Optical/Photonic Networking and Grid Integration

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UvA

www.starplane.org

StarPlane

application-specific management of optical networks

The StarPlane project addresses two concerns in optical networks:

1. The Basic StarPlane Management Infrastructure

StarPlane allows applications to take advantage of the increased bandwidth and potential flexibility in optical networks by letting them create their own network topology in a simple way.

2. The Applications and Their Needs

StarPlane will discover how this new freedom to manipulate the network will benefit the applications.

StarPlane will use the physical infrastructure provided by SURFnet 6 and the distributed supercomputer DAS-3. Hybrid optical networks such as SURFnet 6 allow network administrators to partition the network and to create multiple overlay networks, each with a different logical topology. The novelty of StarPlane is that it does give this flexibility directly to the applications by allowing them to choose the logical topology in real time, ultimately with subsecond switching times.

Staff members of the research team:

Prof. dr. ir. H.E. Bal	VU	professor	Parallel programming
Dr. ir. H. Bos	VU	assistant professor	Computer networks
Dr. ir. C.T.A.M. de Laat	UvA	associate professor	Internet and Grids
Prof. dr. P.M.A. Sloot	UvA	professor	Computational science

SURFnet

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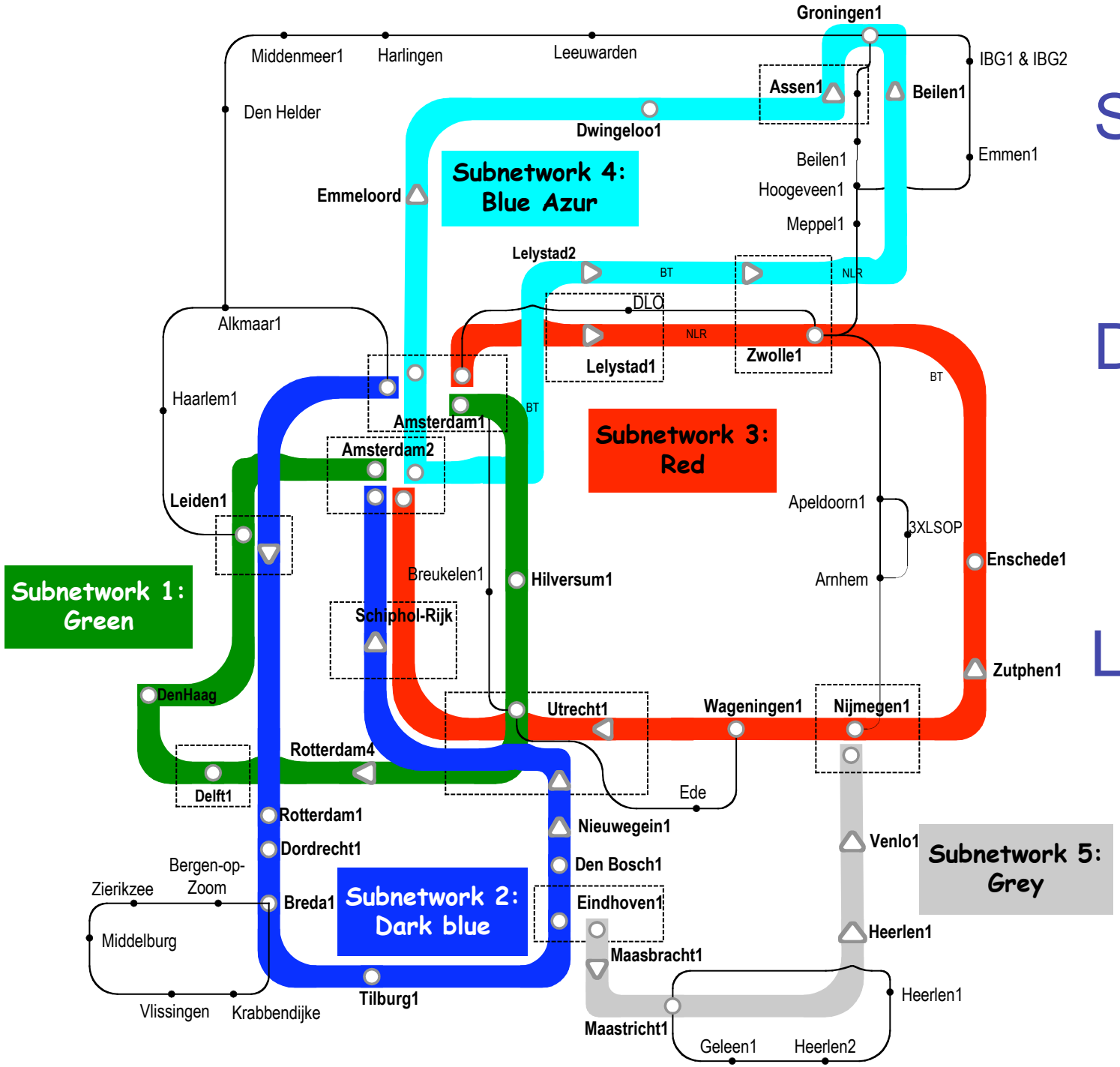
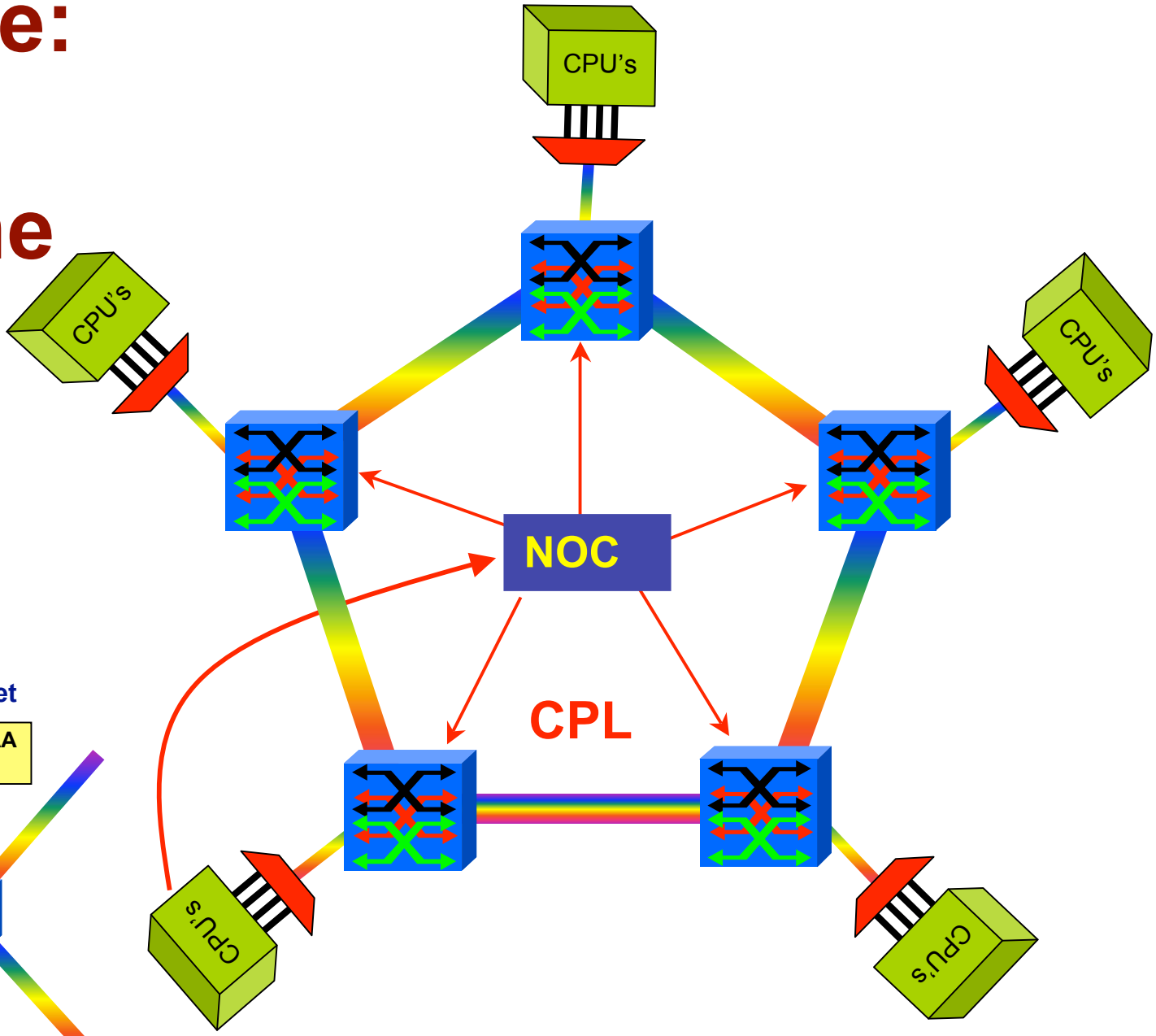


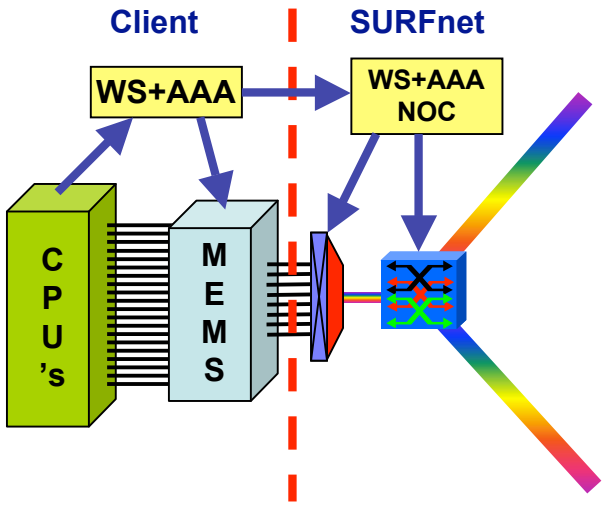
SURFnet6

6000 km Dark Fiber

Our National Laboratory

StarPlane: DWDM backplane for DAS-3





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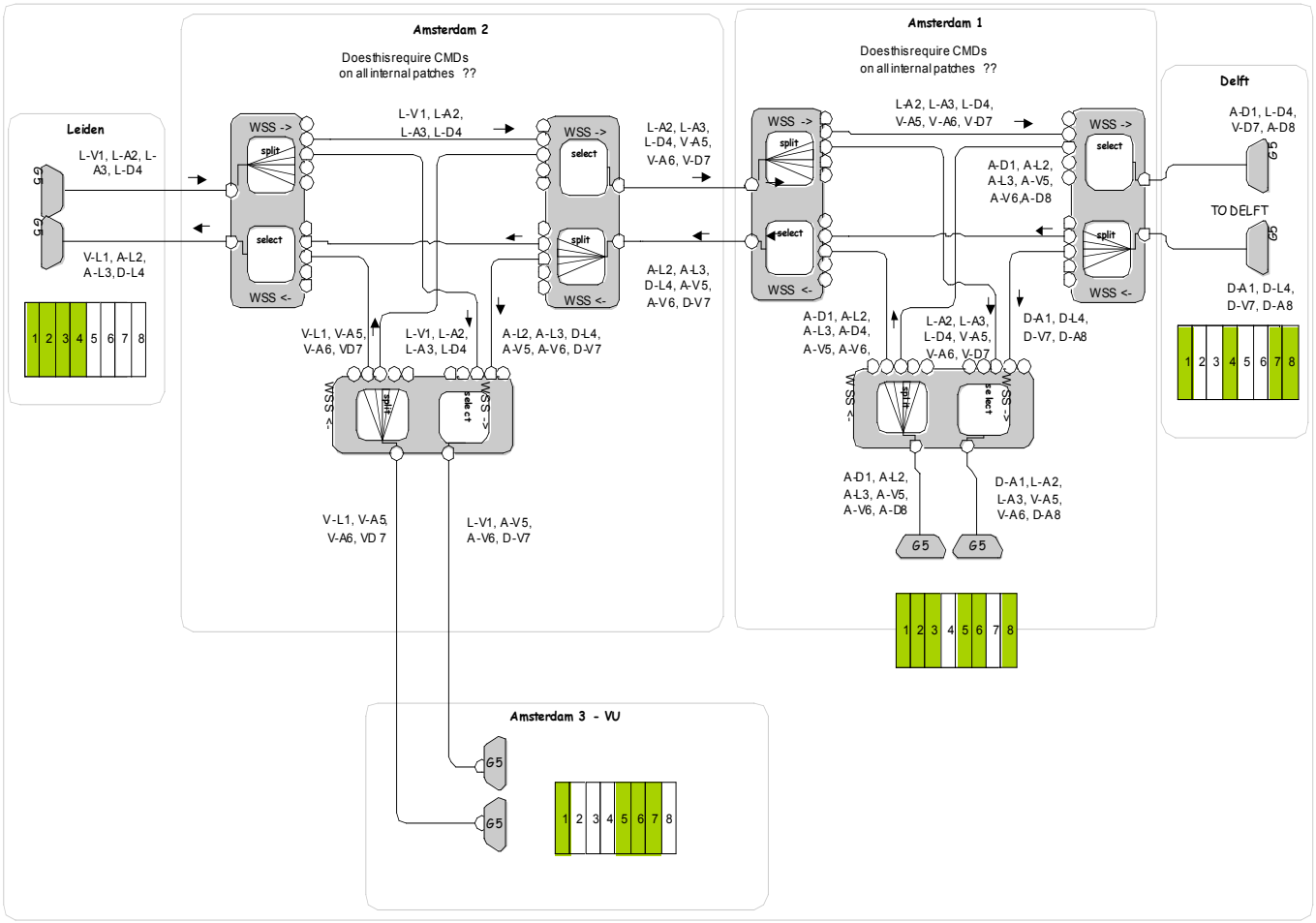
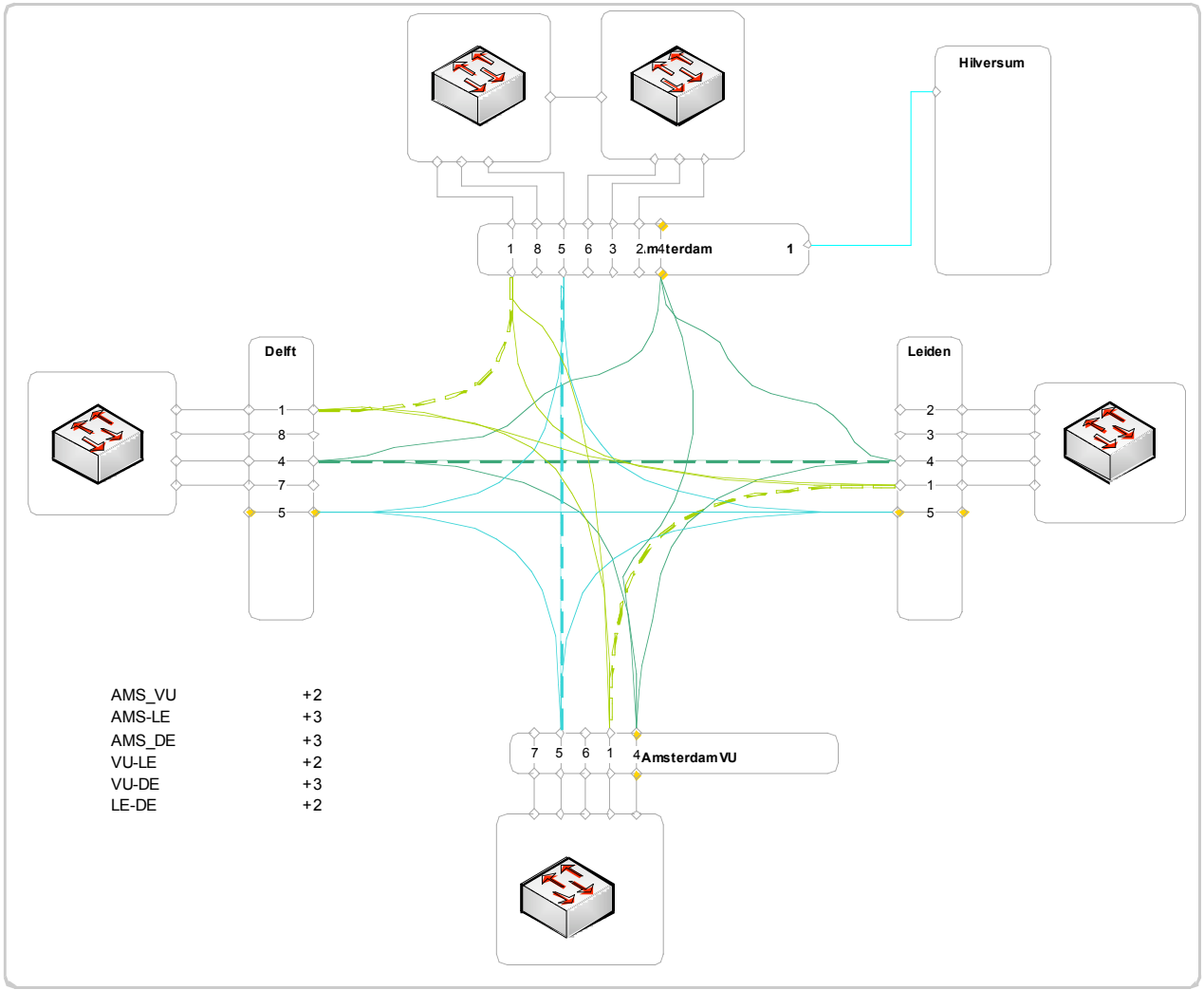
Day 2 detail



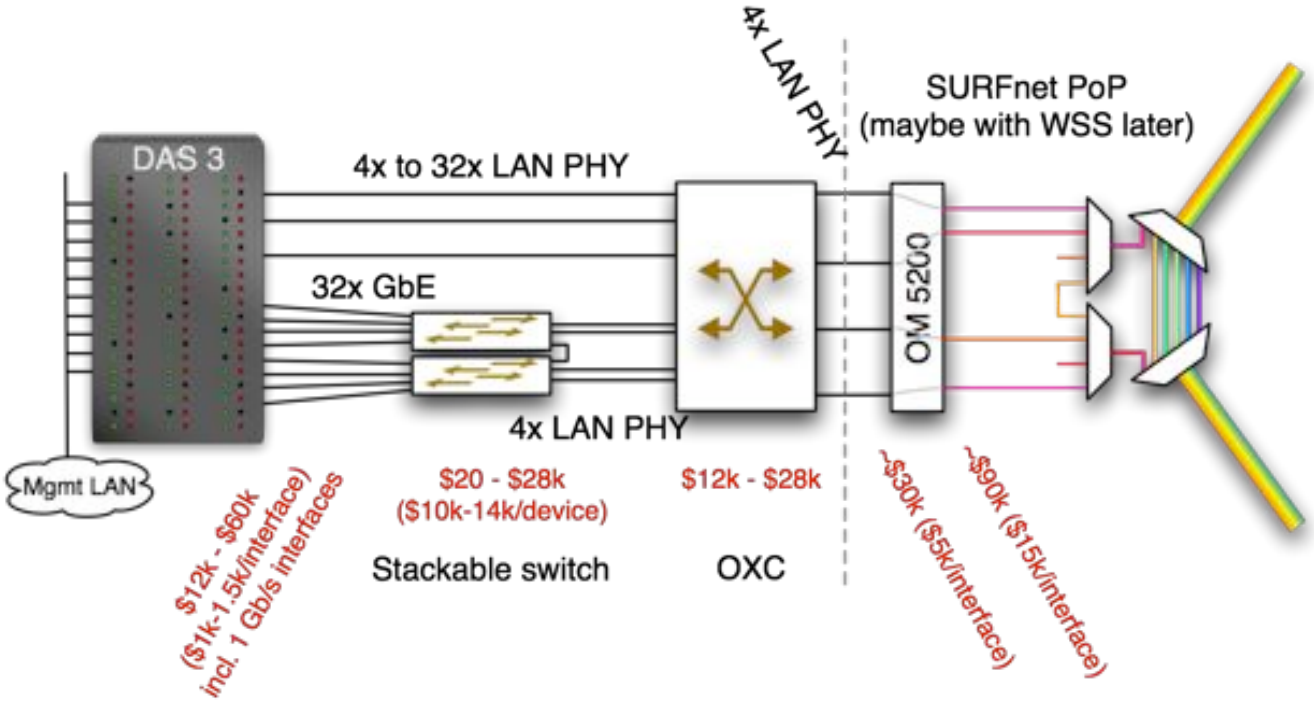
- Wavelength assignment remains – no external changes
- Adding WSSes allows redirecting wavelengths from/to VU and AMS

Day 2 – reconfigurability potential



- Day 2 solution with 4 extra transponders
- Only redirectable wavelengths shown
  - 3 ‘colours’ can be redirected now
- Adding one card at all four sites allows to add at least 20 Gb/s connectivity when required!!
- Limitations now:
  - Number of wavelengths in band
  - Blocking…

3. Gigabit Ethernet and OXC

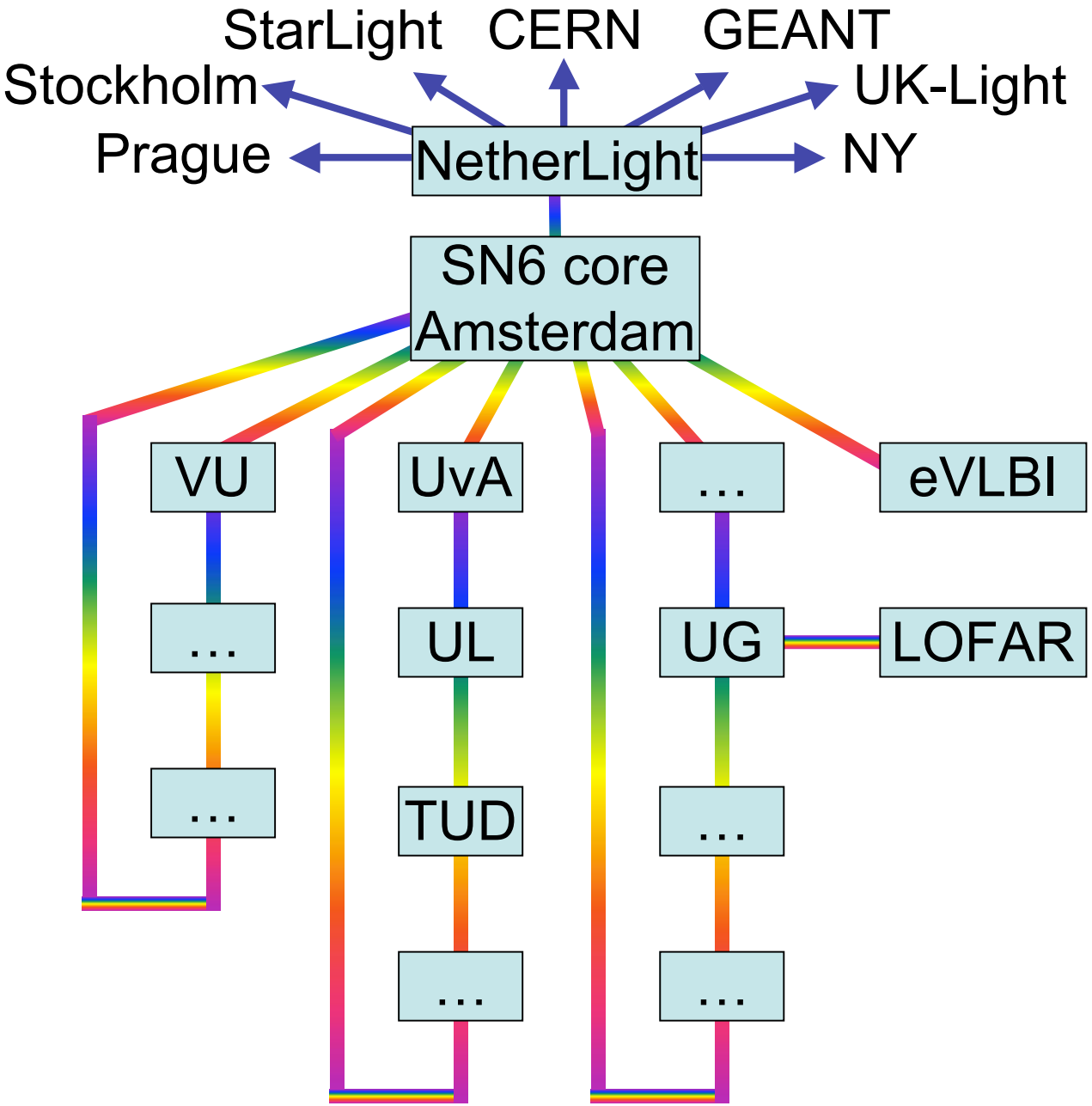


This scenario connects all nodes with 1 Gb/s Ethernet to a relative cheap stackable switch. For example the Force10 S-50. The upstream 10 Gb/s connections are connected via an optical cross connect to SURFnet. In addition a number of nodes is connected directly to the optical cross connect. This number can easily expanded later. The advantage is that both host-to-host as well as (aggregated) LAN-to-LAN connections are possible from the start, and it is relative cost-effective. The disadvantages are that the aggregation is done at only 1 Gb/s towards the hosts, and at least at the start not all nodes in the cluster are equal.

StarPlane Goals

Goals in the proposed StarPlane project:

1. fast, application-specific allocation of the network resources with deterministic characteristics;
2. application-specific composition of the protocol stack that is used to control the resources;
3. low-level resource partitioning (and, hence, no interference);
4. high-level requests (whereby policies and inference are used to assist the user)..


StarLight
CERN
GEANT
Stockholm
UK-Light
Prague
NetherLight
NY
SN6 core
Amsterdam
VU
UvA
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eVLBI
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UL
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TUD
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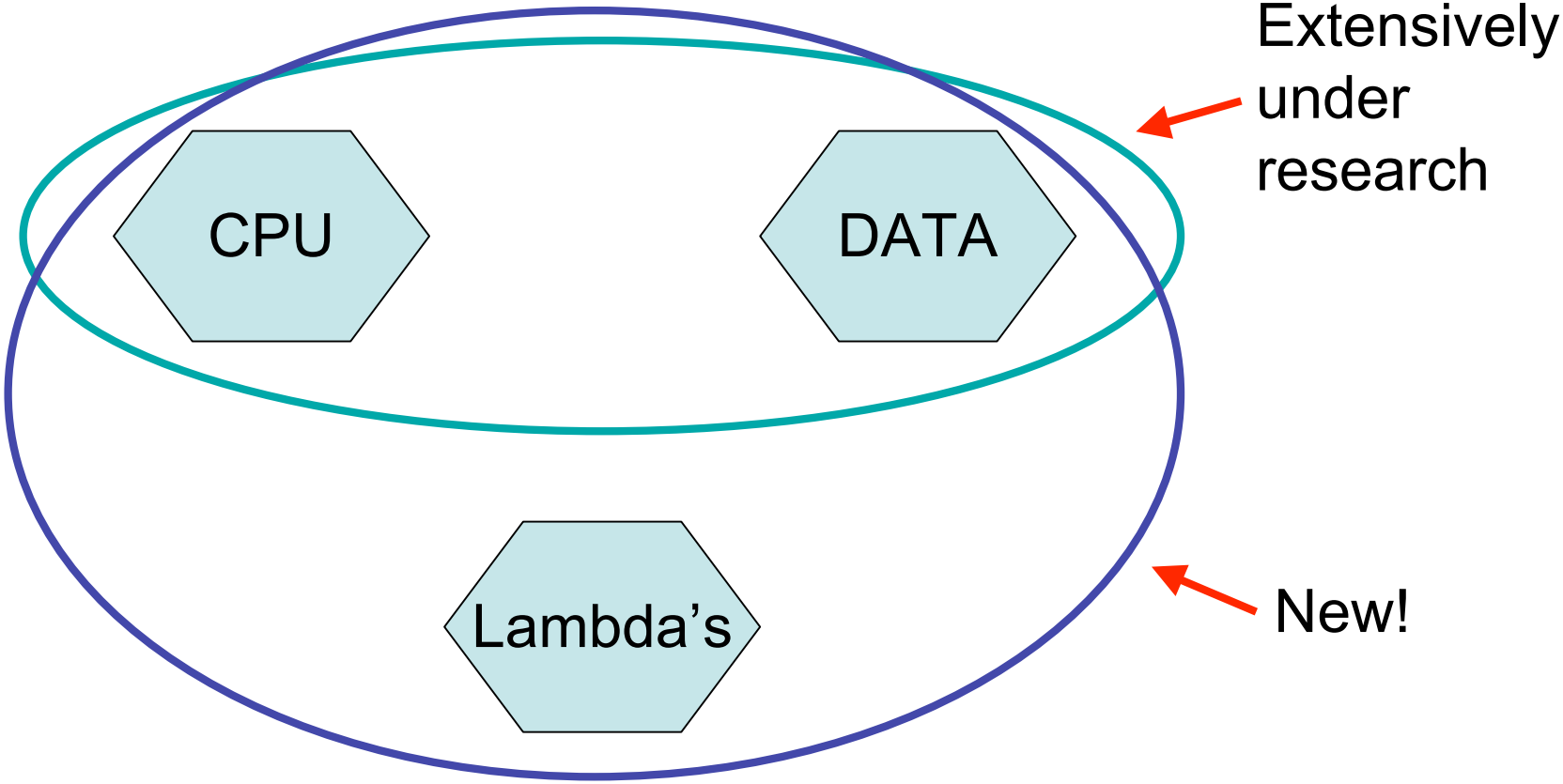
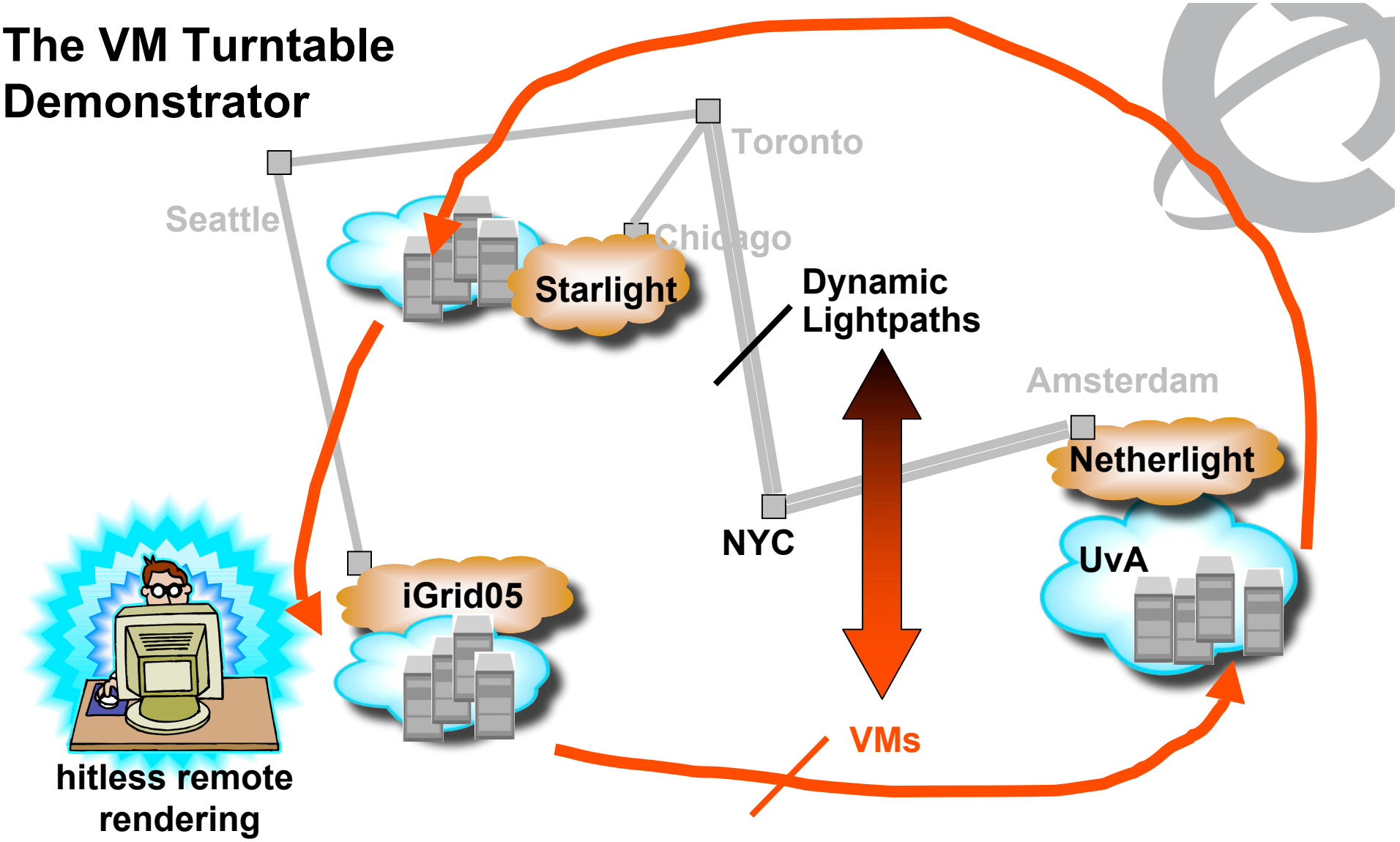
CdL

GRID-Colocation problem space



The VM Turntable Demonstrator



The VMs that are live-migrated run an iterative search-refine-search workflow against data stored in different databases at the various locations. A user in San Diego gets hitless rendering of search progress as VMs spin around

Questions ?

More info:

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iGRID2005 publication opportunity

"Future Generation Computer Systems (FGCS): The International Journal of Grid Computing: Theory, Methods and Applications" will publish a SPECIAL iGRID ISSUE in Spring/Summer 2006.

Guest editors: Larry Smarr, Tom DeFanti, Maxine Brown, Cees de Laat

We can accept around 20-25 papers, Papers will be reviewed

* Maximum paper length is limited to 8 pages
* Limit of 1 paper per demonstration.
* Describe your iGrid experiences, results and performance measurements.
* **DEADLINE for submission is ONE MONTH AFTER iGRID -> Oct 31.**

Submission must be via the FGCS website. For author guides and submission information, see <http://ees.elsevier.com/fgcs/>.

Contact: Cees de Laat delaat@science.uva.nl (need reviewers :-)