



**Rod Wilson, Director External Research
Metro Ethernet Networks
NORTEL Research Labs, Ottawa Canada**

October 22, 2009

Dynamic Resource Allocation Control (DRAC)



- Original concept called CO2 implying optical bandwidth content on demand as required by Applications.
- With help from Marketing it became DRAC
- Developed in 2004 by my Nortel colleagues Franco Travostino, Bruce Schofield and Inder Monga.



- Nortel Research has presented experimental evolutions of DRAC as a GLIF participant and at SC04 → SC07
- Development of DRAC has progressed over the past years, but there were insufficient market forces to expand the functionality to complete the vision.



DRAC Announcement

- In order to fully realize the potential of DRAC, to meet the needs of our R&E collaborators... and others

Nortel is announcing our intention to make DRAC available for the GLIF Community under an Open Source License

- official position is it will take 6 months
- we hope and expect to do better

A technical presentation about DRAC follows later in the 9th GLIF annual meeting agenda.

Thank You



Dynamic Resource Allocation control (DRAC)

A Brief History, where it came from, what it does and where is it going





Original Concept

- Observations

The Interaction between Apps and Nets

It is time for a new balancing act reflecting the increased sophistication in both application's demand and network's supply

Today	Tom'w
<ul style="list-style-type: none">• Total separation of concerns has met portability and scalability design goals	<ul style="list-style-type: none">• Applications see the net as a 1st class manageable resource (akin to <u>cpu</u>, storage)
<ul style="list-style-type: none">• Applications "see" the network through peepholes like TCP CC (ubiquitous) or RAPI-like control (limited, with dialects)• End systems and providers are latched onto independent evolution curves	<ul style="list-style-type: none">• Applications exploit net info surfacing through a semi-porous layer• Applications can directly drive net resources within an envelope• Software constructs aptly handle polymorphism and dynamic feature introspection• Providers move up the value chain in synergy with end systems' curve

NORTEL NETWORKS

NORTEL NETWORKS CONFIDENTIAL

08/01/2003
CO2 project - 3



The CO2 project

Goal: Re-define the interface between applications and network.

Applications to directly drive network resources within an envelope, while continuously absorbing custom reports on operational status.

- ▶ CO2 abstracts the network's "knobs and dials" and exposes a programmatic access to them (i.e., no point-and-click), while shielding application investments from network churn (e.g., due to different knobs, different network gear)
- ▶ CO2 acts as a virtual, "hands-free" patch-panel bridging N partitions of a data center with the M network paths to its on-demand users
- ▶ CO2 gives applications the means to schedule connectivity, define logical VPNs, monitor SLAs, receive custom notifications from the network, etc.

CO2 features includes

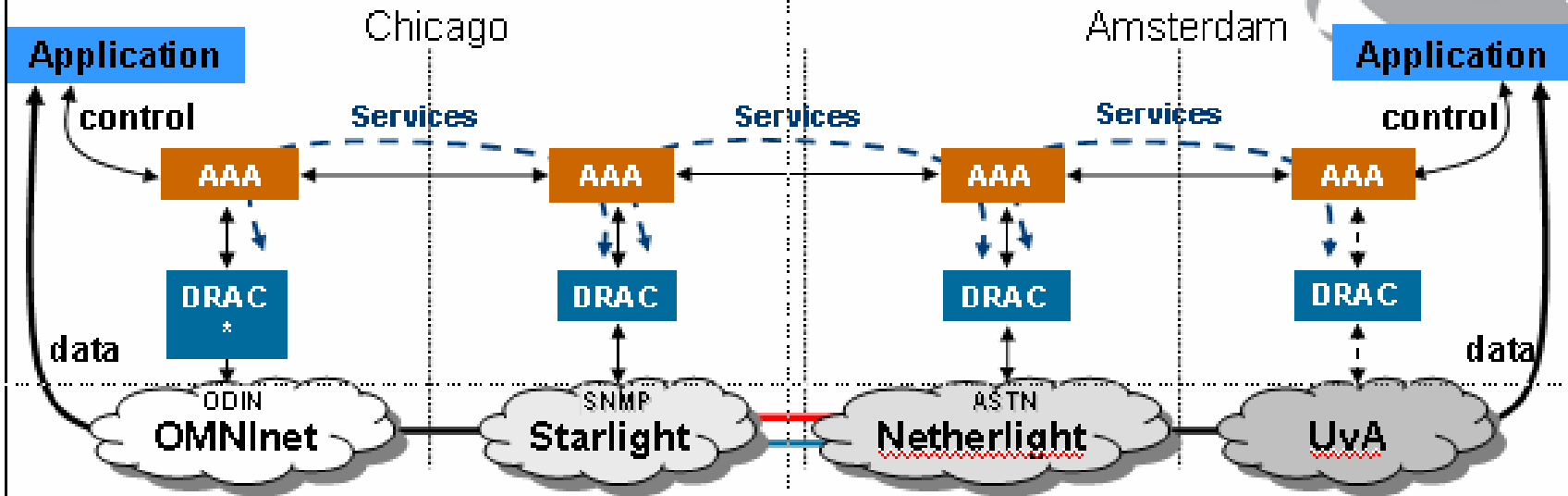
- ▶ Custom QoS management including scheduled connection service, client-operated optical VPNs, SLA monitoring and verification, differential pricing, custom error notifications, diversity formulations, bandwidth defragmentation, 3rd party scripting
- ▶ Upward de-coupling (from the application, via XML, CIM) and downward de-coupling (from the network, via pluggable signaling elements)

DRAC Taxonomy



SC2004 CONTROL CHALLENGE

NORTEL NETWORKS
BUSINESS WITHOUT BOUNDARIES



* Dynamic Resource Allocation Controller

- finesse the control of bandwidth across multiple domains
- while exploiting scalability and intra-, inter-domain fault recovery
- thru layering of a novel SOA upon legacy control planes and NEs

CANARIE
NETWORKS • COLLABORATION • RESULTS
RESEARCH • COLLABORATION • RESULTS

GigaPort

glif

ICAR

INTERNET2
www.internet2.edu

NL Light

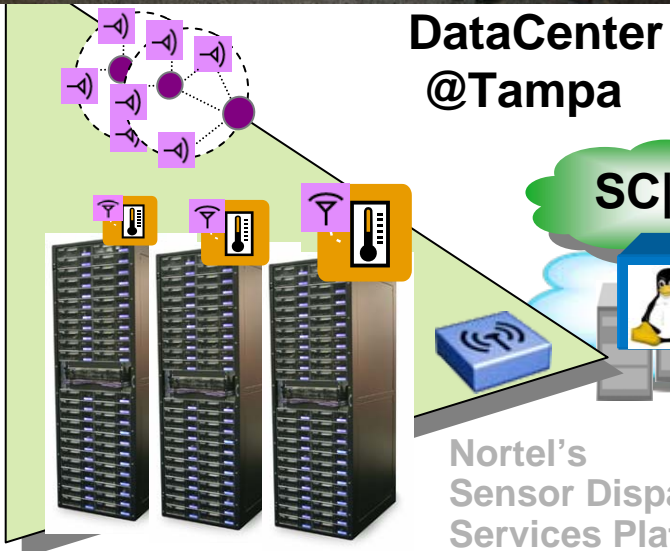
STARLIGHT™

SURFnet

UvA

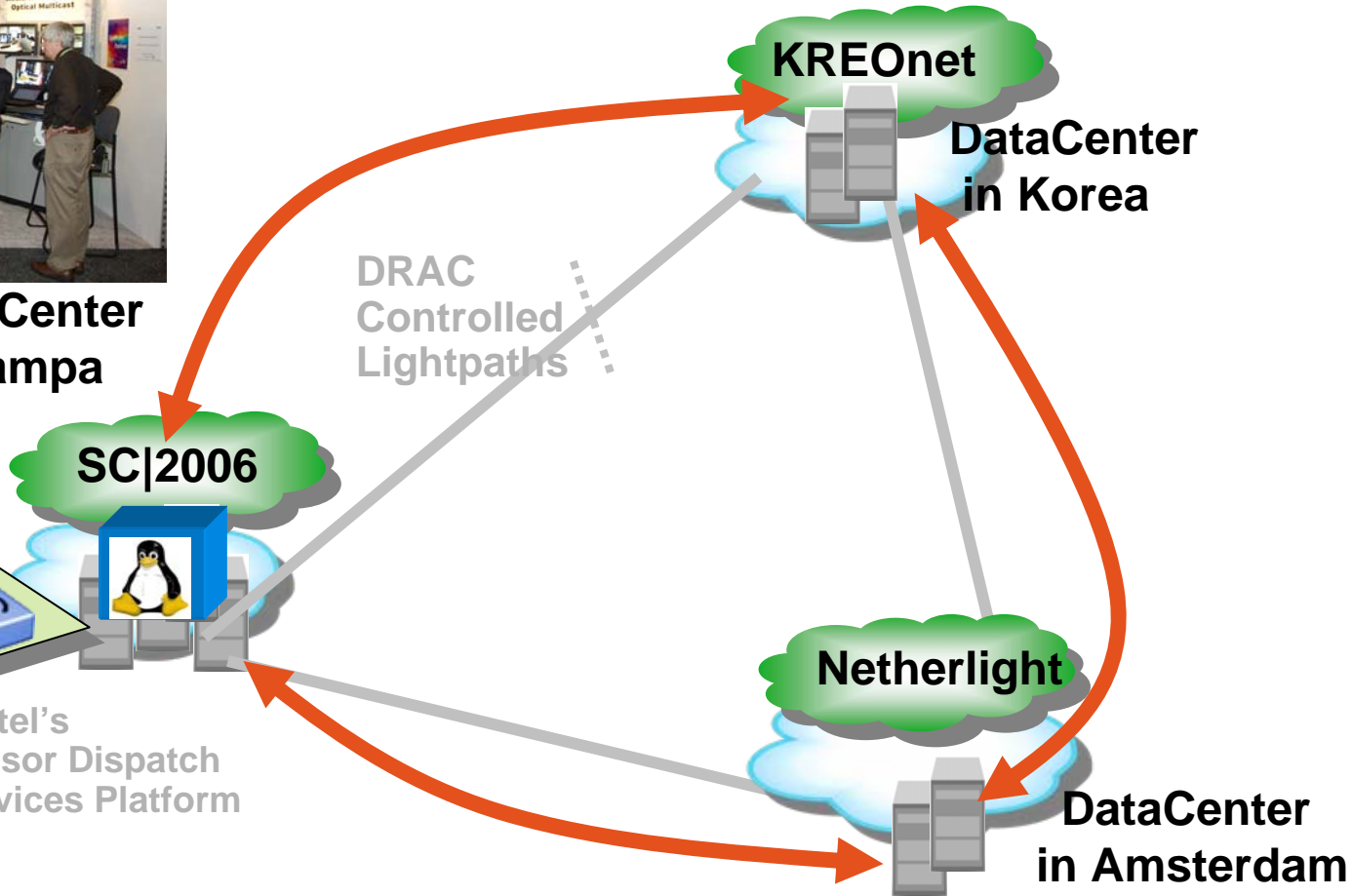
UNIVERSITEIT VAN AMSTERDAM

The SC06 Demonstrator



DataCenter @Tampa

Nortel's
Sensor Dispatch
Services Platform



Computation at the Right Place & Time!
We migrate live Virtual Machines, unbeknownst to applications and clients, for data affinity, BC/DR, load balancing, or power management



Activities to Precede Going Open Source



- Tutorial/Instructional Material
 - As html or apt (almost plain text) file snippets
- Review, approval of Nortel Business Administrators
- Architecture/Philosophy documentation
 - - overall architecture & philosophy & history/vision
 - - document/list of items to fix or improve
 - e.g. RMI vs socket messaging (currently we use a mix of both), OME control plane support, Limitations
- Code preparation in accordance with license requirements
- Define the (collaborative environment) organization of the first year
- Security audit to ensure safe and controlled user access to the network resource.