

Lightpath Monitoring in NetherLight

(funded by SURFnet/GigaPort)

Ronald van der Pol

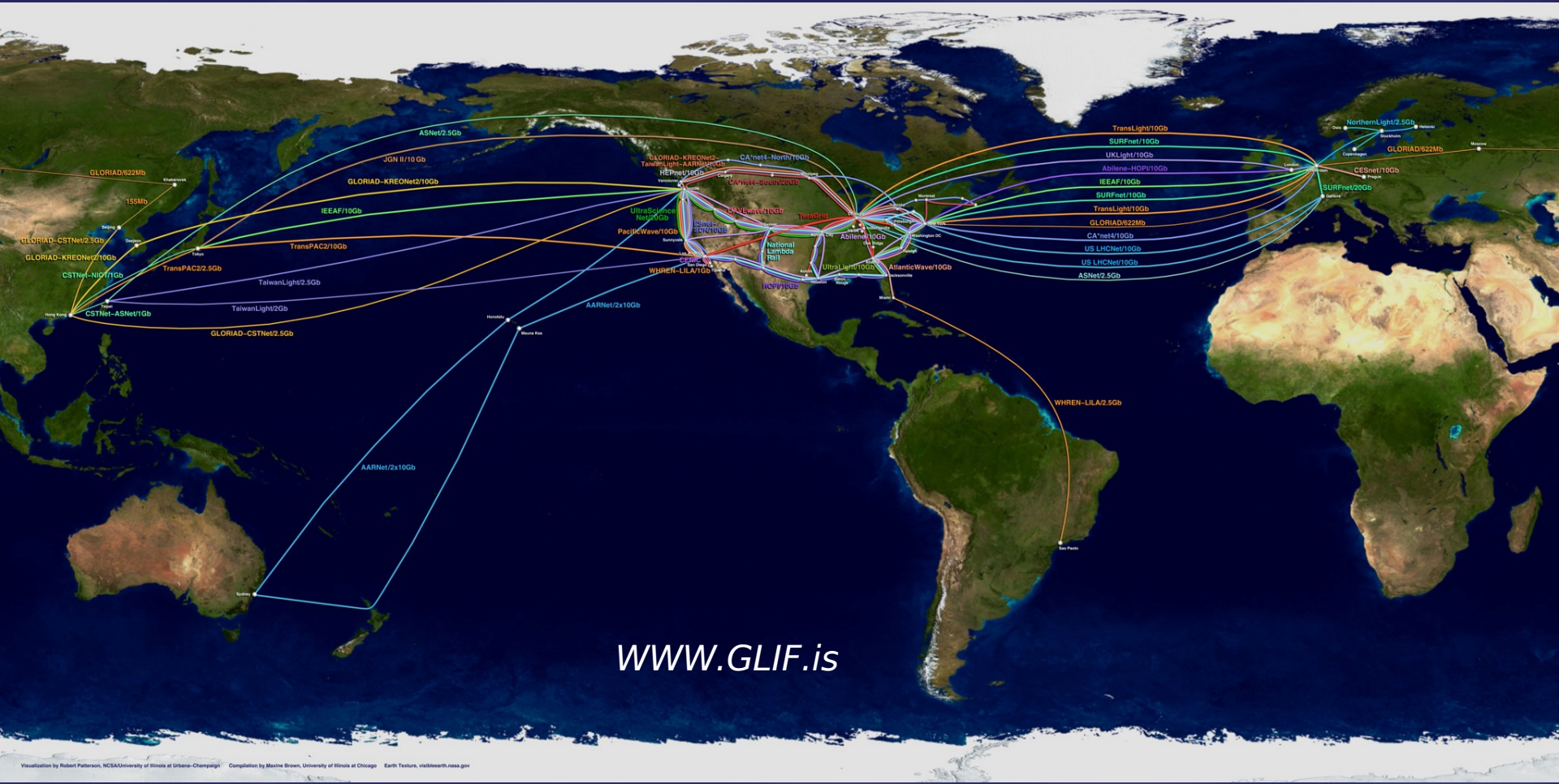
rvdp@sara.nl

GLIF meeting

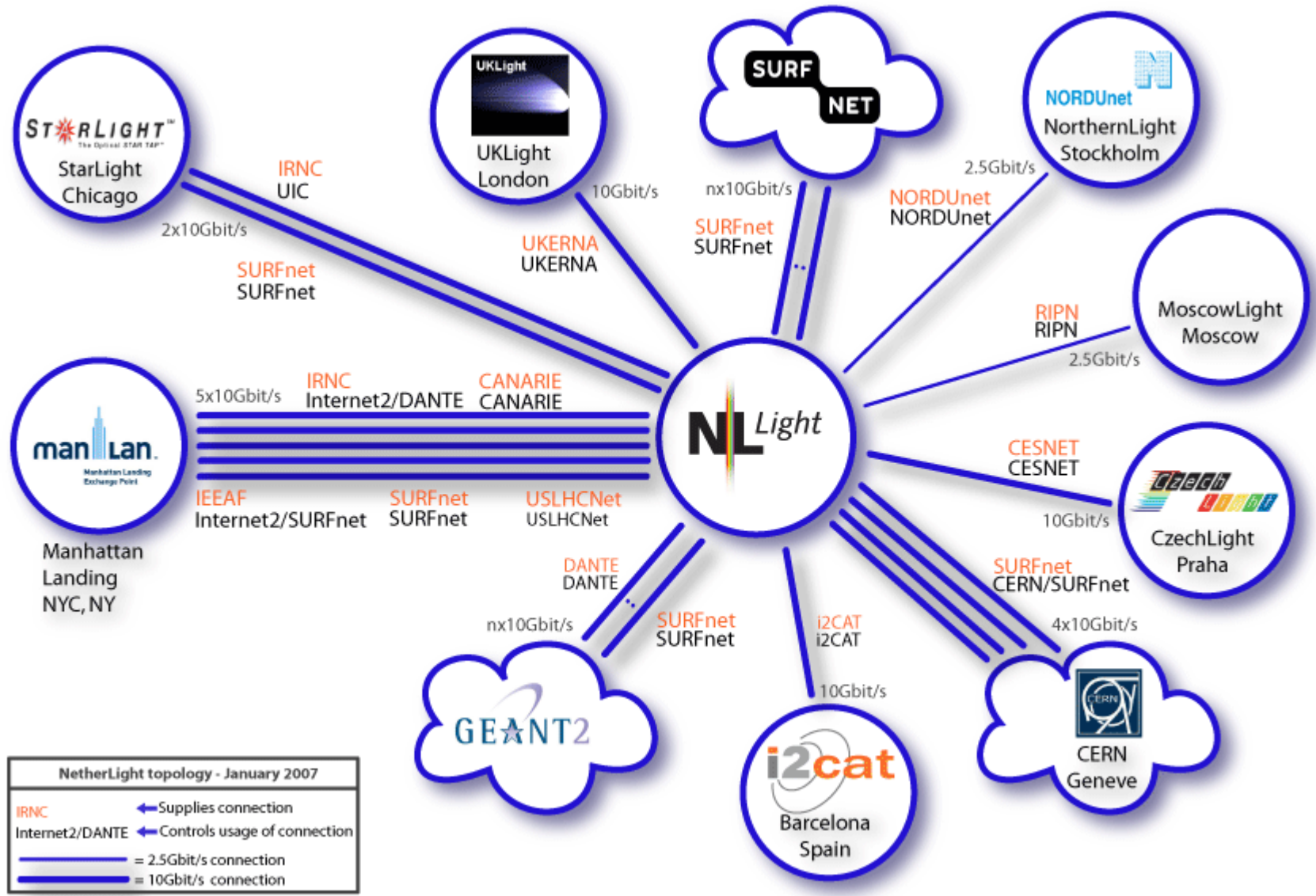
14-15 February 2007, Minneapolis

- ▀ NetherLight
- ▀ Monitoring in NetherLight
- ▀ Tools used for monitoring
- ▀ TL1 Toolkit
- ▀ Interdomain fault isolation

NetherLight: largest Optical Exchange in Europe

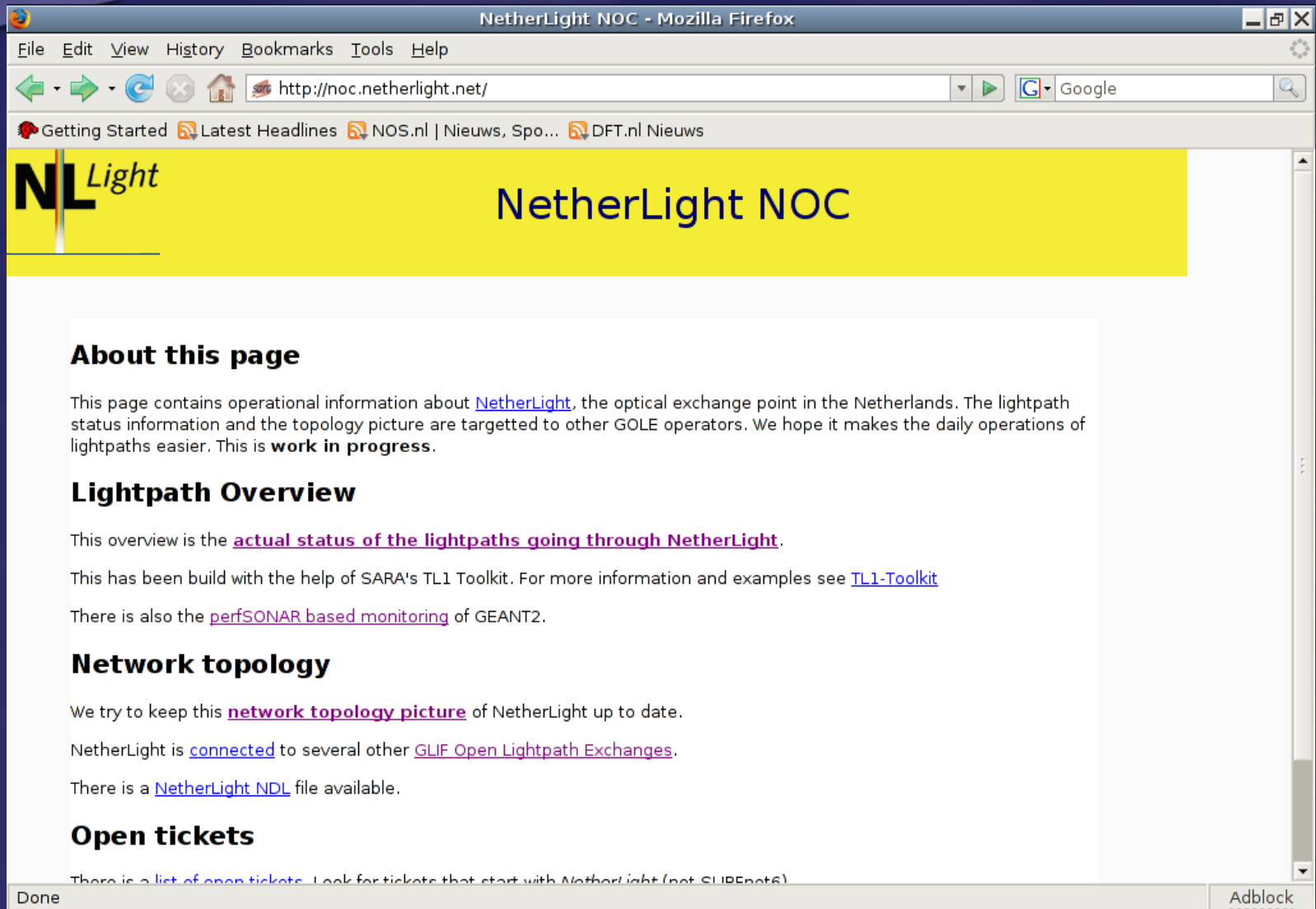


NetherLight Topology



- ▀ Nortel HDXc
- ▀ 2x Nortel OME6500 (Amsterdam & Geneva)
- ▀ Cisco ONS 15454
- ▀ Cisco 6509 (soon Nortel ERS8600)

- 24x7 support
- email & telephone
- noc@netherlight.net
- <http://www.glif.is/resources/netherlight.html>
- <http://noc.netherlight.net/>



The screenshot shows a Mozilla Firefox browser window with the address bar set to <http://noc.netherlight.net/>. The website header features the 'NL Light' logo and the title 'NetherLight NOC'. The main content area includes several sections:

- About this page**: A paragraph stating that the page contains operational information about NetherLight, an optical exchange point in the Netherlands, and that the lightpath status information and topology picture are targeted to other GOLE operators. It notes that this is **work in progress**.
- Lightpath Overview**: A paragraph stating that the overview is the [actual status of the lightpaths going through NetherLight](#). It mentions that this has been built with the help of SARA's TL1 Toolkit and provides a link to the [TL1-Toolkit](#). It also mentions [perfSONAR based monitoring](#) of GEANT2.
- Network topology**: A paragraph stating that they try to keep the [network topology picture](#) of NetherLight up to date. It notes that NetherLight is [connected](#) to several other [GLIF Open Lightpath Exchanges](#). It also mentions that there is a [NetherLight NDL](#) file available.
- Open tickets**: A paragraph stating that there is a [list of open tickets](#) and to look for tickets that start with NetherLight (not SUP5net6).

The browser's status bar at the bottom shows 'Done' and an 'Adblock' button.

NetherLight lightpaths - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://noc.netherlight.net/cgi-bin/netherlight-status.pl

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Back noc.netherlight.net

NetherLight lightpath status overview

ok	2,5Gig SURFnet-Abilene
ok	Amsterdam-chicago-DRAGON-1gbs
ok	CERN-ASnet-1
ok	CERN-ASnet-2
ok	CERN-MANlan-Canarie-Triumph-1
ok	CERN-MANlan-Canarie-Triumph-2
ok	CERN-MANlan-Canarie-Triumph-5Gig
ok	CERN-SARA
ok	CERN-UKLight-RAL-1
ok	CERN-UKLight-RAL-2
ok	CERN-UKLight-RAL-3
ok	CERN-UKLight-RAL-4
ok	F10-WAN-PHY-TST
ok	IRNC - GEANT/Abilene OC192
ok	MAN LAN Laag 2 Exchange New York
ok	Prague ASnet - Korea
ok	Prague-Chicago-IoP-FNAL
ok	RIPN to Moscow
ok	RIPN/GLORIAD
ok	SARA-Deisa
ok	tdm1.ams1.netherlight -- Oslo (score project)
ok	tdm3.ams1_ManLAN-1GIG(Score-N-light)

click on the lightpath name to get more information about the status/route and alarms for this specific lightpath.

Done Adblock

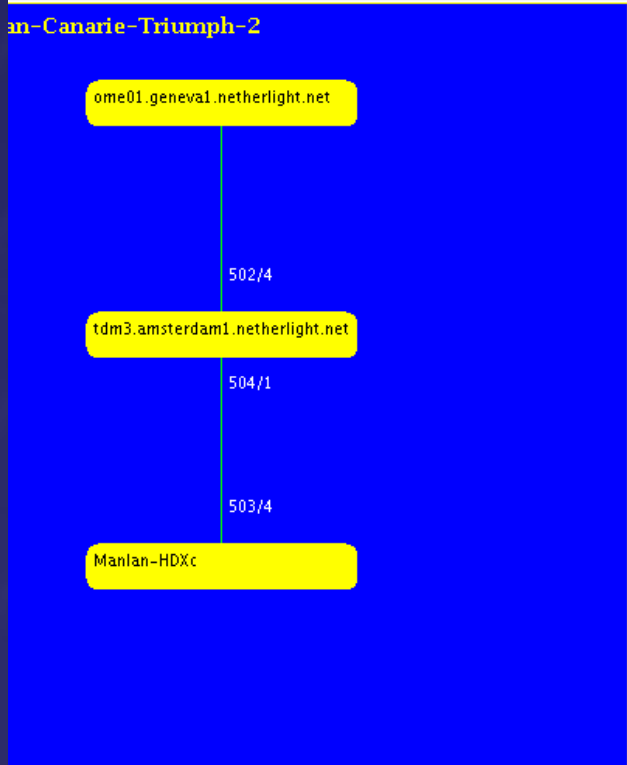
Netherlight TL1 Circuits - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://noc.netherlight.net/cgi-bin/drawjava.pl?CERN-MANlan-Canarie-Triumph-2

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an-Canarie-Triumph-2



```

graph TD
    A[ome01.geneva1.netherlight.net] ---|502/4| B[tdm3.amsterdam1.netherlight.net]
    B ---|504/1| C[Manlan-HDXc]
    
```

circuit details: CERN-MANlan-Canarie-Triumph-2

Status for this circuit is: **UP**

Powered by the [TL1-Toolkit!](#)

NE	circuitname	bandwidth	begin	end	Alarm
gen001a_ome01.netherlight.net	CERN-MANlan-Canarie-Triumph-2 STS-24	6/1/169-192	6/1/169-192	3/2/1-24	OK
tdm3.amsterdam1.netherlight.net	CERN-MANlan-C anarie-Triumph-2 STS-24	502/4/169-192	504/1/73-96	504/1/73-96	OK

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Done Adblock

Example of fault isolation

Netherlight TL1 Circuits - Mozilla Firefox

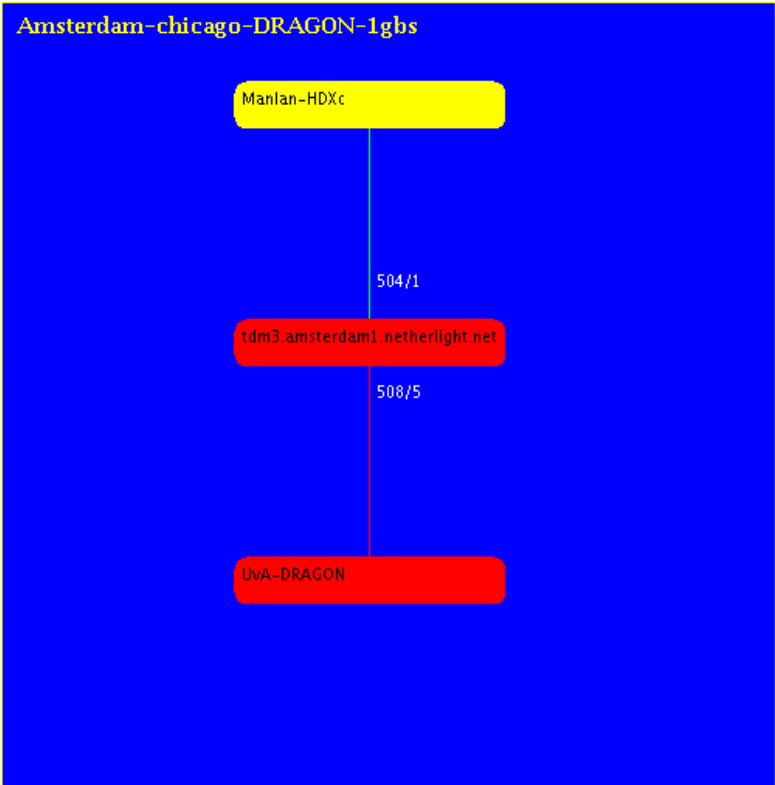
File Edit View History Bookmarks Tools Help

http://noc.netherlight.net/cgi-bin/drawjava.pl?Amsterdam-chicago-DRAGON-1gbs

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Back

Amsterdam-chicago-DRAGON-1gbs



```

graph TD
    A[Manlan-HDXc] ---|504/1| B[tdm3.amsterdam1.netherlight.net]
    B ---|508/5| C[UvA-DRAGON]
    
```

circuit details: Amsterdam-chicago-DRAGON

Status for this circuit is: **DOWN**

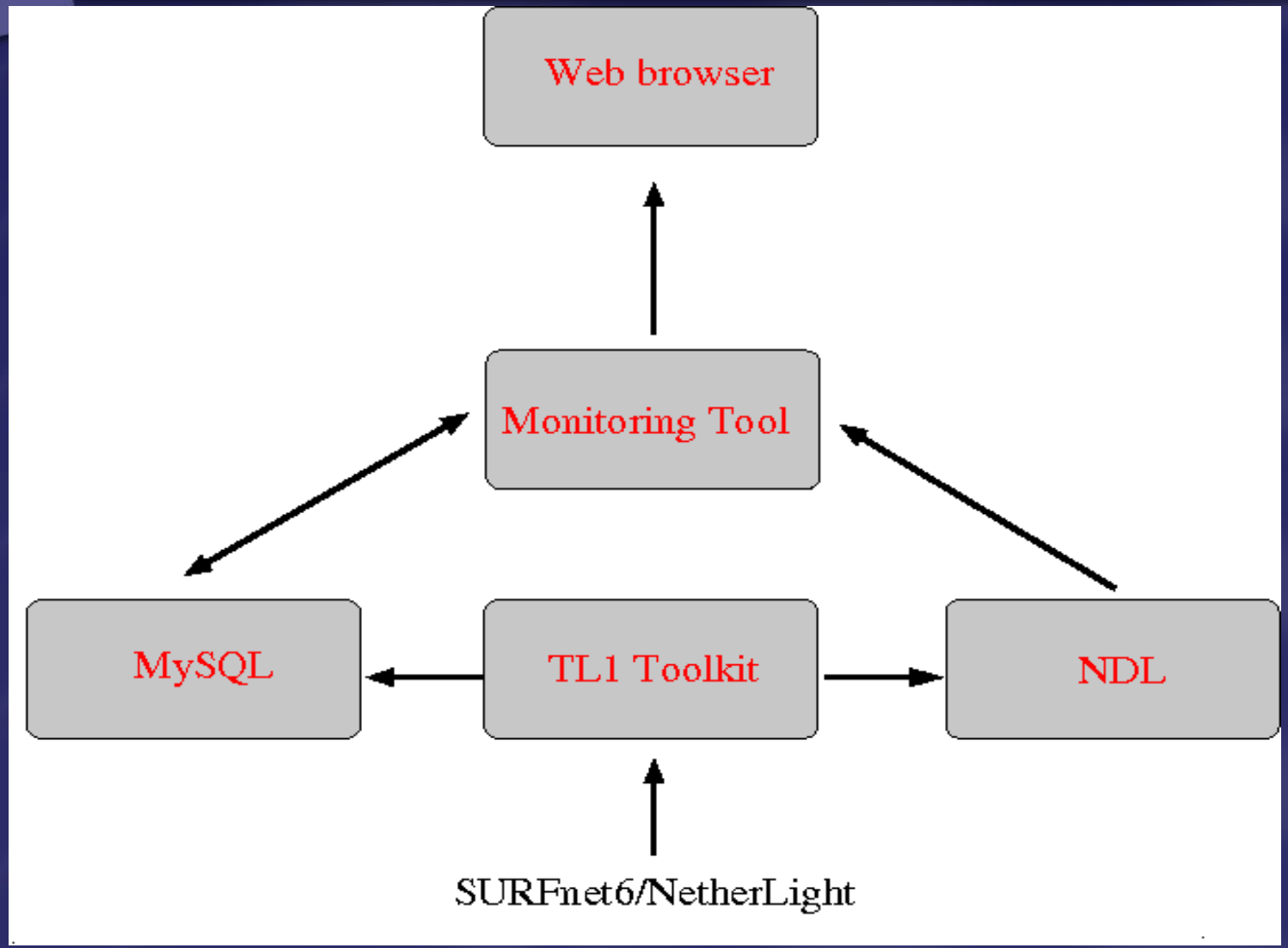
Powered by the [TL1-Toolkit!](#)

NE	circuitname	bandwidth	begin
tdm3.amsterdam1.netherlight.net	Amsterdam-chicago-DRAGON-1gbs	STS-3	508/5/1-3

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Done Adblock

Building blocks



TL1 Toolkit

- Easy interface to Nortel equipment
- Read info from network elements
- Perl module developed by SARA

MySQL database

- Used to store crossconnect info
- Used to store alarm information

localhost / localhost / surfnet6 / crossconnects | phpMyAdmin 2.8.2-Debian-0.2 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost/phpmyadmin/index.php?lang=en-utf-8&token=efc04d903282199

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Sort by key: None in vertical mode and repeat headers after 100 cells

phpMyAdmin

Database: surfnet6 (5)

- alarms
- crossconnects
- lambdadescription
- LPdescription
- tl1alarms

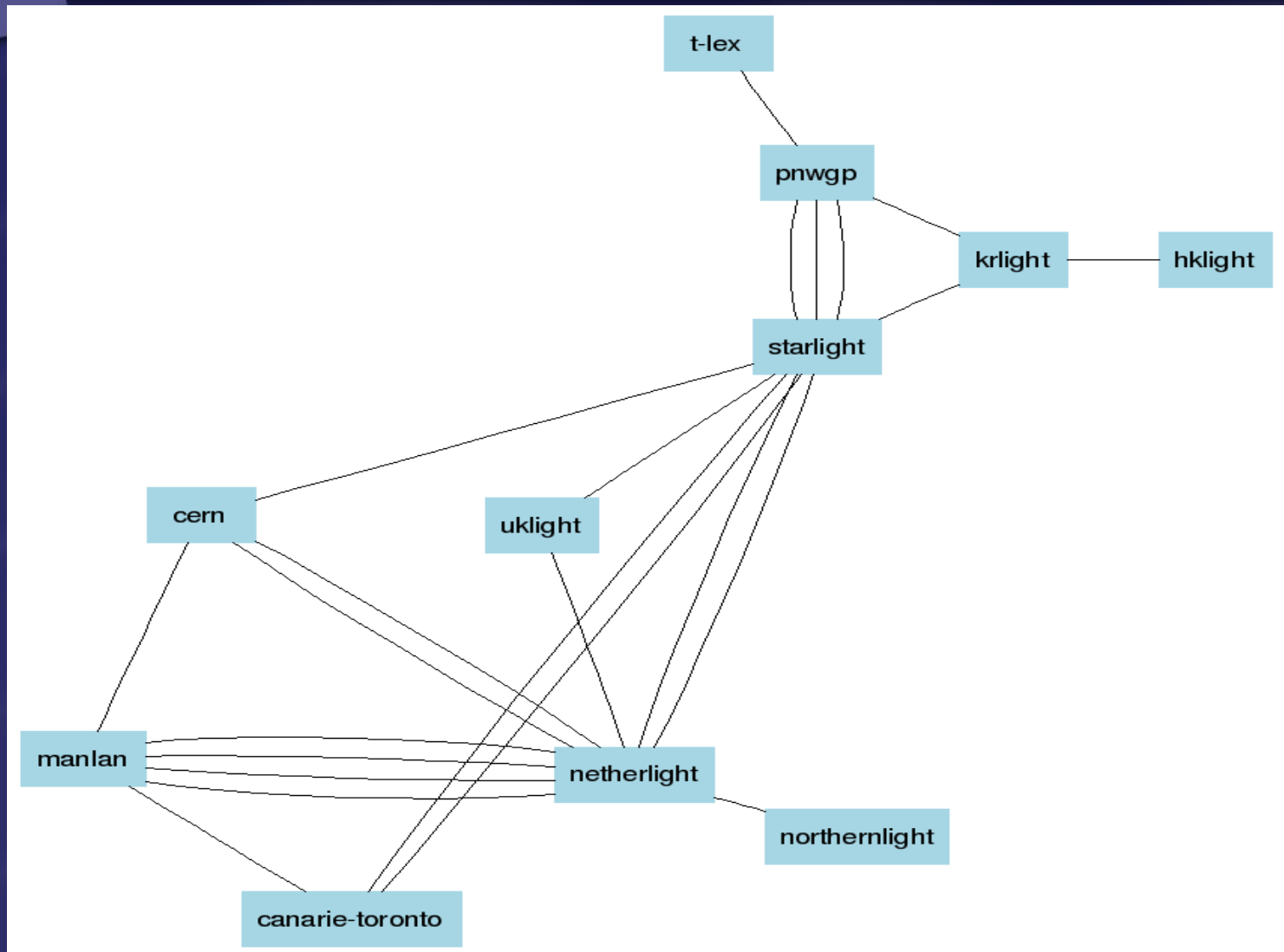
id	9785	9786	9787	9788
host	Ah001A_OME01	Ah001A_OME01	Ah001A_OME01	Ah001A_OME01
circuitname	Ah001A-Asd002A_Ge1(L2ss-01)	Ah001A-Asd002A_Ge1(L2ss-01)	Ah001A-Asd001A_Ge1(L2ss-01)	Ah001A-Asd001A_Ge1(L2ss-01)
bandwidth	3	3	3	3
fromslot	9	9	6	6
fromsubslot	0	0	0	0
fromport	1	1	1	1
fromfirststs	163	166	148	151
fromlaststs	165	168	150	153
toslot	2	2	2	2
tosubslot	0	0	0	0
toport	4	4	3	3
tofirststs	16	19	1	4
tolaststs	18	21	3	6
active	no	no	no	no
lastseen	2006-06-12 19:35:53	2006-06-12 19:35:53	2006-06-12 19:35:53	2006-06-12 19:35:53
inserttime	2006-05-01 16:47:38	2006-05-01 16:47:38	2006-05-01 16:47:38	2006-05-01 16:47:38
swmateslot	0	0	0	0
swmatesubslot	0	0	0	0
swmateport	0	0	0	0
swmatefromsts	0	0	0	0
swmatetosts	0	0	0	0
fromdate	2006-05-01 16:47:38	2006-05-01 16:47:38	2006-05-01 16:47:38	2006-05-01 16:47:38
todate	2020-12-12 12:12:12	2020-12-12 12:12:12	2020-12-12 12:12:12	2020-12-12 12:12:12
status	discovered	discovered	discovered	discovered

Check All / Uncheck All With selected:

NDL

- ▀ Network Description Language
- ▀ Framework developed by UvA
- ▀ NDL Perl module developed by SARA

Visualization of NDL files



- Perl module
- Takes care of logging in and out
- Hides difficult TL1 syntax from user
- Parses TL1 output
- Returns easy to use data structures
- Works with any TL1 device
 - Tested on OME6500, HDXc, CPL, OM5200, ONS15454
- Apache 2.0 license

Example of TL1 Syntax

```
< RTRV-CRS-STS3C:"Asd001A_OME3T":ALL:42:::DISPLAY=PROV,CKTID=ALL;IP 42
<
"Asd001A_OME3T" 060903 13:04:06
M 42 COMPLD
"STS3C11011,STS3C1121:2WAY:CKTID=\\"ARSP11700\\":"
"STS3C11014,STS3C1124:2WAY:CKTID=\\"ARSP11700\\":"
"STS3C11017,STS3C1127:2WAY:CKTID=\\"ARSP11700\\":"
"STS3C110110,STS3C11210:2WAY:CKTID=\\"ARSP11700\\":"
"STS3C110113,STS3C11213:2WAY:CKTID=\\"ARSP11700\\":"
"STS3C110116,STS3C11216:2WAY:CKTID=\\"ARSP11700\\":"
"STS3C110119,STS3C11219:2WAY:CKTID=\\"ARSP11700\\":"
"STS3C110122,STS3C1611:2WAY:CKTID=\\"OME1010_1060_testen\\":"
;
```

Example Perl Script

```
#!/usr/bin/env perl
use strict;
use warnings;
use t11;
my $device = t11->new(
    hostname => "Asd001A_OME3T",
    username => "xxxx",
    password => "xxxx",
    peerport => 23,
    verbose => 0,
);
die if ($device->open() == 0);
my @out = $device->retrieve_circuits();
$device->close();
for my $row (@out) {
    print "circuitname = $$row[0], from = $$row[2]/$$row[4], to = $$row[7]/$$row[9]\n";
};
```

```
$ get_crossconnects.pl  
circuitname = ARSP11700, from = 10/1, to = 1/2  
circuitname = ARSP11700, from = 10/1, to = 1/2  
circuitname = ARSP11700, from = 10/1, to = 1/2  
circuitname = ARSP11700, from = 10/1, to = 1/2  
circuitname = ARSP11700, from = 10/1, to = 1/2  
circuitname = ARSP11700, from = 10/1, to = 1/2  
circuitname = ARSP11700, from = 10/1, to = 1/2  
circuitname = OME1010_1060_testen, from = 10/1, to = 6/1  
$
```

- `get_cardtype()`
- `retr_swversion()`
- `retr_inoctets()/retr_outoctets()`
- `retr_alarms()`
- `retrieve_circuits()`
- `get_section_trace()`

interface information for Asd001a_ome05

Interface	Card Type	Neighbour	Capacity (STS Timeslots)	number of free STS timeslots
Asd001a_ome05:1/1	GigE	NA	21	0
Asd001a_ome05:1/2	GigE	NA	21	0
Asd001a_ome05:1/3	GigE	NA	21	21
Asd001a_ome05:1/4	GigE	NA	21	0
Asd001a_ome05:10/1	SONET	Asd001a_ome01:9/1	192	84
Asd001a_ome05:11/1	SONET	Asd001a_ome02:12/1	192	87
Asd001a_ome05:2/1	GigE	NA	21	0
Asd001a_ome05:2/2	GigE	NA	21	0
Asd001a_ome05:2/3	GigE	NA	21	0
Asd001a_ome05:2/4	GigE	NA	21	0
Asd001a_ome05:3/1	GigE	NA	21	18
Asd001a_ome05:3/2	GigE	NA	21	21
Asd001a_ome05:3/3	GigE	NA	21	18
Asd001a_ome05:3/4	GigE	NA	21	21
Asd001a_ome05:4/1	GigE	NA	21	0
Asd001a_ome05:4/2	GigE	NA	21	18
Asd001a_ome05:4/3	GigE	NA	21	21
Asd001a_ome05:4/4	GigE	NA	21	0
Asd001a_ome05:5/1	SONET	Ddt001a_ome01:6/1	192	21
Asd001a_ome05:6/1	SONET	Tb001a_ome01:6/1	192	129
Asd001a_ome05:9/1	SONET	Elv001a_ome01:6/1	192	0

Backbone Usage

Ah001a_ome01:6/1 - Ap001a_ome01:9/1	OC192 - free timeslots 42	78%
Ah001a_ome01:9/1 - Nm001a_ome01:6/1	OC192 - free timeslots 39	80%
Alr001a_ome01:6/1 - Asd001a_ome07:11/1	OC192 - free timeslots 129	33%
Amr001a_ome01:1/1 - Hedr001a_ome01:2/1	OC48 - free timeslots 0	100%
Amr001a_ome01:1/2 - Hlm001a_ome01:6/1	OC48 - free timeslots 6	88%
Amr001a_ome01:5/1 - Asd001a_ome04:5/1	OC192 - free timeslots 102	47%
Ap001a_ome01:6/1 - Zl001a_ome01:9/1	OC192 - free timeslots 42	78%
Ap001a_ome01:9/1 - Ah001a_ome01:6/1	OC192 - free timeslots 42	78%
Asd001a_ome01:1/1 - Asd001a_ome02:1/1	OC48 - free timeslots 6	88%
Asd001a_ome01:1/2 - Asd001a_ome02:1/2	OC48 - free timeslots 6	88%
Asd001a_ome01:10/1 - Asd002a_ome01:10/1	OC192 - free timeslots 51	73%
Asd001a_ome01:12/1 - Asd002a_ome01:11/1	OC192 - free timeslots 192	0%
Asd001a_ome01:13/1 - Asd001a_ome06:11/1	OC192 - free timeslots 69	64%
Asd001a_ome01:3/1 - Ut001a_ome01:6/1	OC192 - free timeslots 150	22%
Asd001a_ome01:4/1 - Ledn001a_ome01:5/1	OC192 - free timeslots 108	44%
Asd001a_ome01:5/1 - Asd001a_ome03:10/1	OC192 - free timeslots 3	98%
Asd001a_ome01:6/1 - Asd001a_ome04:10/1	OC192 - free timeslots 60	69%
Asd001a_ome01:9/1 - Asd001a_ome05:10/1	OC192 - free timeslots 84	56%
Asd001a_ome02:1/1 - Asd001a_ome01:1/1	OC48 - free timeslots 6	88%
Asd001a_ome02:1/2 - Asd001a_ome01:1/2	OC48 - free timeslots 6	88%
Asd001a_ome02:10/1 - Asd002a_ome02:10/1	OC192 - free timeslots 6	97%
Asd001a_ome02:12/1 - Asd001a_ome05:11/1	OC192 - free timeslots 87	55%
Asd001a_ome02:13/1 - Asd001a_ome04:11/1	OC192 - free timeslots 150	22%
Asd001a_ome02:14/1 - Asd001a_ome03:11/1	OC192 - free timeslots 108	44%
Asd001a_ome02:3/1 -	OC192 - free timeslots 186	3%
Asd001a_ome02:4/1 - Nm001a_ome02:6/1	OC192 - free timeslots 192	0%

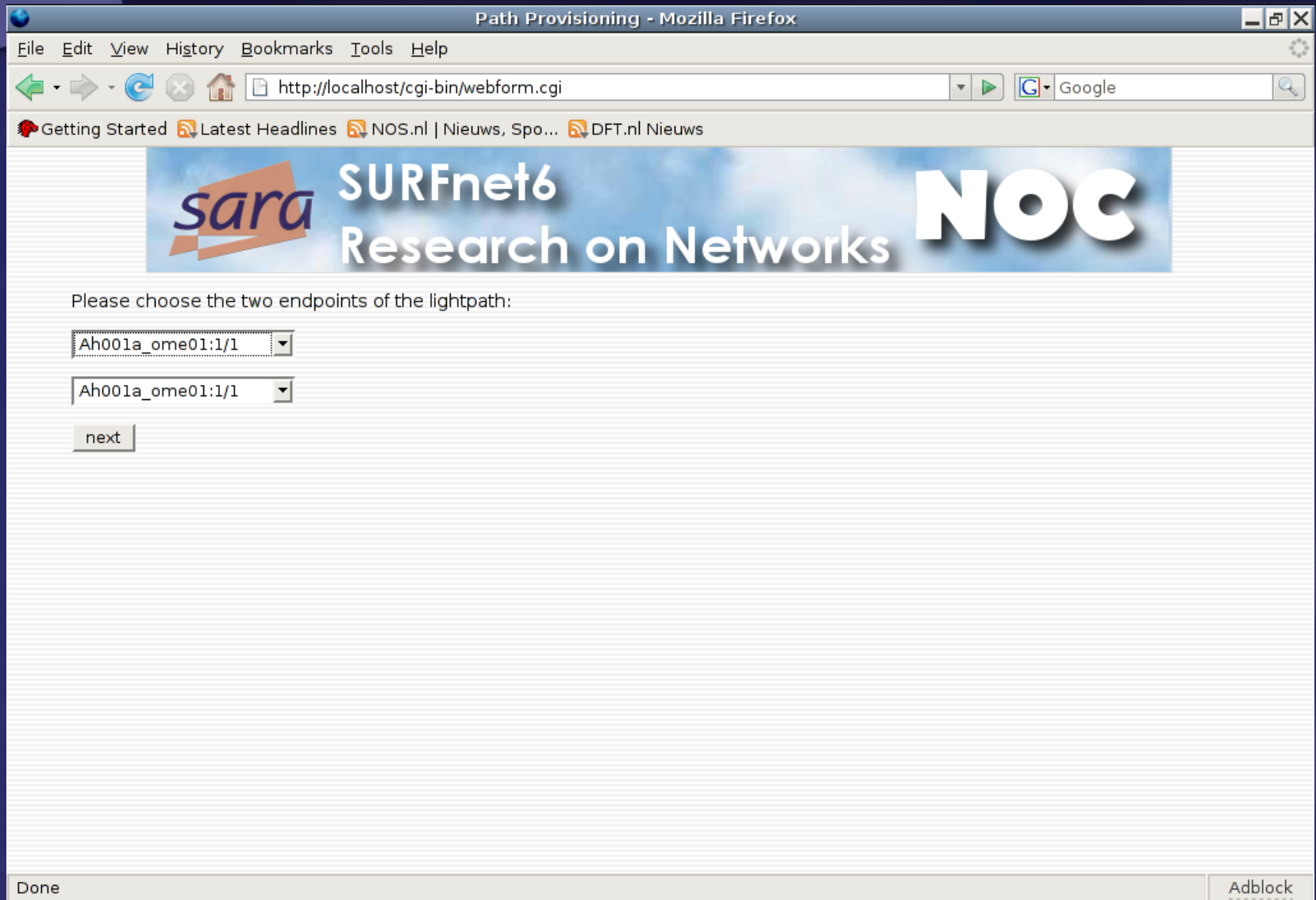
Timeslot Information

Es001a_ome01 6/1

free
reserved
used

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

Planning on SURFnet6 (1/4)




Path Provisioning - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost/cgi-bin/webform.cgi

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 SURFnet6
Research on Networks **NOC**

Please choose the two endpoints of the lightpath:

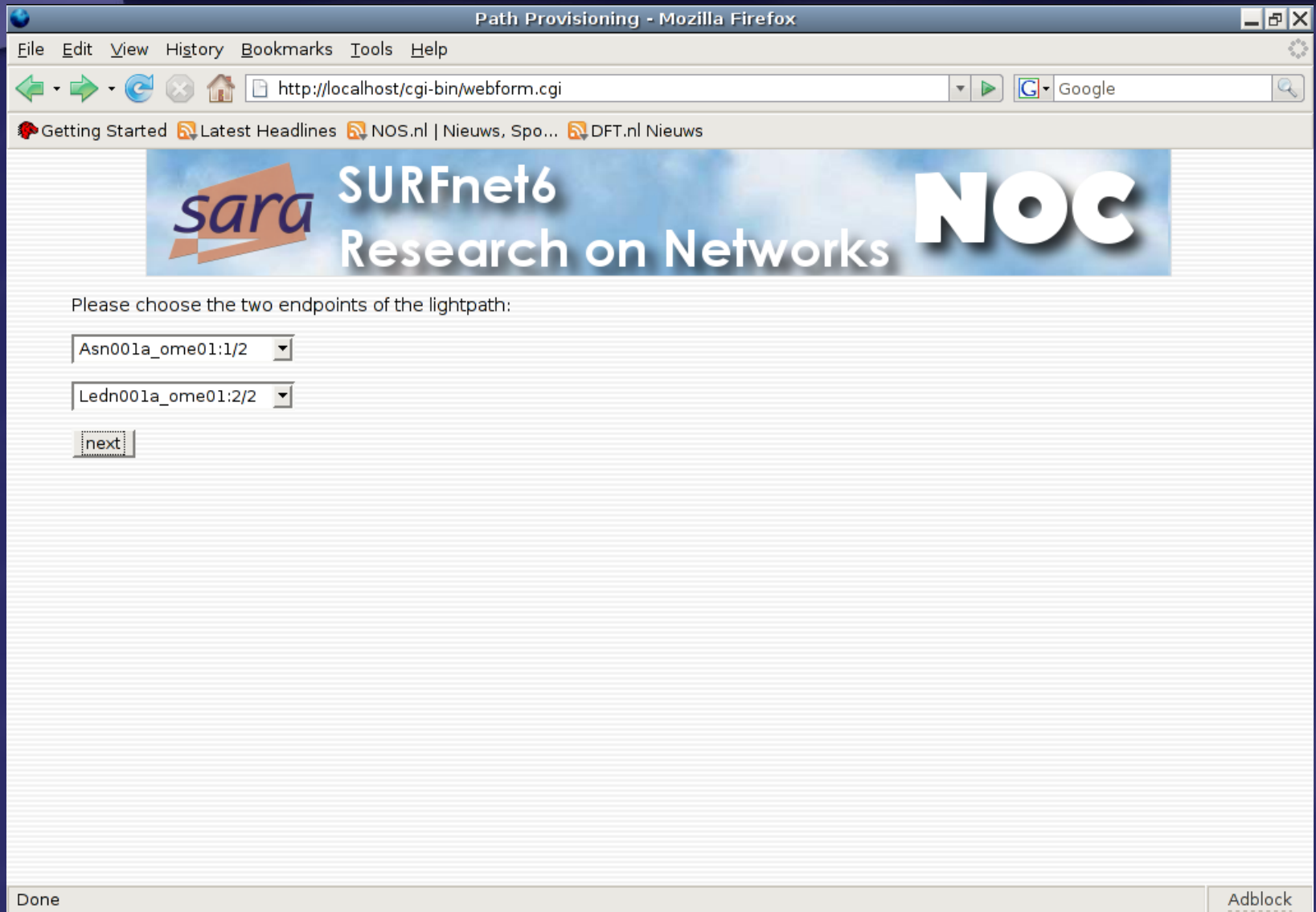
Ah001a_ome01:1/1

Ah001a_ome01:1/1

next

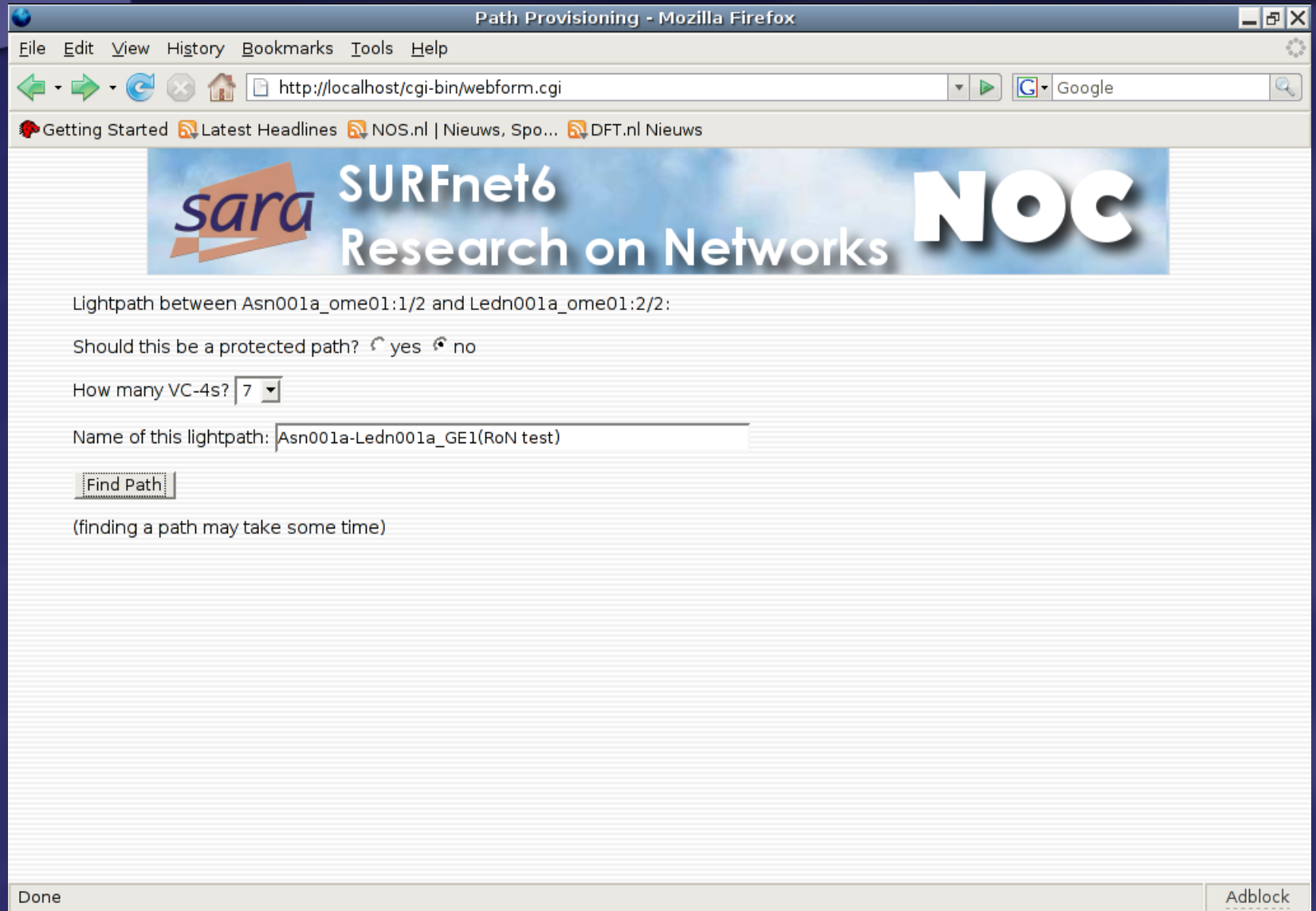
Done Adblock

Planning on SURFnet6 (2/4)



The screenshot shows a Mozilla Firefox browser window titled "Path Provisioning - Mozilla Firefox". The address bar contains "http://localhost/cgi-bin/webform.cgi". The page features a header with the "sara" logo, "SURFnet6 Research on Networks", and "NOC". Below the header, the text "Please choose the two endpoints of the lightpath:" is displayed. Two dropdown menus are present: the first is set to "Asn001a_ome01:1/2" and the second is set to "Ledn001a_ome01:2/2". A "next" button is located below the dropdowns. The browser's status bar at the bottom shows "Done" and "Adblock".

Planning on SURFnet6 (3/4)




Path Provisioning - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost/cgi-bin/webform.cgi

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 SURFnet6
Research on Networks **NOC**

Lightpath between Asn001a_ome01:1/2 and Ledn001a_ome01:2/2:

Should this be a protected path? yes no

How many VC-4s?

Name of this lightpath:

(finding a path may take some time)


Done Adblock

Path Provisioning - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost/cgi-bin/webform.cgi

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Path															
From	Timeslots	To	Timeslots												
Asn001a_ome01:1/2	1 2 3 4 5 6 7	Asn001a_ome01:9/1	8 9 10 11 12 13 14												
Gn001a_ome01:2/2	8 9 10 11 12 13 14	Gn001a_ome01:9/1	8 9 10 12 15 16 17												
Asd002a_ome07:5/1	8 9 10 12 15 16 17	Asd002a_ome07:10/1	52 53 54 55 56 57 58												
Asd002a_ome02:5/1	52 53 54 55 56 57 58	Asd002a_ome02:1/1	1 2 3 4 5 6 7												
Asd002a_ome01:1/1	1 2 3 4 5 6 7	Asd002a_ome01:4/1	15 16 17 18 19 20 21												
Ledn001a_ome01:10/1	15 16 17 18 19 20 21	Ledn001a_ome01:2/2	1 2 3 4 5 6 7												

Cancel Reserve in Database

Done Adblock

Where to get it?

- ▀ <http://nrg.sara.nl/TL1-Toolkit>
- ▀ New release available soon
- ▀ Have a look
- ▀ Please provide feedback

- Monitoring scripts available soon
- Open source
- Needs to be packaged
- Need to write installation documentation
- Announcement on GLIF mailing list
- Link on <http://noc.netherlight.net>

- NetherLight provides lightpath status
- End-to-end status needed
- Cooperation of other GOLEs needed
- What is needed:
 - link status info (TL1 Toolkit)
 - remote access to info (web services?)
 - collecting and displaying software

- If you want to use the NetherLight software, we can help you
- Discuss inter-domain monitoring requirements and design
- Look at perfSONAR E2EMON
- Contact us if you want to work on this

Thank You

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