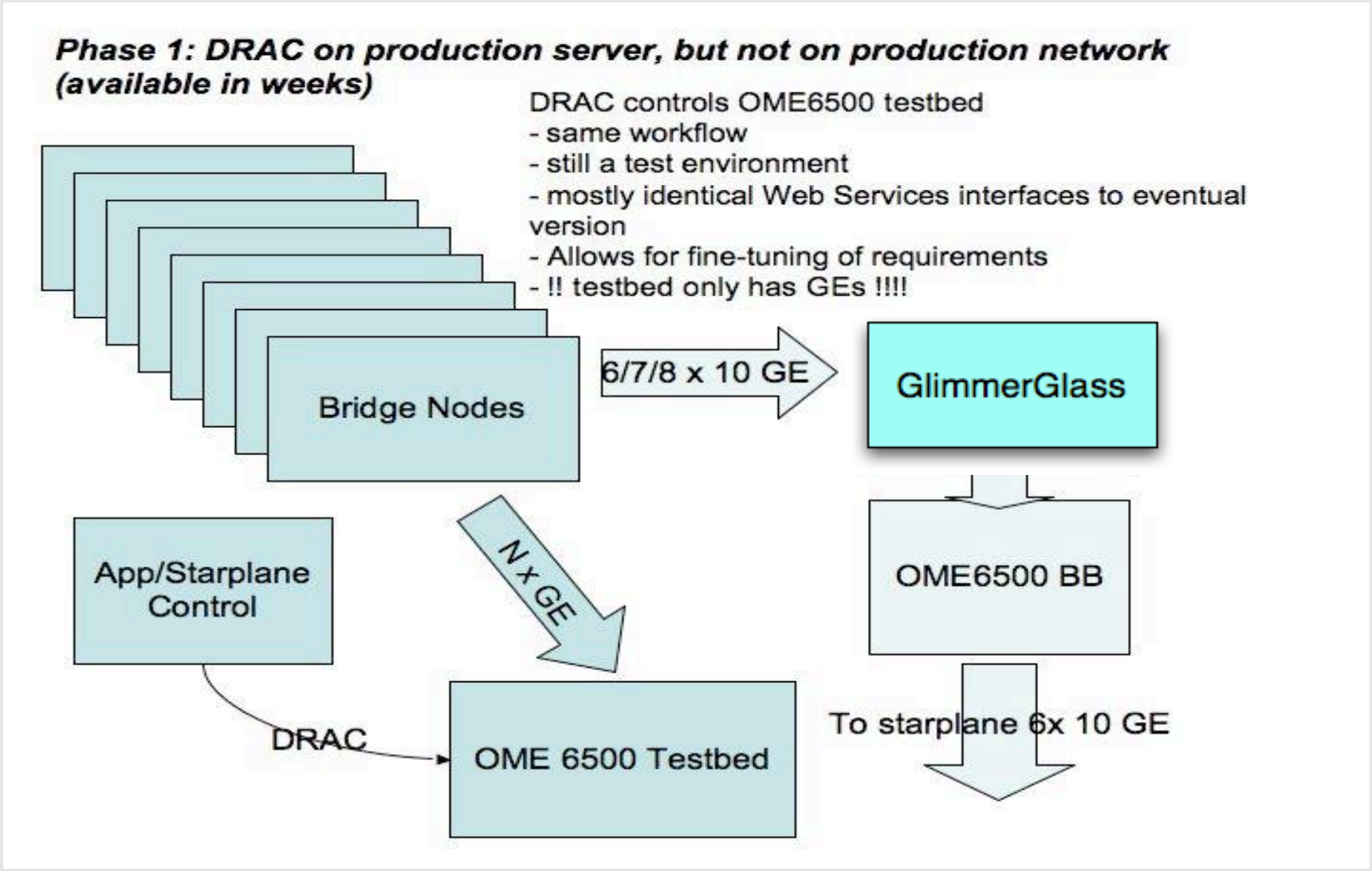
Launching StarPlane

- NWO funded research project, carried out by UvA (PhD, Scientific programmer) and VU (postdoc), with major contributions from SURFnet and NORTEL
- Use the SURFnet6 CPL infrastructure to interconnect the DAS-3 sites
- Vision: give flexibility directly to the applications by allowing them to choose the logical topology of the photonic network and allocating the requested resources in real time
- Ultimately sub-second switching

Outline

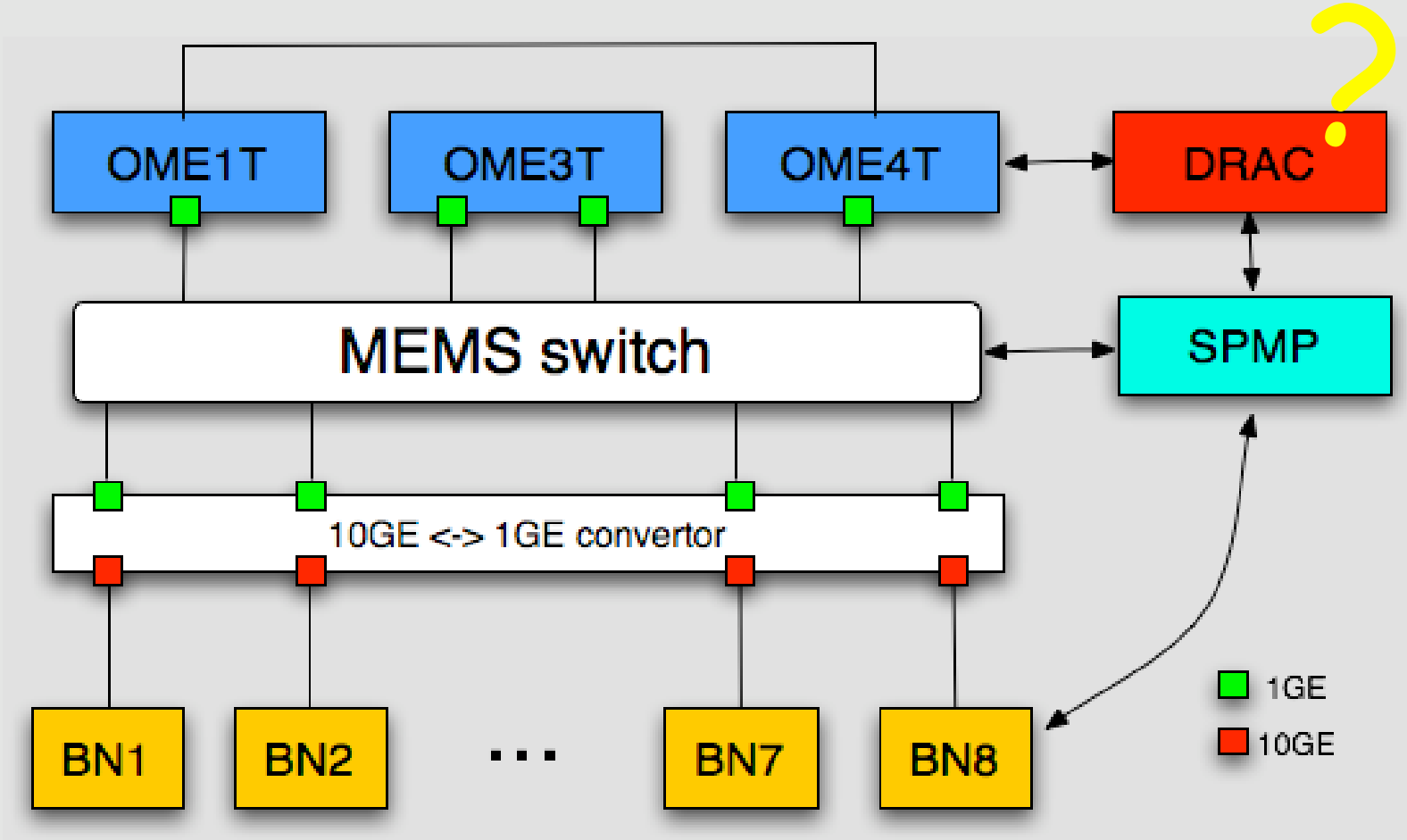
- Quick overview
  - Problems
  - Launching StarPlane
- Work in progress
  - Phase1 testbed
  - Management Plane Architecture
  - StarPlane/DAS-3 monitoring tool – rTPL
  - Dynamicity in StarPlane
  - Using NDL for StarPlane
- Live Demo
- Future work

Phase1 Testbed Setup

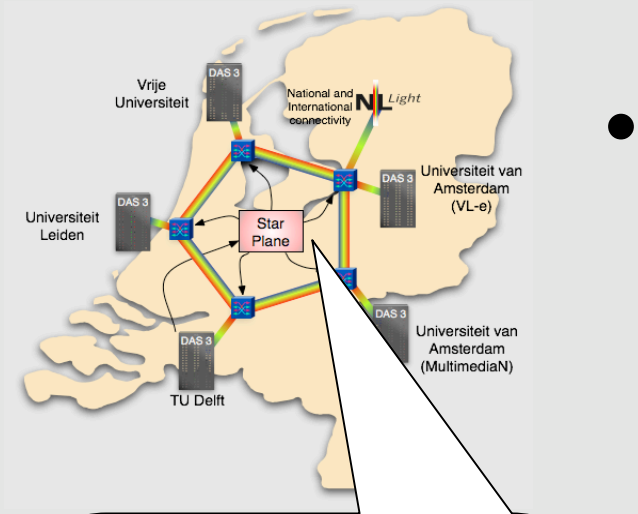


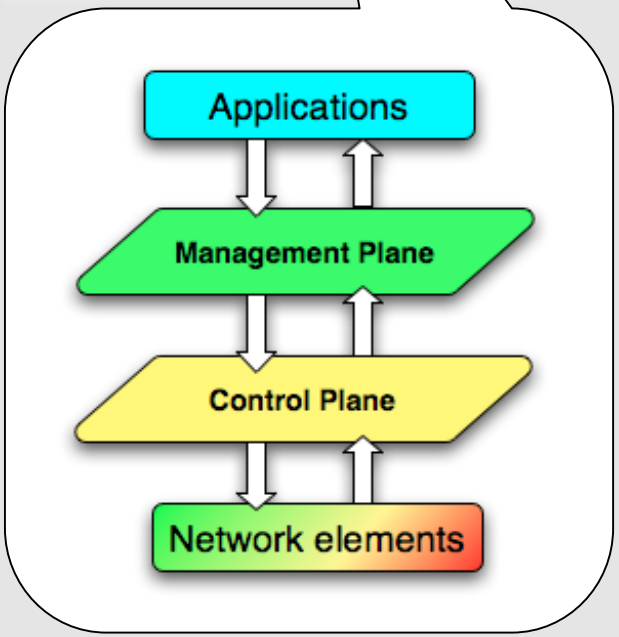
Ref: Bram Peeters

Current status



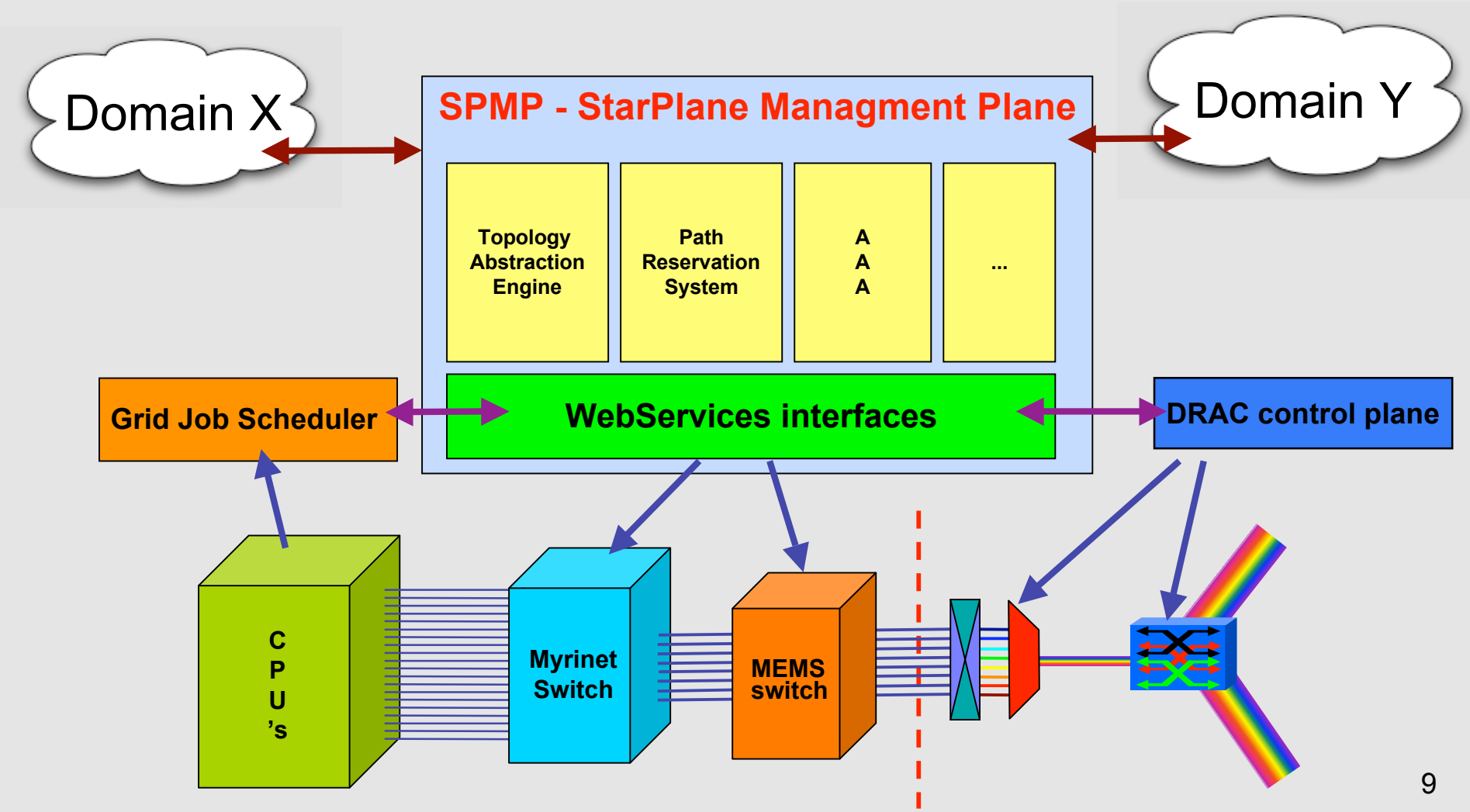
Management Plane





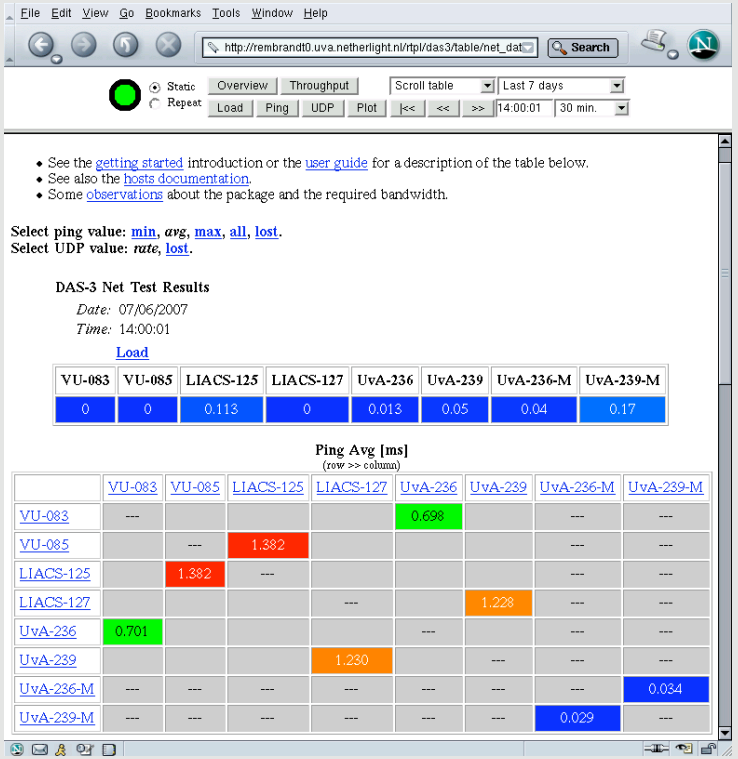
- Development of Mgmt Plane
  - Accessible for all nodes
  - Interfacing to both application and control plane (DRAC)
  - Aware of entire network topology
  - Web Services (ruby in rails)
  - Independent reservation system
  - Interfaces to DRAC WebServices are ready for testing.

MgmtPlane Architecture



Monitoring tool - rTPL

- remote Throughput Ping Load – a package that runs periodic net performance measurement tests between a limited number of workstations(hosts)
- Authors: Hans Blom & Cees de Laat
- Main components:
  - TCP Throughput via Netperf
  - UDP Bandwidth via UDPmon
  - Ping ICMP
  - System load via "uptime" command
- Why choosing Netperf and UDPmon?
- How does it work?
  - Measurement and presentation procedures



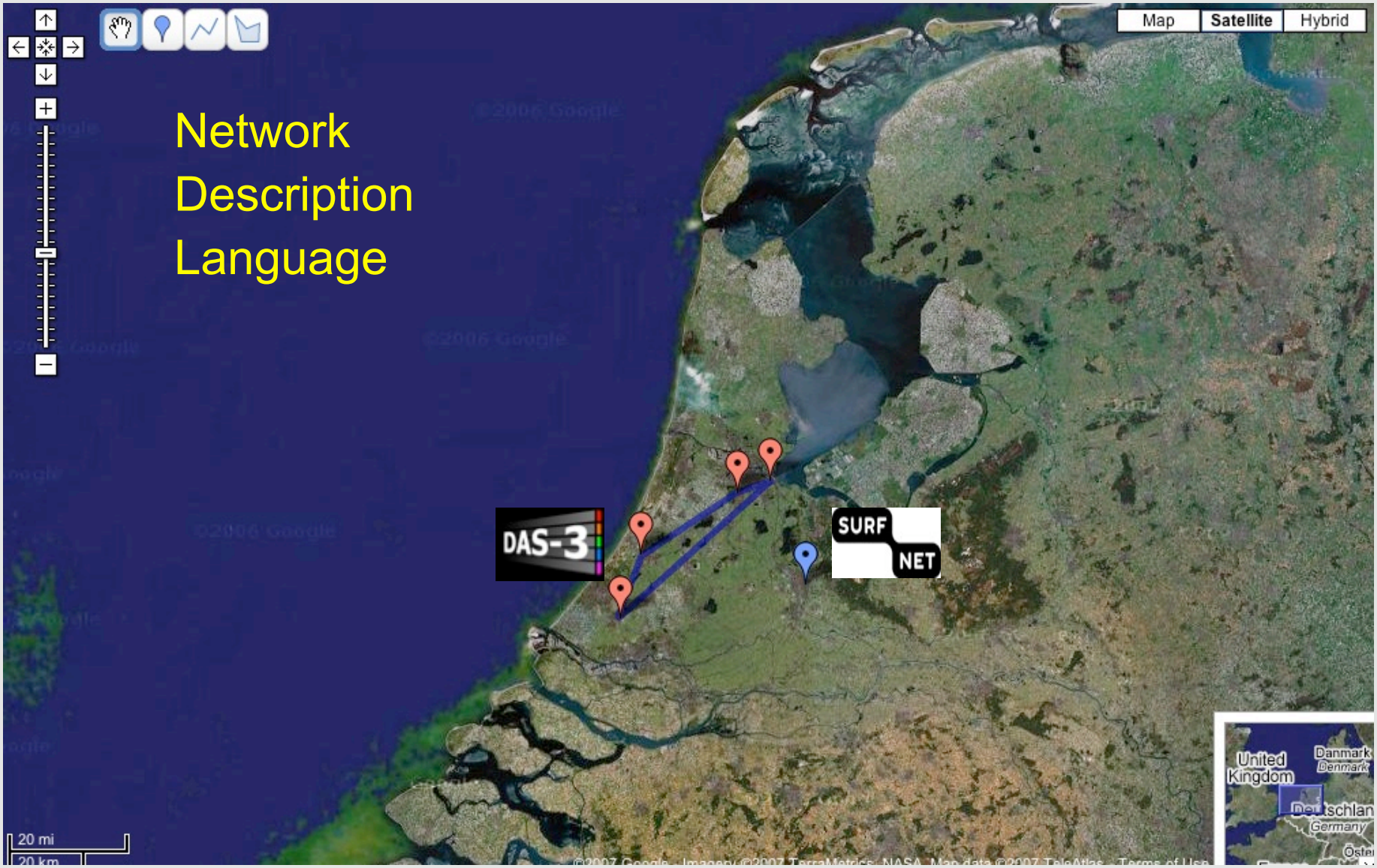
StarPlane/DAS-3 test

- Setup StarPlane rTPL
  - Two bridge nodes each at VU, LIACS, UvA
  - Try all possible connections between bridge nodes (run only TCP and UDP tests if Ping was successful)
  - Between the UvA bridge nodes also native Myrinet tests as comparison
  - Monitor only intended to run during first test phase with the bridge nodes
- Myrinet DAS-3 Tests
  - TCP, UDP traffic generator tests via Myrinet (Ethernet) interfaces (Iperf, Netperf, Nuttcp)
  - Different test scenarios with DAS-3 and 10 GE nodes; tests between:
    - 10 GE nodes internal as reference
    - DAS-3 UvA cluster internal: Myri 10 G
    - DAS-3 UvA 4U bridge nodes internal: Myri 10 GE
    - 4U node with multiple Myri 10 GE and 10 GE nodes
- More tests and results, see http://rembrandt0.uva.netherlight.nl/rtpl/ and JP's presentation

Dynamicity in StarPlane

- Dynamic lightpath provisioning
  - 3 types: user-controlled / scheduled / dynamic
    (ref: Paul Brand and presented by Erik-Jan Bos)
  - A fast initial setup time
  - A fast service change time
- *lightpath portfolios*
- Dynamic services
  - Optimize the lightpath reservations
  - Seamlessly shift applications to other lightpaths to optimize 'global' utilization or provisioning

NDL for StarPlane



NDL for StarPlane cont.

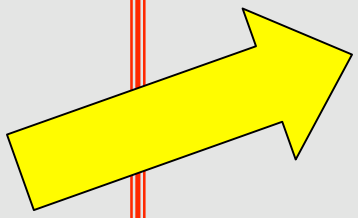
- as repository for the storage of the global topology information
- as the vehicle for topology information exchange between users/applications and management plane
- possible for mgmt-ctrl plane communication

- Modality of network topology exchange
  - Intra domain case for StarPlane
    - The 'master description'
    - Available resources (presented in form of topology)
    - Reserved topology
  - Inter domain case for other projects

NDL for StarPlane cont.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:ndl="http://www.science.uva.nl/research/sne/ndl#"
        xmlns:geo="http://www.w3.org/2003/01/geo/wgs84_pos#">

<!-- LOCATIONS -->
<ndl:Location rdf:about="#starplane">
  <rdfs:label>Starplane Test Network</rdfs:label>
</ndl:Location>

<ndl:Location rdf:about="#uva1">
  <rdfs:label>Amsterdam UvA 1</rdfs:label>
  <ndl:locatedAt rdf:resource="#starplane"/>
</ndl:Location>

<ndl:Location rdf:about="#uva2">
  <rdfs:label>Amsterdam UvA 2</rdfs:label>
  <ndl:locatedAt rdf:resource="#starplane"/>
</ndl:Location>

<ndl:Location rdf:about="#vu">
  <rdfs:label>Amsterdam VU</rdfs:label>
  <ndl:locatedAt rdf:resource="#starplane"/>
</ndl:Location>

<ndl:Location rdf:about="#delft">
  <rdfs:label>TU Delft</rdfs:label>
  <ndl:locatedAt rdf:resource="#starplane"/>
</ndl:Location>

<ndl:Location rdf:about="#leiden">
  <rdfs:label>ULeiden</rdfs:label>
  <ndl:locatedAt rdf:resource="#starplane"/>
</ndl:Location>
```

Sample

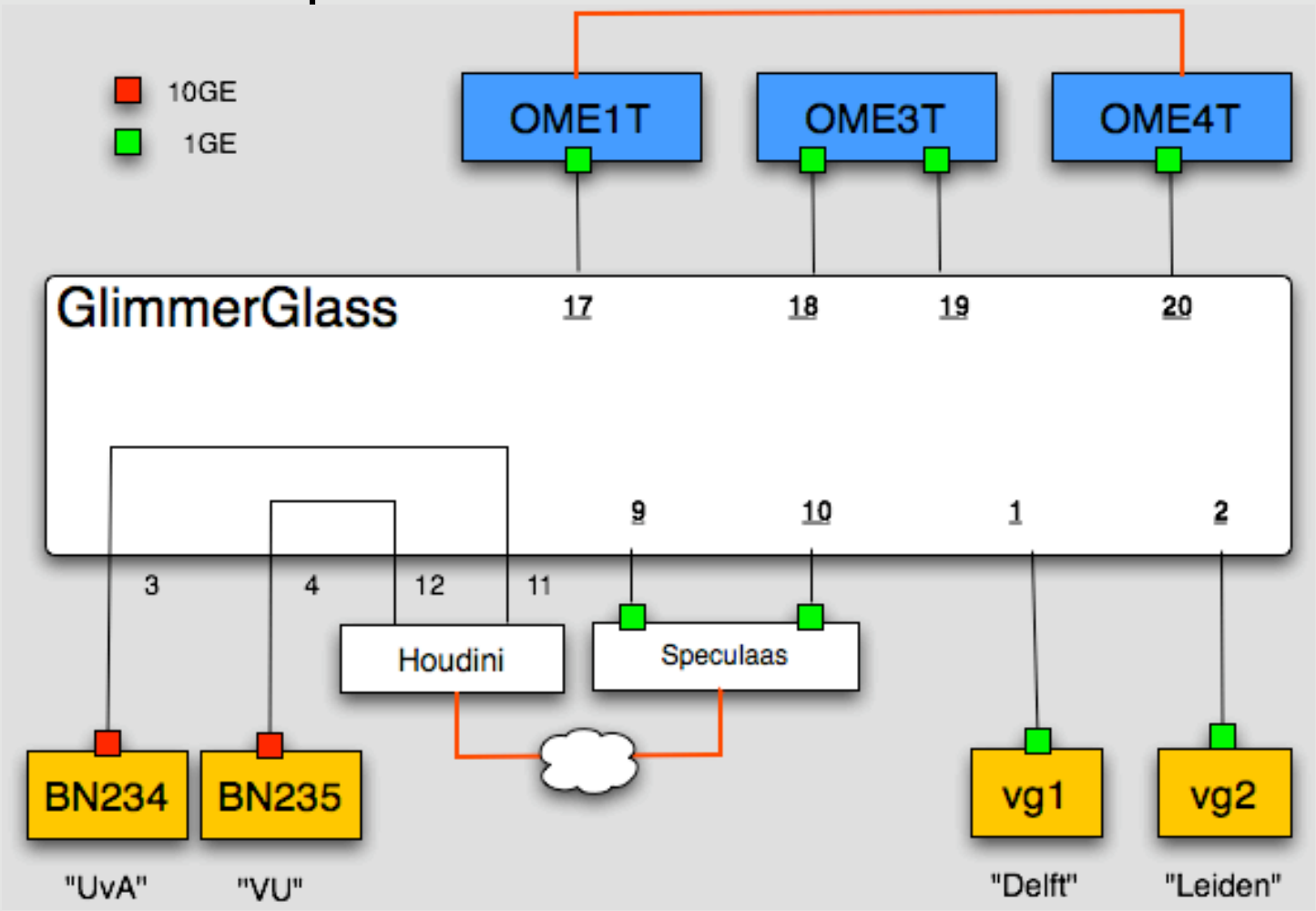


```
<!-- interfaces (BN-> OXC) -->

<ndl:Interface rdf:about="#bn1:1">
  <rdfs:label>bn1:1</rdfs:label>
  <ndl:connectedTo rdf:resource="# OXC :1"/>
</ndl:Interface>

<ndl:Interface rdf:about="#bn2:1">
  <rdfs:label>bn2:1</rdfs:label>
  <ndl:connectedTo rdf:resource="#OXC:2"/>
</ndl:Interface>

<!-- interfaces (OXC->BN) -->

<ndl:Interface rdf:about="# OXC :1">
  <rdfs:label> OXC :1</rdfs:label>
  <ndl:connectedTo rdf:resource="#bn1:1"/>
  <ndl:switchedTo rdf:resource="# OXC :5"/>
</ndl:Interface>
```

‘Digested NDL’ for path setup request (Indan Zupancic), see demo

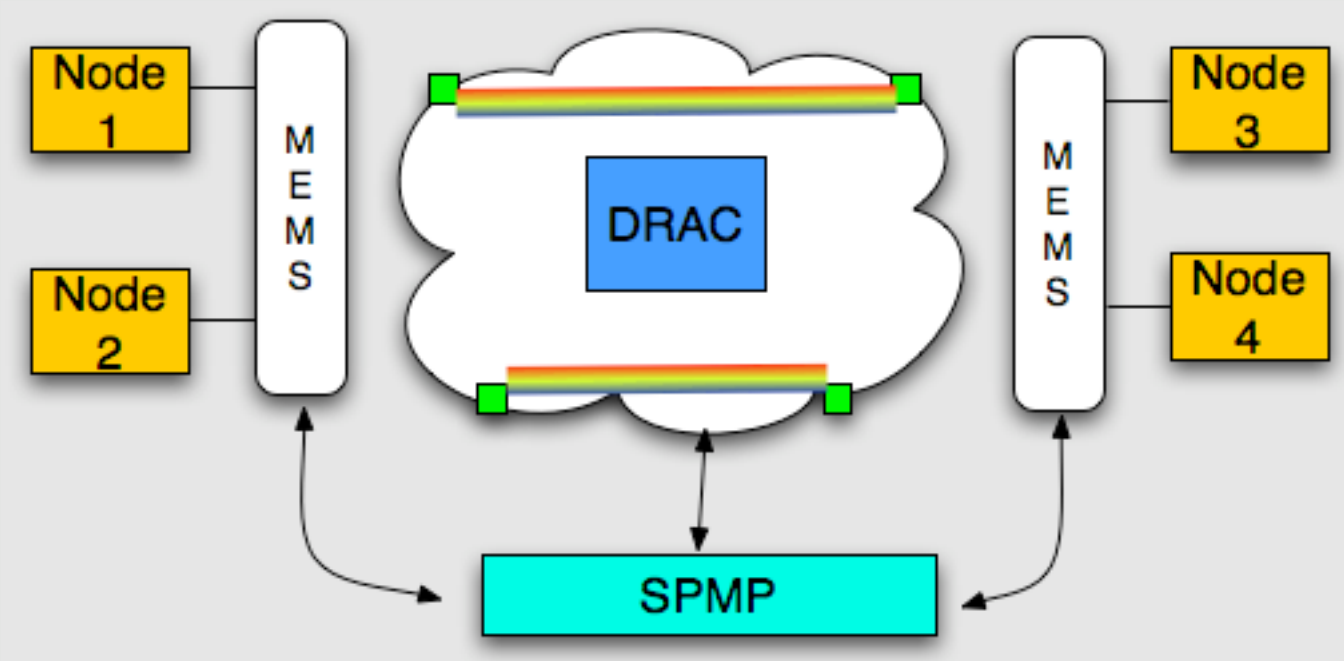
Live Demo

- Hardware setup



Live Demo cont.

- Topology exchange in form of NDL
- Fast topology switching



Future work

- Explore DRAC (policy etc.)
- StarPlane time scale line
- Time-dependent topology generation
- Lightpath reservation system
- Flexible resource manager/job scheduler (both DAS&Network resources, work with Postdoc at VU)
- AAA issues
- Benefit from Phosphorus, UPVN, DRAGON, UCLP, etc.

SC|07 StarPlane demo

- StarPlane network lightpath provisioning and monitoring demonstration with SARA
- Goal: have something that runs on the REAL StarPlane CPL infrastructure (not in the testbed) and showing actual usage, “traffic/load shifts” and setup.
- Timeframe: Nov 2007

...

- For more info:
  - website: www.starplane.org
  - contact:

{lixu, jpv, grosso, jblom, delaat}@science.uva.nl

Questions ?

Thank you!