

TeraBit Lan Networking: TeraControl

www.science.uva.nl/~delaat

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SARA
TI
TNO
NCF

Simple service access



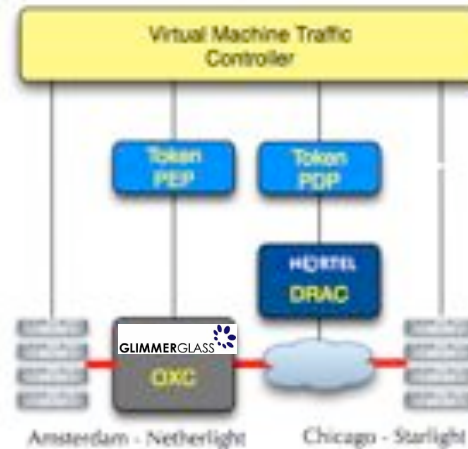
Pitlochry, Scotland - Summer 2005

Leon Gommans

Token Based Networking

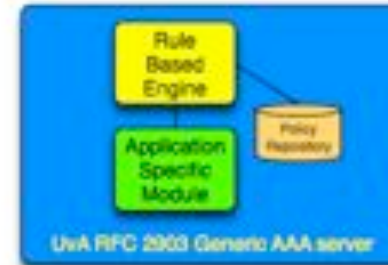
Access Control, Resource Management and Path Selection in Optical Networks using Tokens

Tokens performing Resource Management and Access Control in Virtual Machine Turntable Experiment.



Tokens will allow:

- Separation of (slow) authorization process and real time usage.
- Binding to many different types of attributes: user, time, resource, etc.
- Policy Decision to be abstracted from Policy Enforcement Point.
- Anonymous usage
- Resource Management



Tokens performing Path Selection and Access Control at Optical Inter-Connection Points



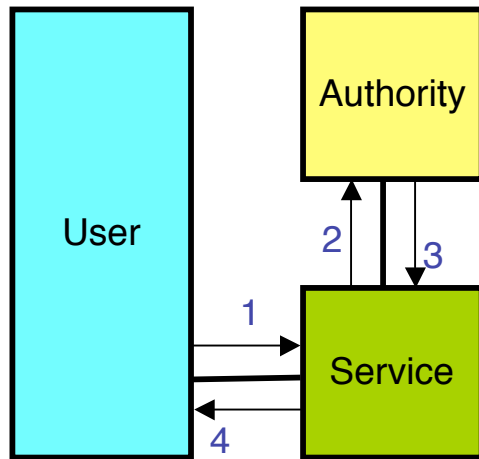
Token marked IP packets will allow:

- Economic Link Owners to assign usage rights without routing changes.
- Recognition at Inter-Connection Points (Optical Exchanges). When authentic and valid, token marked traffic will use the Link Owners path.
- Implementations that support different business models
- Hardware (NPU based) recognition rate expected to be a 10 Gb/s.



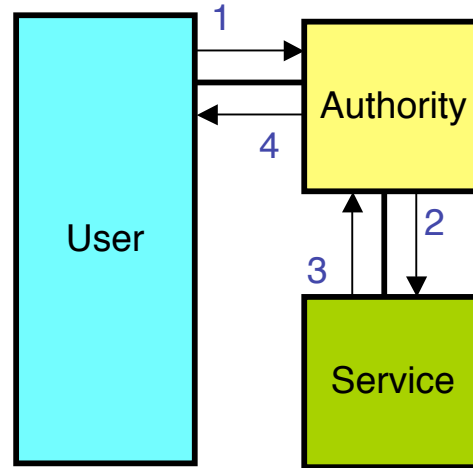
Authorization Sequences*

PULL Sequence



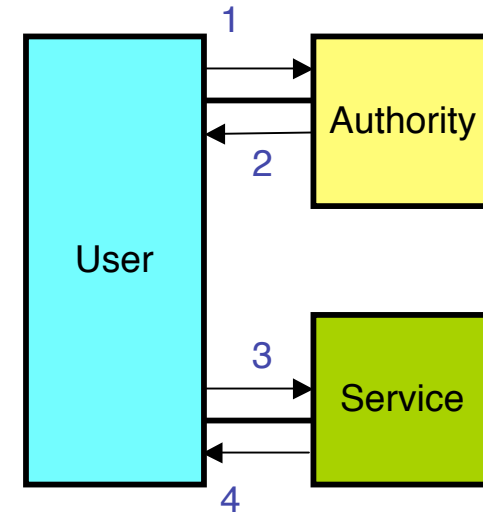
Internet Dail-in, RSVP

AGENT Sequence



Bandwidth Brokers
Lightpath provisioning

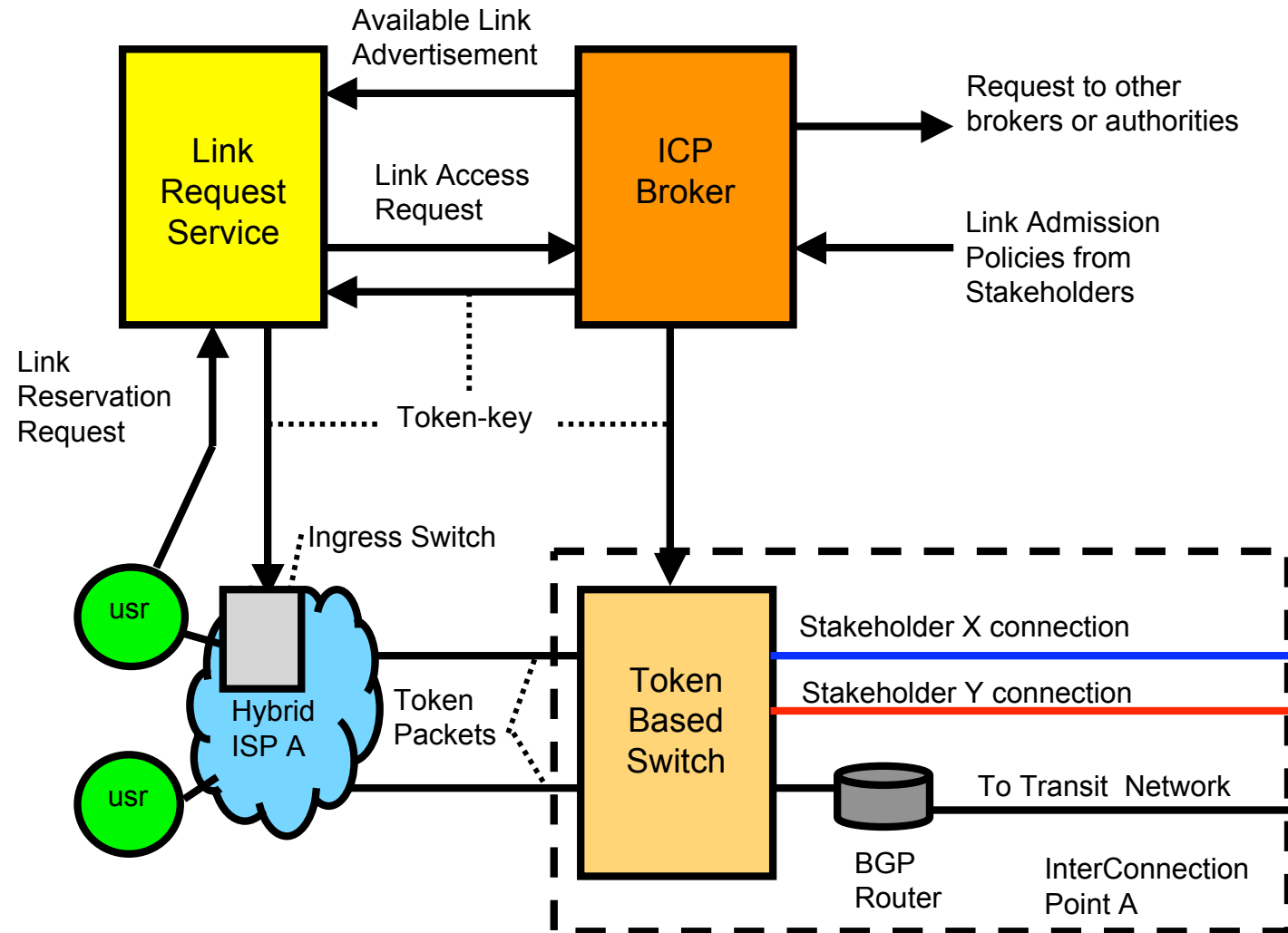
PUSH Sequence



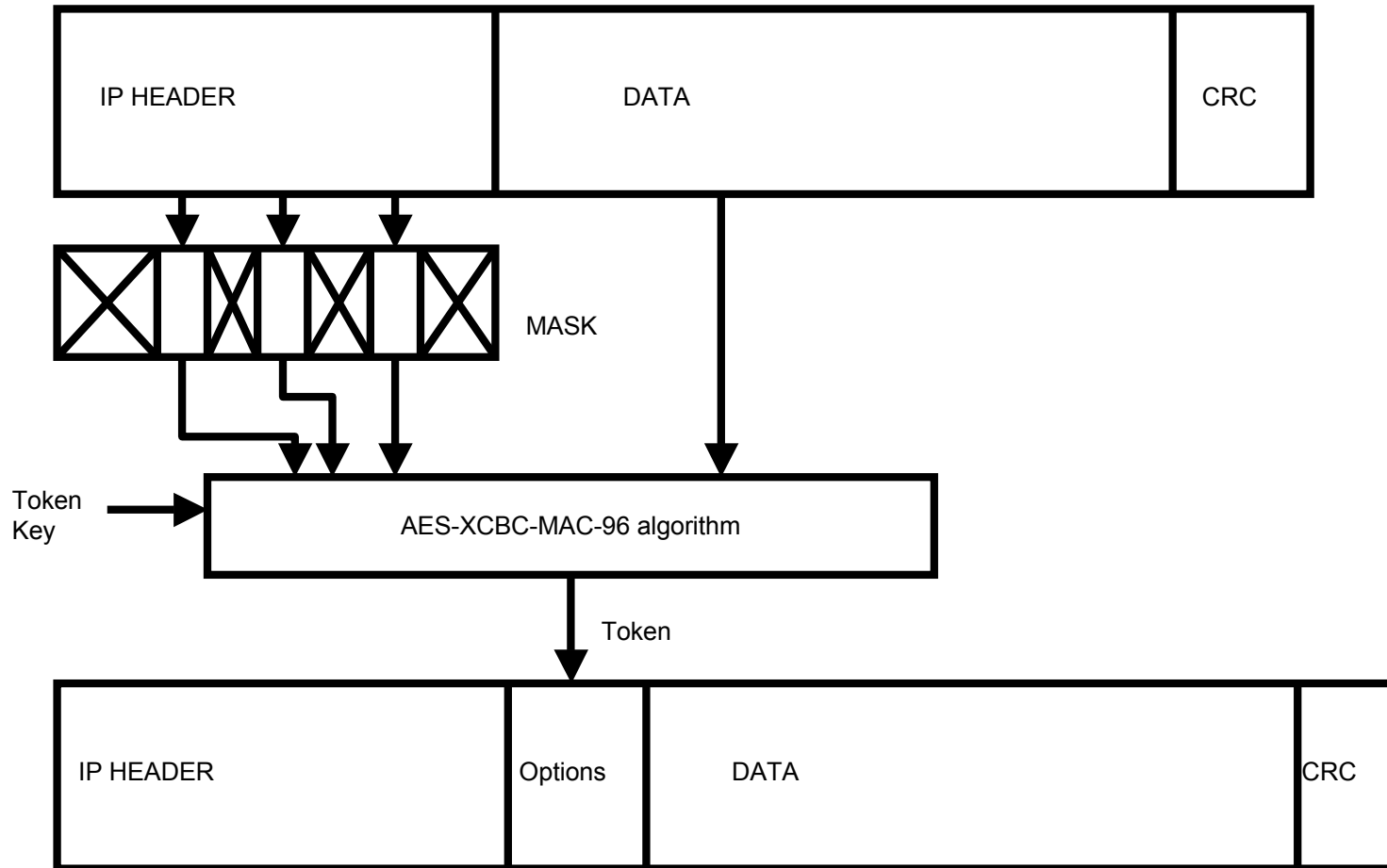
(2/3) Tokens, Tickets
Attribute Certificates,
SAML Assertions

* According to RFC 2904 / GFD.38

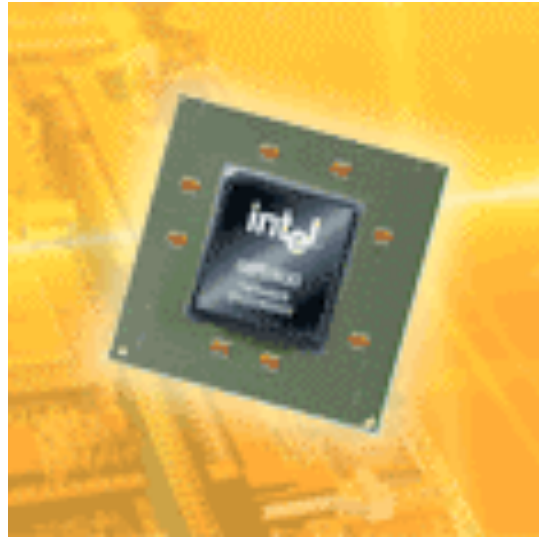
Token Switch Function at Interconnection Point



Token Switch Principle

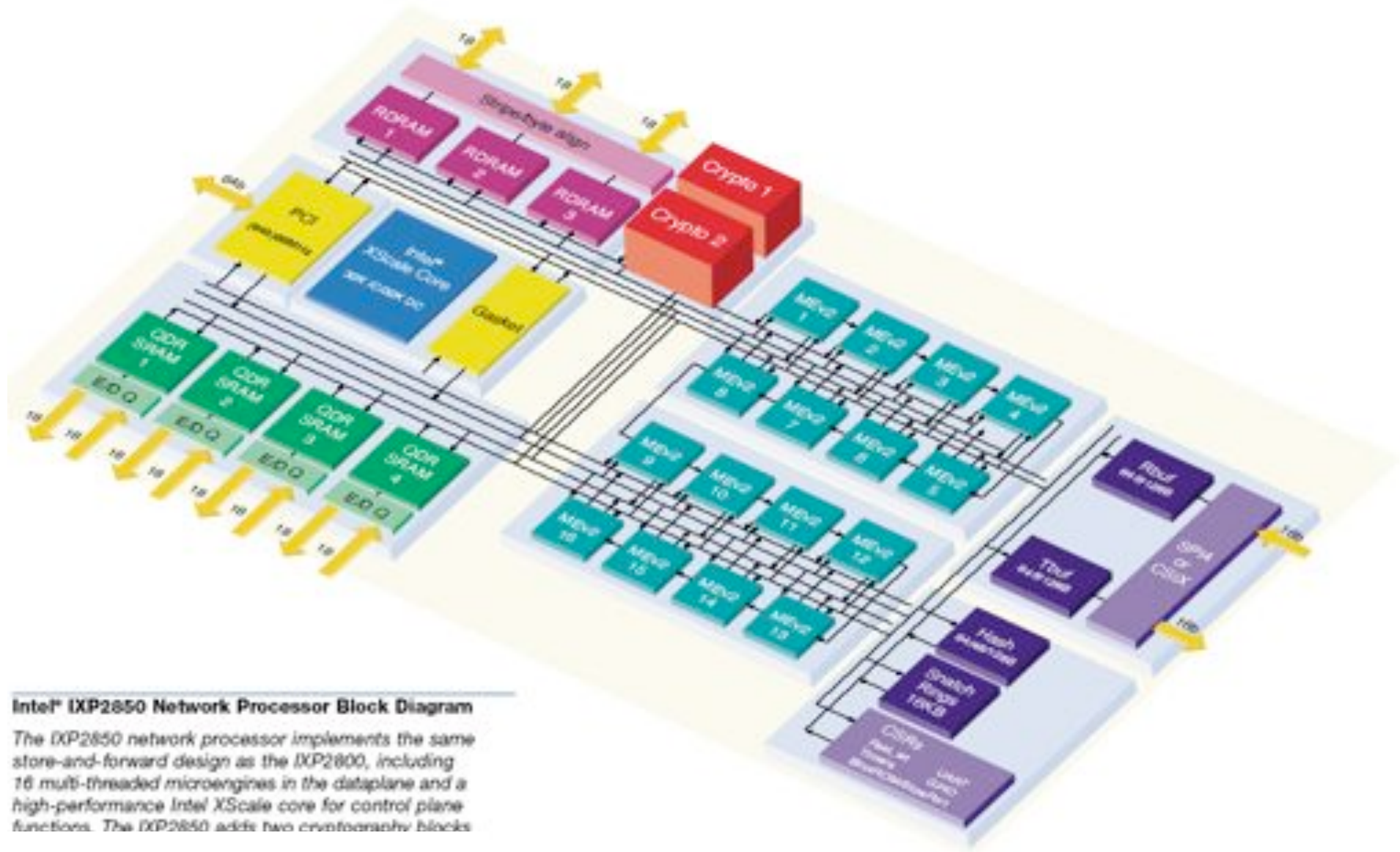


Implementation: Network Processor Units



Features:

- The IXP 2850 is able to perform packet functions at 10 gb/s
- 16 programmable Micro Engines to allow parallel dataplane processing.
- Two crypto units support bulk security algorithms (AES, DES, 3DES, SHA1)
- Designed for IPSec, however is general enough to do other things.
- Supports Cypher Block Chaining in combination with MAC.
- Expected to be usable within a Content Monitoring & Action Device (CMAD)



Intel® IXP2850 Network Processor Block Diagram

The IXP2850 network processor implements the same store-and-forward design as the IXP2800, including 16 multi-threaded microengines in the dataplane and a high-performance Intel XScale core for control plane functions. The IXP2850 adds two cryptography blocks

Principle points in TBN

- Decoupling of Authentication and Authorization from provisioning
- Real Time
- In band vs out of band signalling
- Out of band just in time provisioning



StarPlane

application-specific management of optical networks

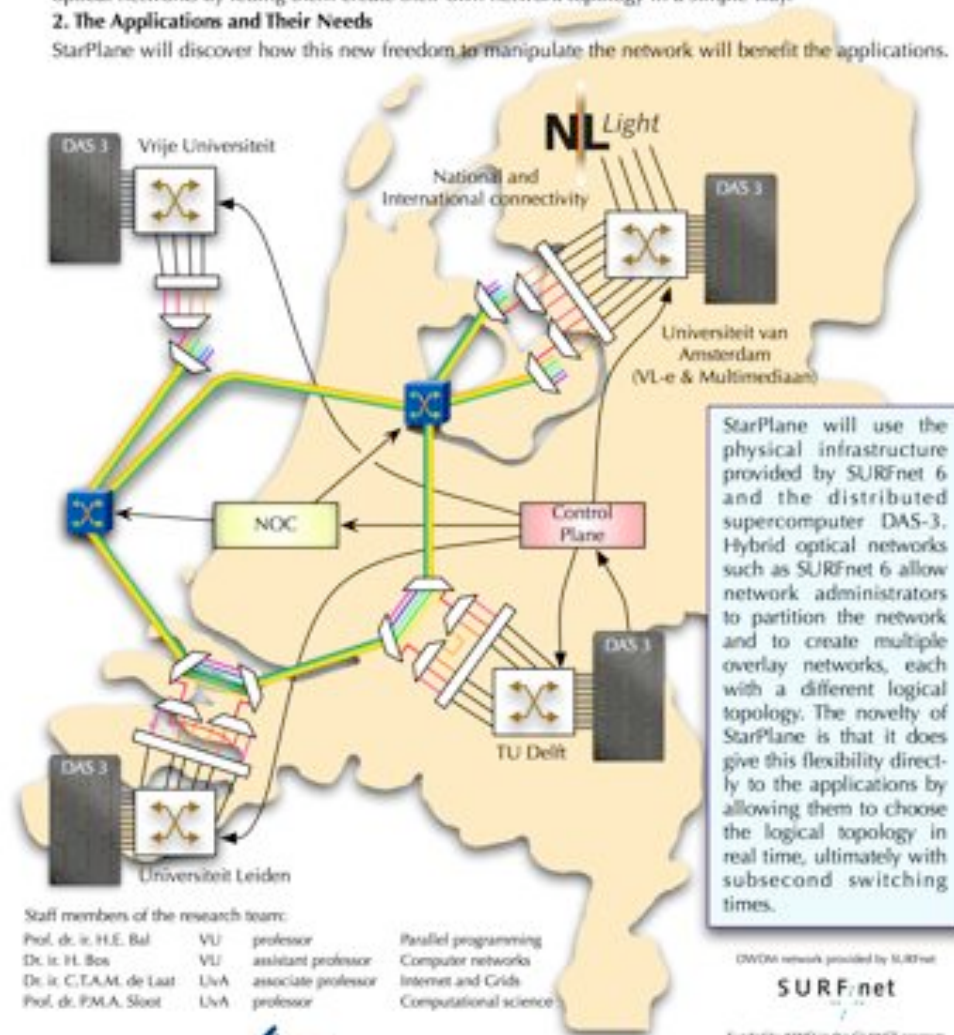
The StarPlane project addresses two concerns in optical networks:

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.



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 |

DWDM networks provided by SURFnet

SURF.net

Funded by NWO in the CLUNCE program

NWO

www.starplane.org



vrije Universiteit amsterdam



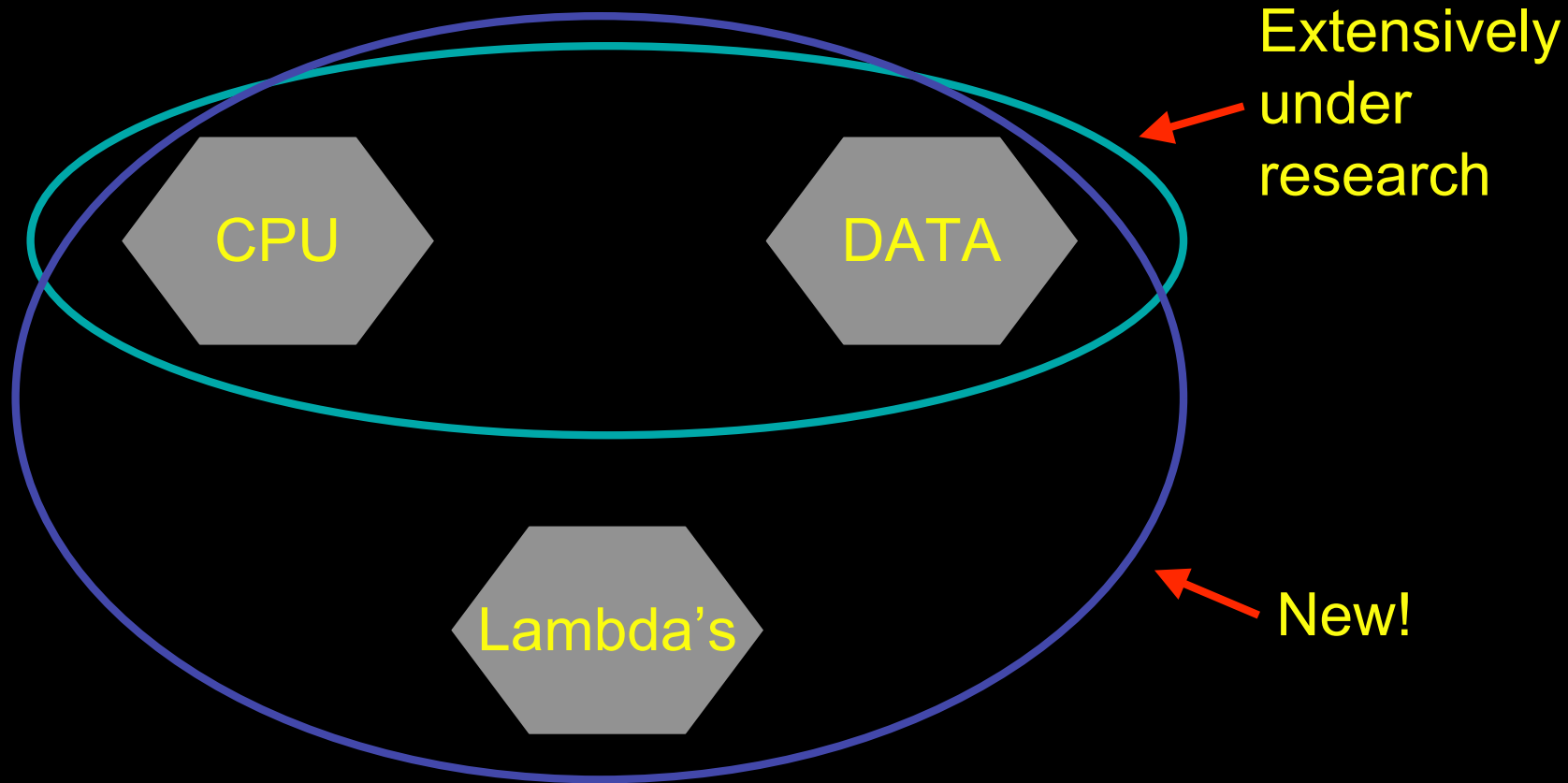
UvA **U** UNIVERSITEIT VAN AMSTERDAM

StarPlane Goals

Goals in the proposed StarPlane project:

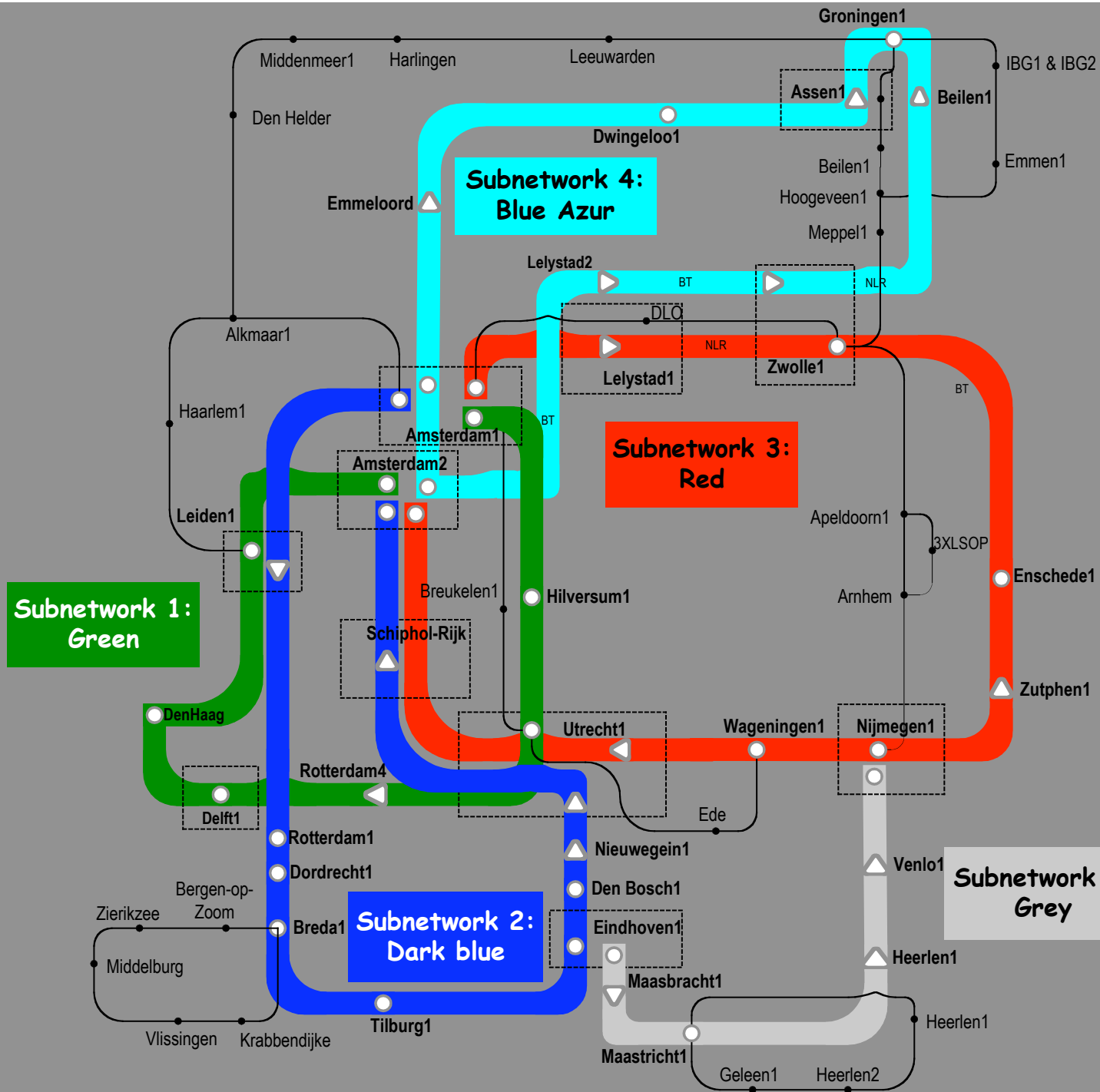
1. fast, application-specific allocation of the network resources with deterministic characteristics;
2. application-specific composition of the protocol stack that is used to control the resources;
3. low-level resource partitioning (and, hence, no interference);
4. high-level requests (whereby policies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

GRID-Colocation problem space

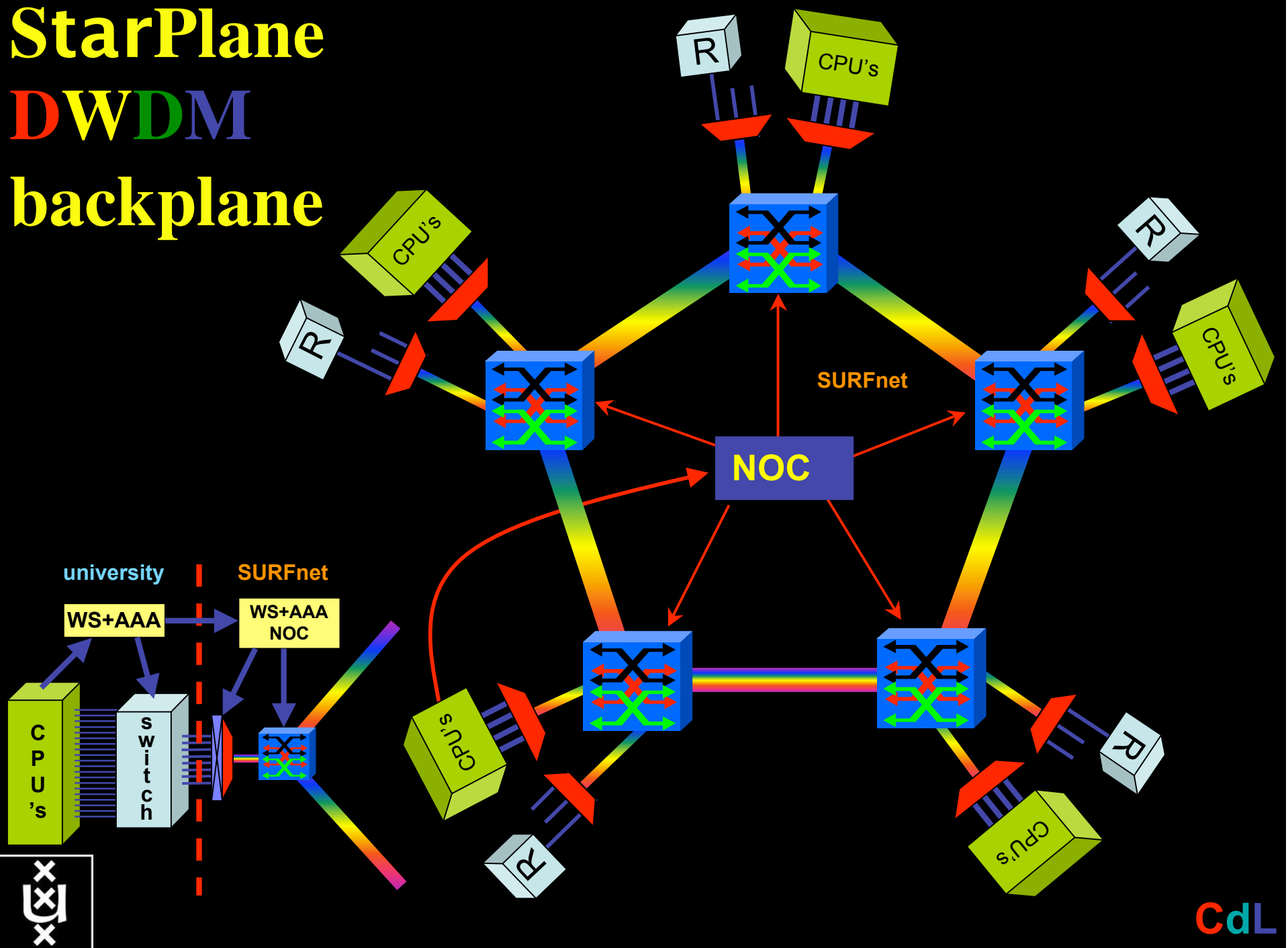


Common Photonic Layer (CPL) in SURFnet6

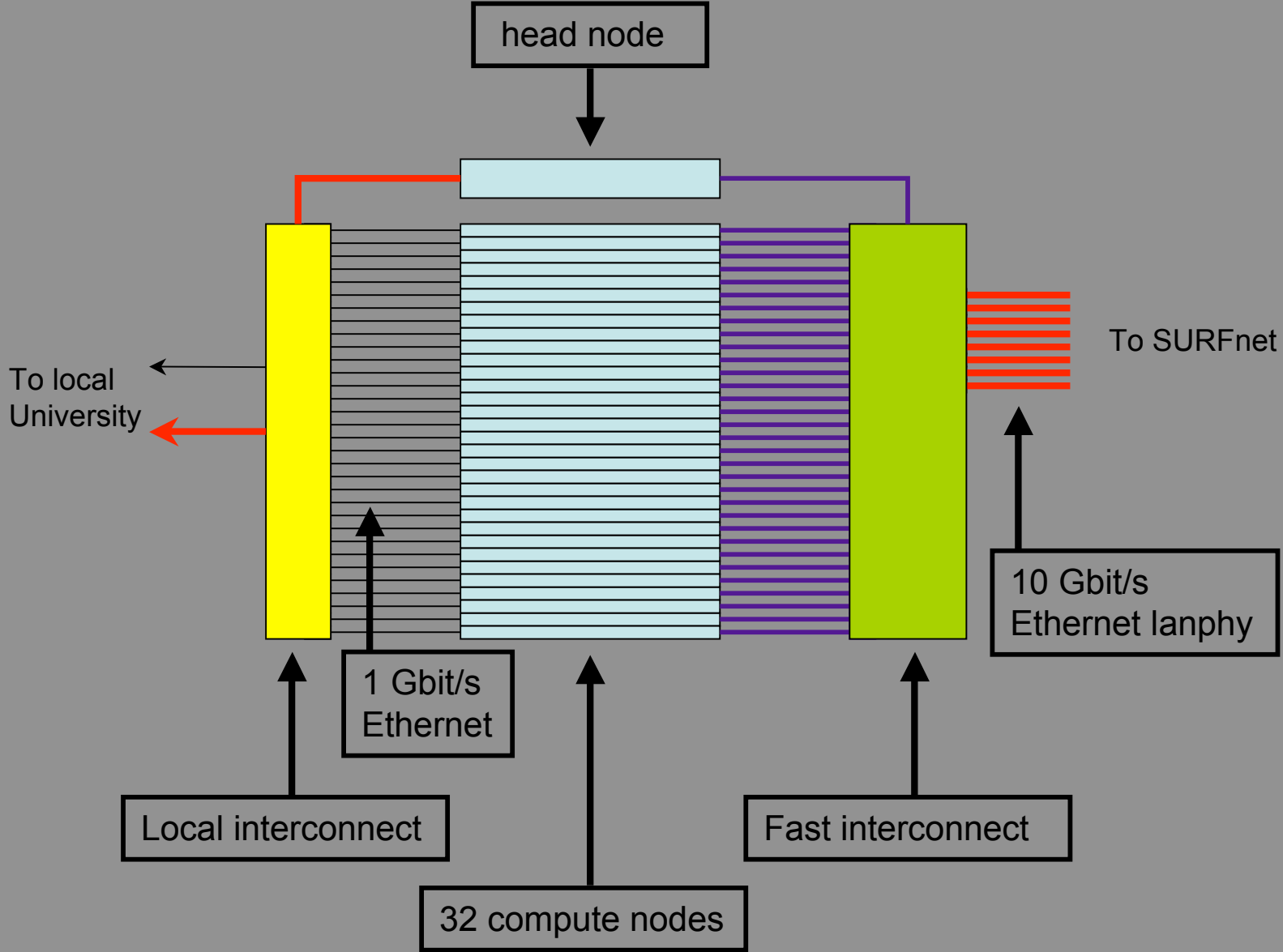
~5000 km



StarPlane DWDM backplane



DAS Cluster



Paola Grosso

Resource Brokering: Your Ticket Into NetherLight

Application architecture:



Lambda networking allows the creation of application specific light paths.

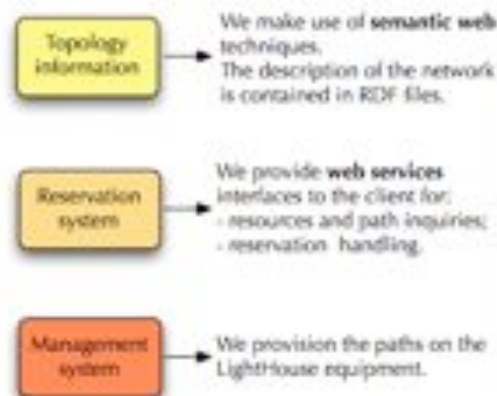
Lambda networking facilities empower users to request services and provision **end-to-end light paths** if and when they need it.

NetherLight, located in Amsterdam, The Netherlands, is one of such facilities.

The Amsterdam **LightHouse** is a joint research laboratory of the UvA and SARA.

Resources in the LightHouse can be used by collaborators to prove the concepts of hybrid networks.

Lightpath setup components:



Semantic web

The Network Description Language, an RDF Schema, describes networks in a standard, interoperable way.

Web Services

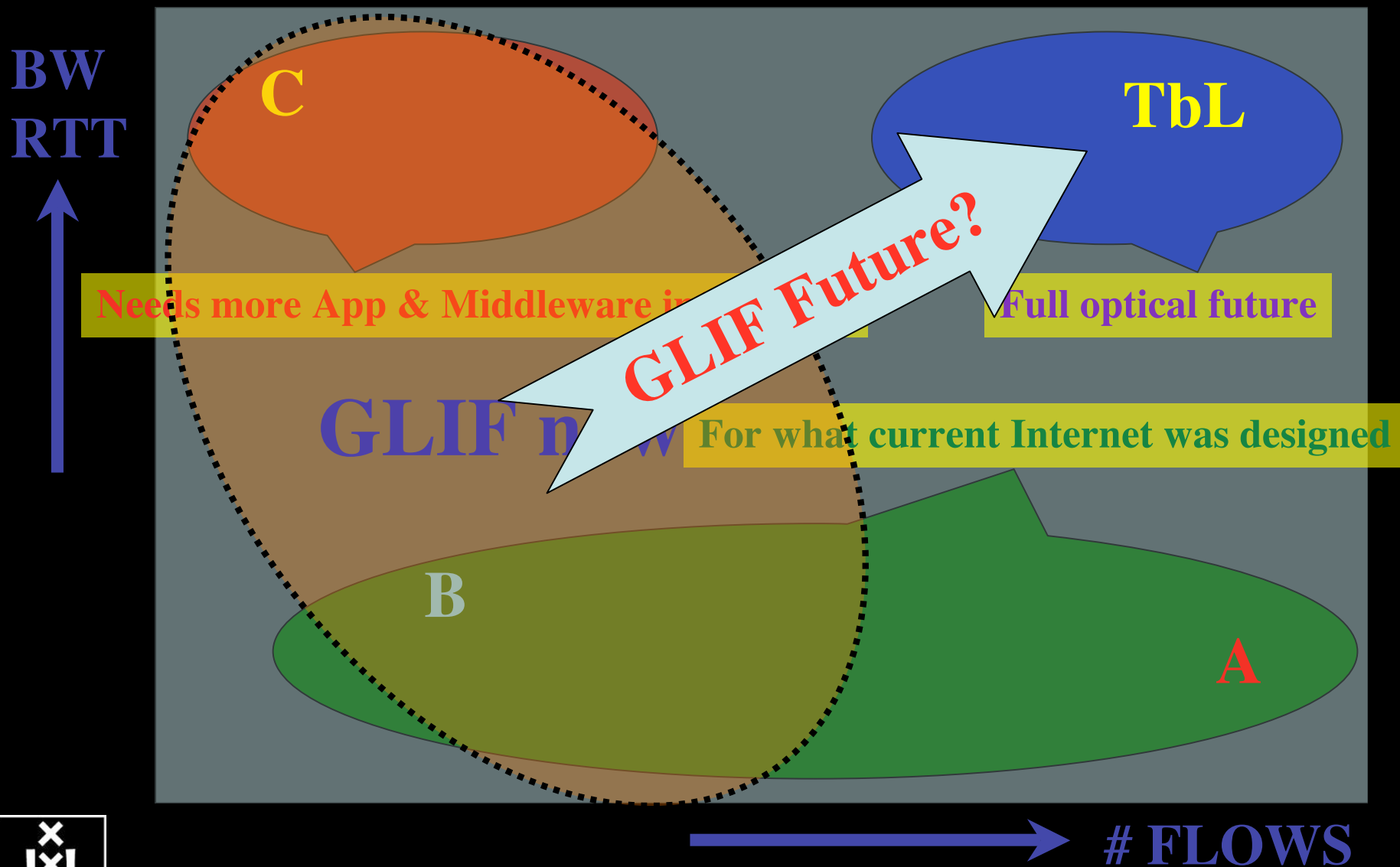
A WSDL file describes the interfaces to the service available to clients. Clients can interact with the service directly or via a portal.

Our SC|OS demonstration

We show the setup of dynamic connections between two computing nodes through the LightHouse/ NetherLight Optical Exchange.



Transport of flows



Not quite ~~FIN~~ END

Thanks to

SURFnet: Kees Neggers, UIC&iCAIR: Tom DeFanti, Joel Mambretti, CANARIE: Bill St. Arnaud

Freek Dijkstra, Hans Blom, Leon Gommans, Bas van oudenaarde, Arie Taal, Pieter de Boer, Bert Andree, Fred Wan, Jeroen van der Ham, Karst Koymans, Paola Grosso, Yuri Demchenko, Rob Meijer, VL-team.



Partially complete list:

- Caas
- Chase
- Cess
- Kess
- Case

