

# OpenDRAC Update

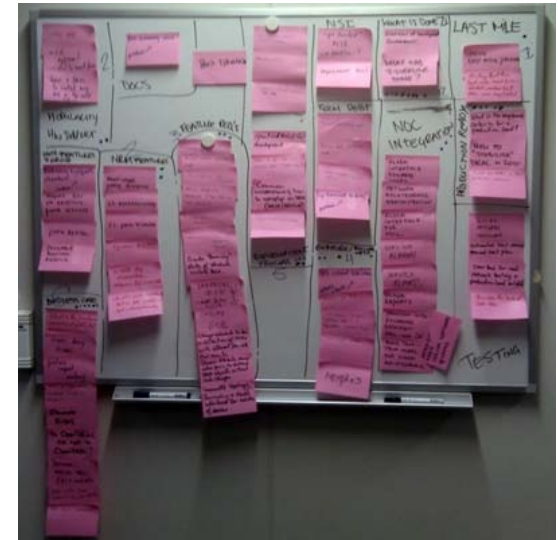
John MacAuley & Gerben van Malenstein

GLIF Technical Working Group Meeting – 25 February 2011, Hong Kong

# 2010 OpenDRAC Developer's Workshop



- Held November 16 – 18 2010 in Utrecht.
- Day one was filled with presentations to level set designers on the initial problem space
  - Developing workflow enabled networks (October 2005)
  - DRAC Layer 0/1/2 Control – Controlling bandwidth to the edge (December 2006)
  - Finding a Path – Routing mechanics in OpenDRAC (November 2010)
- Day two and three focused on
  - Development environment.
  - Team's mode of operation.
  - Key features for the 2011 development year.





# Open Source Status

- Last load received from Ciena end of December 2010
  - Merged changes in to the main branch of OpenDRAC.
  - Fixing outstanding issues from the December drop.
- Key development features completed in 2011
  - Platform independent load and install.
  - Decoupled third-party dependencies.
  - Reduced code complexity and increased test coverage.
  - Simplified startup and coherent logging.
  - Improved simulation test bed.
- OpenDRAC will now run on a laptop!
- CzechLight under OpenDRAC control

# Network Simulation

Dynamic Resource Allocation Controller Desktop - localhost

File Help

+ - PICKING reset save

**Facility Management**  
Rows retrieved: 82

NE	Type	Facility AID	Signaling Type	TNA
OME0039	OC12	OC12-1-11-1	INNI	OME0039_OC12-1-11-1
OME0039	OC12	OC12-1-12-1	UNI	OME0039_OC12-1-12-1
OME0039	OC48	OC48-1-5-1	unassigned	N/A
OME0039	OC192	OC192-1-9-1	INNI	OME0039_OC192-1-9-1
OME0039	OC192	OC192-1-4-1	INNI	OME0039_OC192-1-4-1
OME0039	ETH10G	ETH10G-1-2-1	unassigned	N/A
OME0039	ETH	ETH-1-3-2	unassigned	N/A
OME0039	ETH	ETH-1-3-1	UNI	OME0039_ETH-1-3-1
OME0039	ETH	ETH-1-13-4	unassigned	N/A
OME0039	ETH	ETH-1-1-4	unassigned	N/A
OME0039	ETH10G	ETH10G-1-13-2	unassigned	N/A
OME0039	ETH	ETH-1-1-2	unassigned	N/A
OME0039	ETH10G	ETH10G-1-13-1	unassigned	N/A
OME0039	ETH	ETH-1-1-3	unassigned	N/A
OME0039	ETH	ETH-1-1-1	unassigned	N/A
OME0237	OC12	OC12-1-11-1	INNI	OME0237_OC12-1-11-1
OME0237	OC12	OC12-1-11-2	INNI	OME0237_OC12-1-11-2
OME0237	OC12	OC12-1-11-3	INNI	OME0237_OC12-1-11-3
OME0237	OC12	OC12-1-12-1	INNI	OME0237_OC12-1-12-1
OME0237	OC48	OC48-1-5-1	unassigned	N/A
OME0237	OC48	OC48-1-5-2	unassigned	N/A
OME0237	OC192	OC192-1-9-1	INNI	OME0237_OC192-1-9-1
OME0237	OC192	OC192-1-4-1	INNI	OME0237_OC192-1-4-1
OME0237	ETH	ETH-1-3-1	UNI	OME0237_ETH-1-3-1
OME0237	ETH	ETH-1-13-4	unassigned	N/A
OME0237	ETH	ETH-1-1-4	unassigned	N/A
OME0237	ETH10G	ETH10G-1-13-2	unassigned	N/A
OME0237	ETH	ETH-1-1-2	unassigned	N/A
OME0237	ETH10G	ETH10G-1-13-1	unassigned	N/A
OME0237	ETH	ETH-1-1-3	unassigned	N/A

All Primary state: All Signaling Type: All Retrieve Export

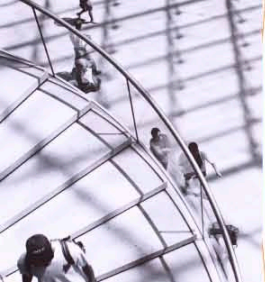
Administration Event Browser Facilities Link Utilisation Scheduling  
Service Alarms Audit Sites Network Elements Users Topology

Path from: OME0039 to Asd001A\_OME3T, cost: 3 hops: 3



# OpenDRAC Futures

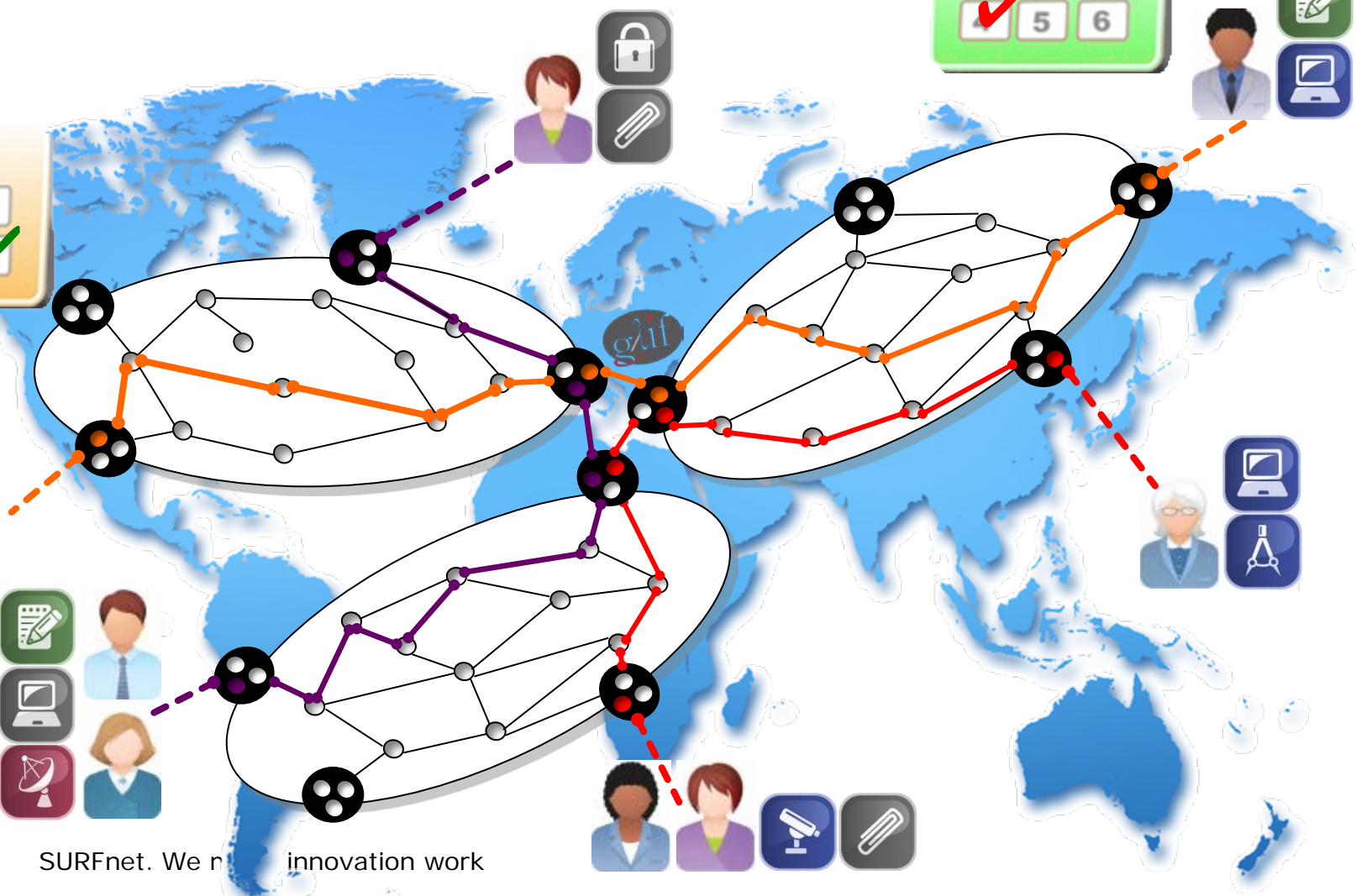




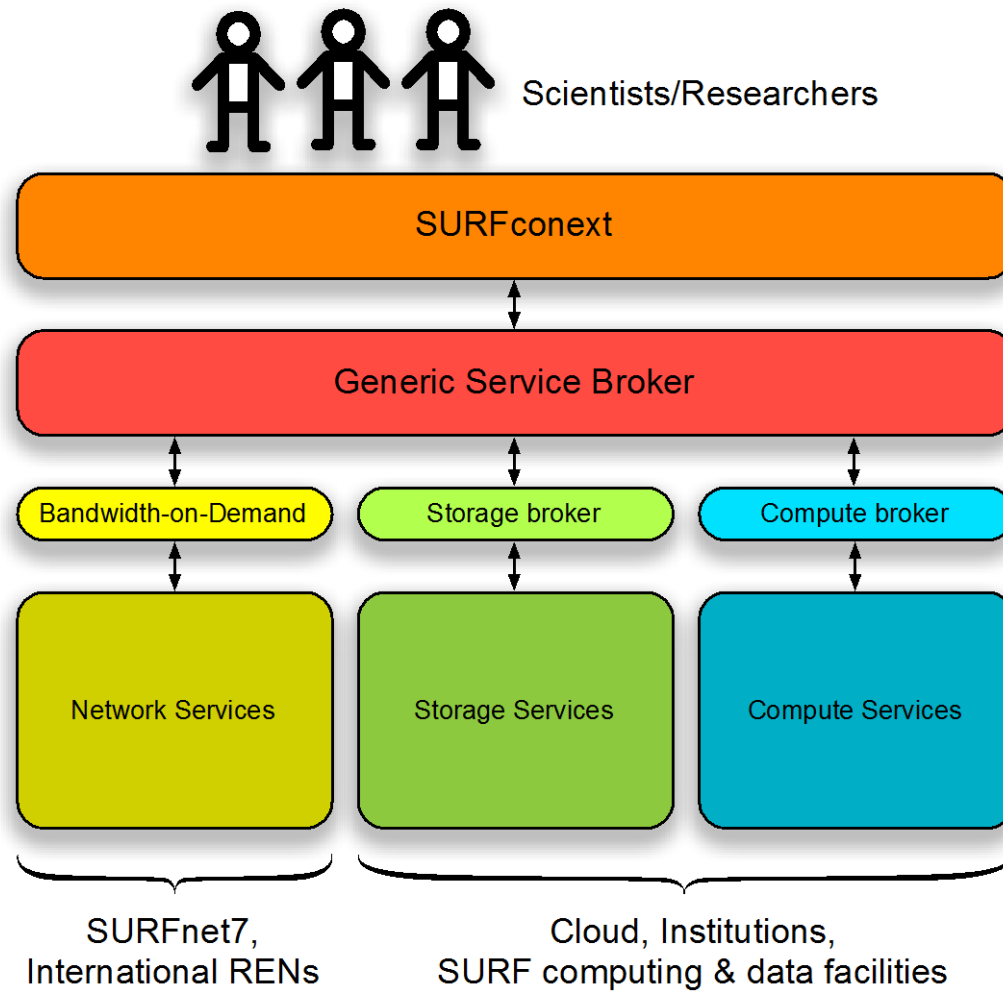
# e-Research Scenario

or: why do we want Bandwidth-on-Demand?

SURF  
NET



# High Level Architecture





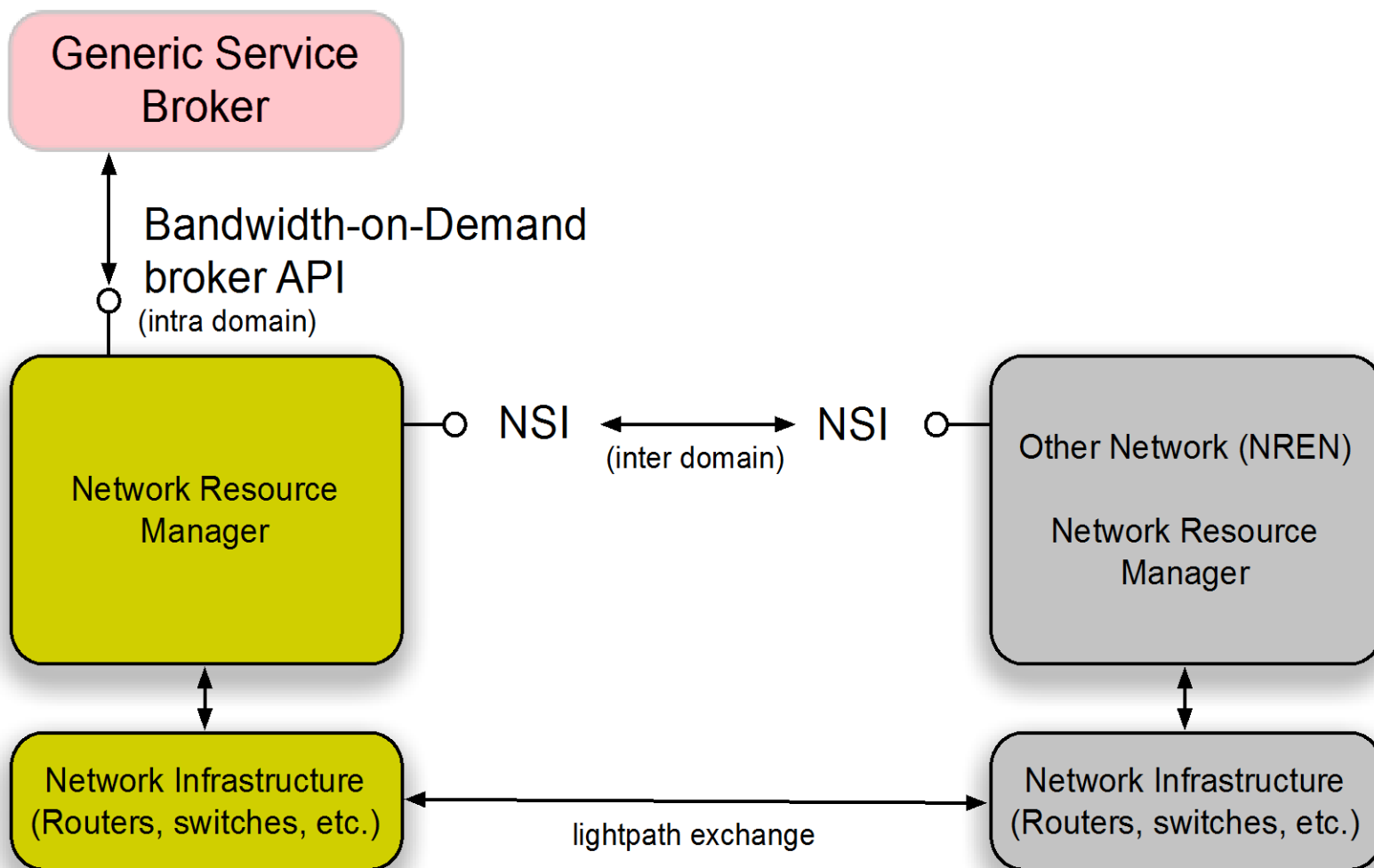
# Bandwidth-on-Demand Services



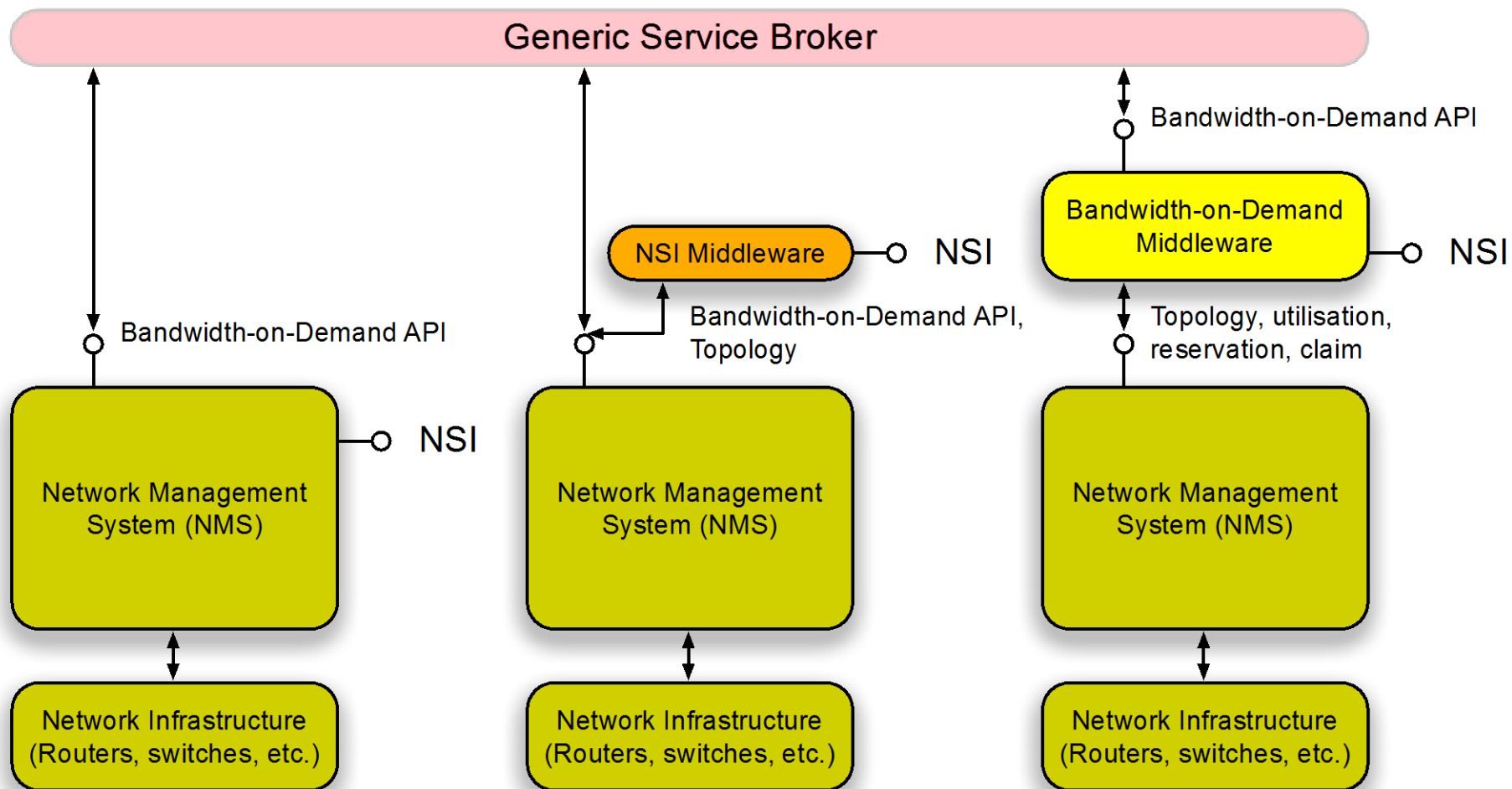
- End user on-demand and scheduled bandwidth
- Resource access control and enforced bandwidth policies
- Path computation at the time of the reservation request, taking existing schedules into account
- Model assumes core underprovisioned w.r.t. edge ports
- Externalized AAI



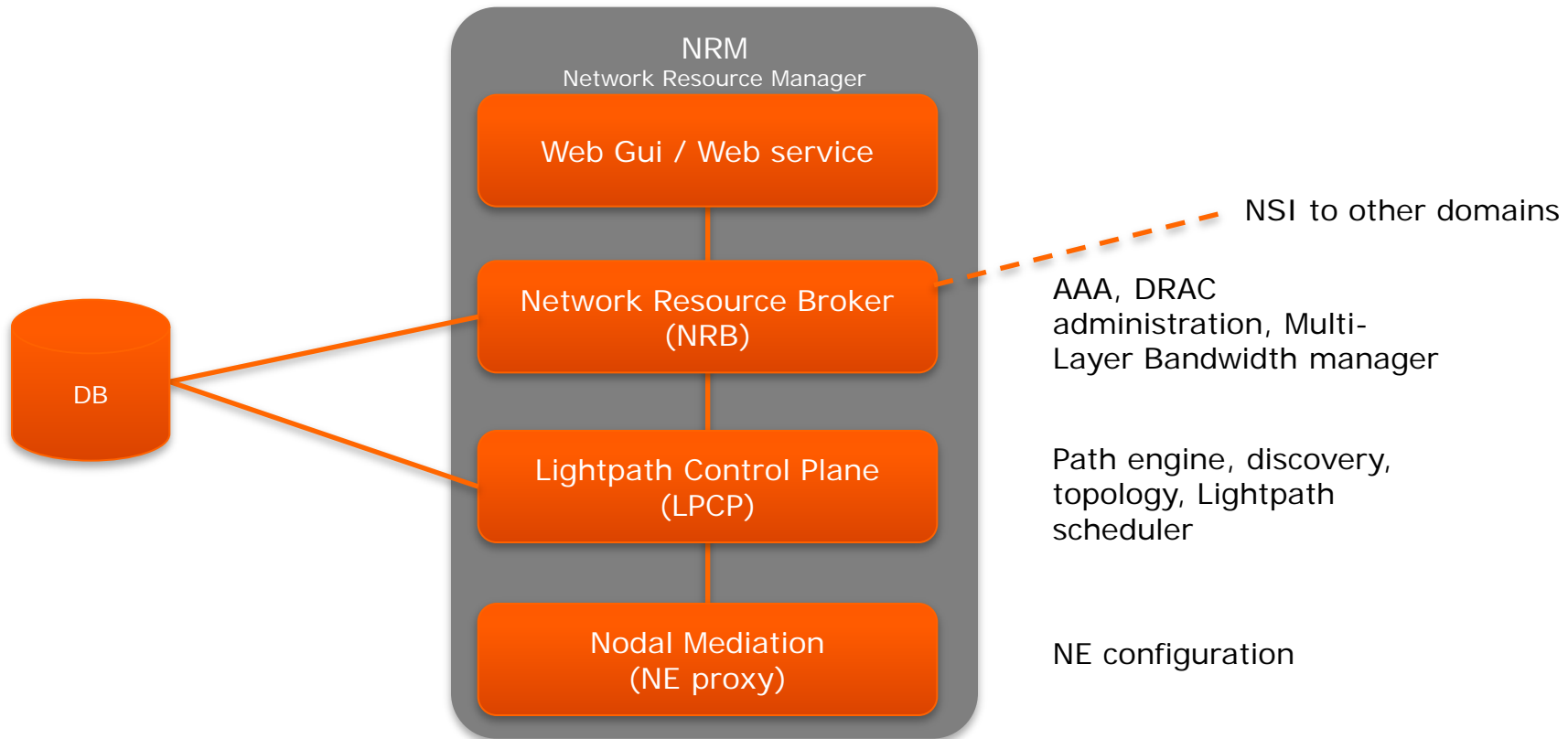
# Bandwidth-on-Demand Interfaces/APIs



# Bandwidth-on-Demand Implementation Scenarios



# Current OpenDRAC architecture





# External interfaces

- Inter domain API (OGF NSI)
- Provide topology north bound (OGF NML WG)
- Open user API (if different from inter domain API)
- Web GUI (can possibly be built on top of user API)
- Service monitoring with notifications of service/reservation failures

# NMS/NRM partitioning

- Need to decide where the NRM ends and the NMS starts
- Depending on above choice different kinds of information have to be exchanged between the two
- The dividing line can be anywhere between
  - Public interfaces (GUI, WS API, NSI)
  - Network Resource Broker
  - Light Path Control Plane
  - Nodal Mediation
- or NMS implements all NRM functionality

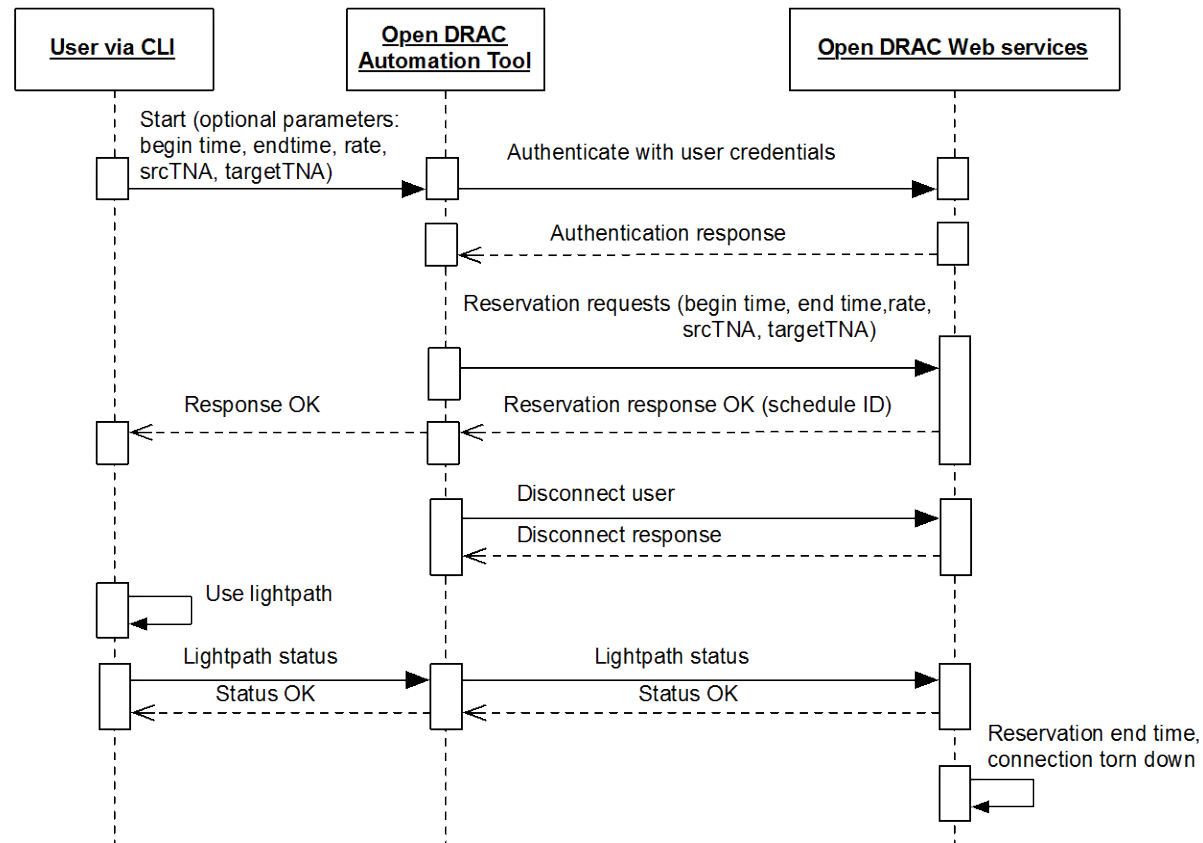
# OpenDRAC Automation Tool



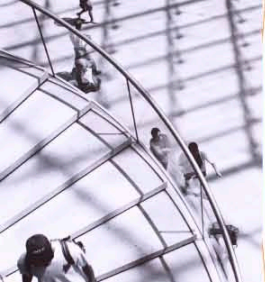
- Easy automated access to the dynamic lightpath service by end users

- CLI and Java app
  - Reserving schedules
  - Listing reservations
  - Reservation status
  - Cancel reservations

- Available through [www.opendrac.org](http://www.opendrac.org)







# Use cases

## Dynamic SURF lightpaths

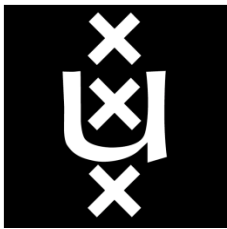


- **Pulsar**, research on neutron stars
- **Proteomics**, research on protein concentration
- **CineGrid**, HQ (4K) audiovisual testbed
- **NEXPreS**, radio-astronomy

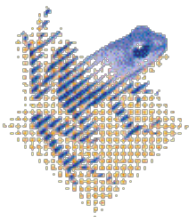
Making interdomain dynamic services up to 10Gb/s available to e-VLBI



**Amsterdamse Hogeschool voor de Kunsten**



university of  
 groningen



Erasmus MC  
 Universitair Medisch Centrum Rotterdam



ASTRON





# NetherLight

## Offering BoD internationally



- **Automated GOLE Pilot**
  - OpenDRAC at CERN, CESNET, KISTI
  - Towards 10GE



# Thank you!

**John MacAuley**

john.macauley@surfnet.nl

**Gerben van Malenstein**

gerben.vanmalenstein@surfnet.nl