SC09 Holland Avond
The Power of Change!

Cees de Laat

University of Amsterdam





Themes for next years

- 40 and 100 gbit/s
- Network modeling and simulation
- Cross domain Alien Light switching
- Green-Light
- Network and infrastructure descriptions & WEB2.0
- Reasoning about services
- Cloud Data Computing
- Web Services based Authorization
- Network Services Interface (N-S and E-W)
- Fault tolerance, Fault isolation, monitoring
- eScience integrated services
- Data and Media specific services

Alien light From idea to realisation!



40Gb/s alien wavelength transmission via a multi-vendor 10Gb/s DWDM infrastructure



Alien wavelength advantages

- Direct connection of customer equipment⁽¹⁾
 → cost savings
- Avoid OEO regeneration → power savings
- Faster time to service^[2] → time savings
- Support of different modulation formats⁽⁾
 - → extend network lifetime

Alien wavelength challenges

- Complex end-to-end optical path engineering in terms of linear (i.e. OSNR, dispersion) and non-linear (FWM, SPM, XPM, Raman) transmission effects for different modulation formats.
- Complex interoperability testing.
- End-to-end monitoring, fault isolation and resolution.
- End-to-end service activation.

In this demonstration we will investigate the performance of a 40Gb/s PM-QPSK alien wavelength installed on a 10Gb/s DWDM infrastructure.

New method to present fiber link quality, FoM (Figure of Merit)

In order to quantify optical link grade, we propose a new method of representing system quality: the FOM (Figure of Merit) for concatenated fiber spans.



Transmission system setup

JOINT SURFnet/NORDUnet 40Gb/s PM-QPSK alien wavelength DEMONSTRATION.



Test results



Error-free transmission for 23 hours, 17 minutes + IKR < 3.0 t018

Conclusions

- We have investigated experimentally the all-optical transmission of a 40Gb/s PM-QPSK alien wavelength via a concatenated native and third party DWDM system that both were carrying live 10Gb/s wavelengths.
- The end-to-end transmission system consisted of 1056 km of TWRS (TrueWave Reduced Slope) transmission fiber.
- We demonstrated error-free transmission (i.e. BER below 10-15) during a 23 hour period.
- More detailed system performance analysis will be presented in an upcoming paper.

NORTEL





NET

INTERNO: II "INTERNOTAL IOUTIDIATION CHE INVESTIGATIONI CONTRETA LA CONTRETA L

DAS-3 Cluster Architecture



Power is a big issue

- UvA cluster uses (max) 30 kWh
- 1 kWh ~ 0.1 €
- per year
- add cooling 50%
- Emergency power system $\rightarrow 60 \text{ k} \in /\text{y}$

-> 26 k€/y

- -> 39 k€/y
- over 4 year = 240 kEuro for a 500 kEuro set.
- per rack 15 kWh is now normal
- YOU BURN HALF THE CLUSTER OVER ITS LIFETIME!



DAS-4 Proposed Architecture





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







Visualization courtesy of Bob Patterson, NCSA Data collection by Maxine Brown.

CosmoGrid

Supercomputing Grid across Continents and Oceans

And yes, it works!

Application

he signal mount of the states by top means secondary prototy in the Controllect second. Not it of least state material prime above primes and it to particle a data name annuality using superconsulent or the conference

a the investor as on its contribution 1 total that means house a physic be sed notice particles who a parallel ree. carlots read in heriz ching pict Taul764. The sequence intelessy the control and the second resides and the second terminal The imageness which and the second and substant of \$5040 at 2 States painting taken related

ant giving his comprised to comout the scientific informations the local division of The independent lists into the state of state 1871 canterenter, or one and adaptivations increasing \$407 International distances in party Contraction of the Propage Public at series

and Collegest-manifest-Addr. roles (Manalast Research in Includence and Associations, April 1



The local division in which the

al design of

11111

Motivation

the car of these is instants for only one communications at the Converting proprily others convertinglish fellowy operations tell an plot of paperson particular by Tarl probability of on removing. In more tail and an anguar of the restricts have partie of Controlled, an owned pressnang canary derive had suggestin him and to an example intervention satisfy the institutermine of semants, because dance for indexingly tomath, when strong the same "the accenticipation on the last hold in fact administration and address only

Marty logarithmeters label 4 latter named and reporterious state tak and address in the others, without ton it that particular thanhow installing and generating a feature way in NAMES OF TAXABLE PARTICIPALITY OF TAXABLE PARTY. application in at main think to go the content of Street to a state and response consular and when and shat hears in manyhear The National of An Investige Advision, a the largest succession where where company, but applications, logal of incertenting will be study incommunat the maker series into





_



In research the party leases of 107 their because the lands of offering approximation, one souther in The Approximation, the other In Particular Travel August Information and continuated with 4 10 Mar. 4. where. The cluster bid mise for the campoints in 17.8 years

and the country of 102 has any chattange contraction, where and stand the assurer finduated and the designation of the pathonesis he had not a state when it will be

when it has a private the second Out many place introduced performance. when saving them downloss assumedly for states includes them.

No. and respect MPROD in p. productor and every strong a Conversion out p trained an end for integers superschools in Anasolam and he Gran Augustustupules in Talays, & like rul, the which the second the second selectores, why he contentrated. the prosticing dated one legitly of the

and execution from

Related work and future

he we statement that there is not built the WACH MANY property states, 1.64 - Officerum, cont. multimeter stor surnaut plants saultant, with making and if he some tift many or the lotters. The case officiency in name which take and the barry has so for that the party of the specific a site solid stand change where the site of a set of the a financiality imposition for the other state of the ball I to man the schedule or if a suprisonality have pretheir implementations of SMT, No. Cont. SMT and SMT(1)-1 the later that within and it in the second in the sample of the research hand.

and including the little states of the to the read him to be build also state the Constantion of the AND REAL OF THE ADDRESS and then, and the set in science incased in the o





RDF describing Infrastructure "I want"



Applications and Networks become aware of each other!

CineGrid Description Language

CineGrid is an initiative to facilitate the exchange, storage and display of high-quality digital media.

The CineOrid Description Language (CDL) describes CineOrid resources. Streaming, display and storage components are organized in a hierarchical way.

CDL has bindings to the NDL ontology that enables descriptions of network components and their interconnections.

With CDL we can reason on the CineGrid infrastructure and its services.







EDX, tritle to MDX, comp, the peril formarks property EDX, defines the services, MDX, the network oracleone and tinks. The combination of the two ontologies claimtiles the food pairs that puppert matching salvices via satisfing redexist connections.



GigaPort

Interactive programmable networks



SCARIe Programmable networks to distribute work



Last Thoughts

- Energy consumption is the main issue
- Cloud Computing as solution
- We did Hybrid networking

 now hybrid computing, what else?
- Network photonics developments

The Power of Change?

OR

The Change of Power!

sc09.delaat.net

Questions?

University of Amsterdam ASSOCIATE EDITORS P.V. Coveney University College London

> J. Dongarra University of Tennessee

EDITOR-IN-CHIEF

P.M.A. Sloot

www.elsevier.com/locate/jocs



Journal of COMPUTATIONAL ISSN NUCLEURS SCIENCE

January 2010

Volume 1, Issue 1

