

Disk to Network Streaming at 42 Gbit/s

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Outline

- ▀ Goal of the project
- ▀ 40GE and 100GE Status
- ▀ Streaming server
- ▀ GLIF demo
- ▀ SC10 demo
- ▀ Conclusions

Goal of the 40GE project

- Application to be used on SURFnet's 40G cross border fiber between Amsterdam and Geneva
- Exploring the limits of a modern off the shelf server
 - What network I/O can be reached from a single server?
- Give a demonstration at GLIF 2010 at CERN in Geneva



40 Gigabit Ethernet (802.3ba)

Type	Cable	Reach	Connector
40GBASE-CR4	twinax	~20m 1)	QSFP+
40GBASE-SR4	4 pair MMF	100m	CFP/QSFP+
40GBASE-LR4	1 pair SMF	10 km	CFP/QSFP+

1) ~20m with active cable, ~7m with passive cable

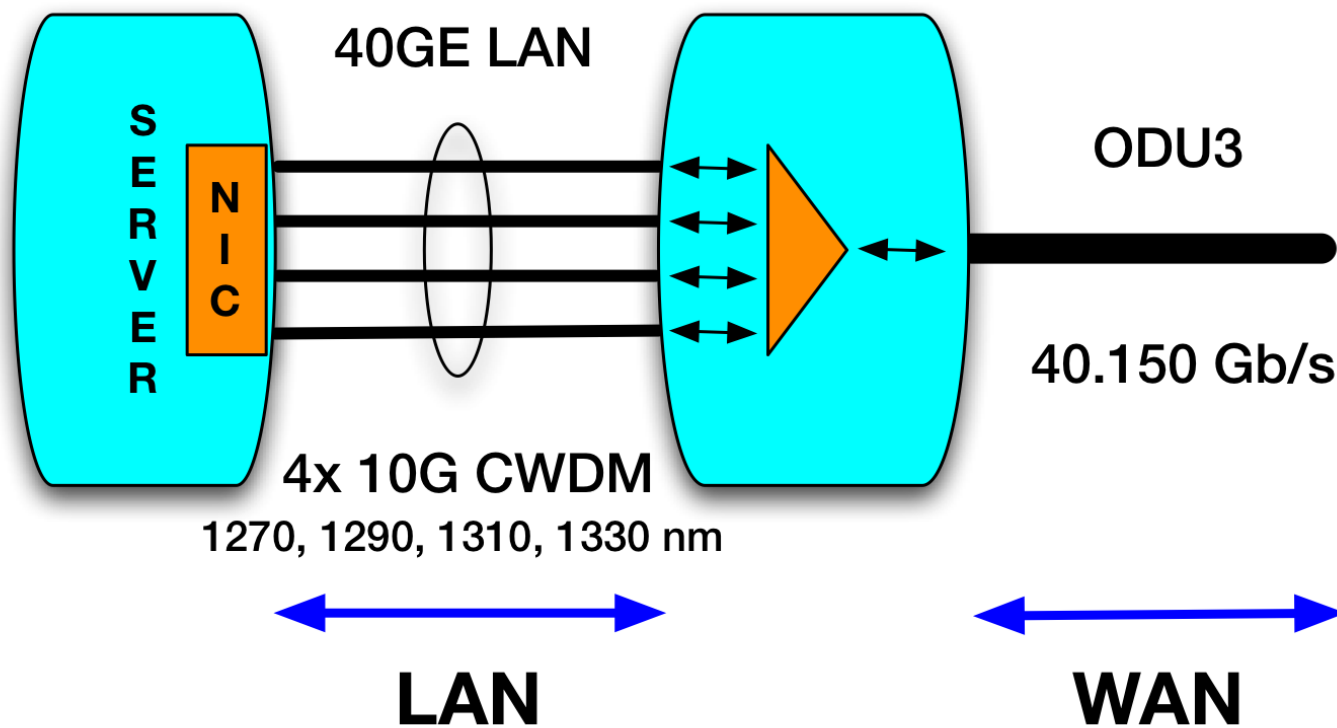


100 Gigabit Ethernet (802.3ba)

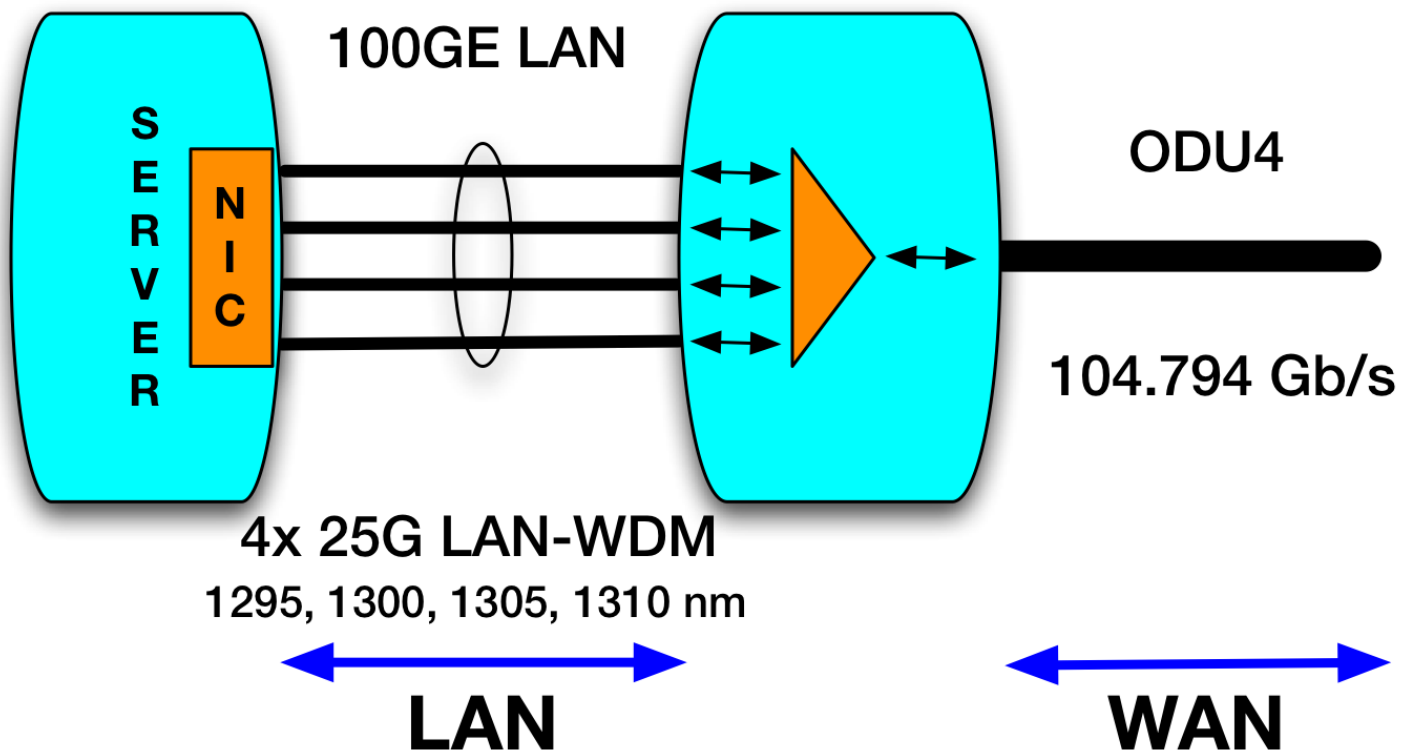
Type	Cable	Reach	Connector
100GBASE-CR10	twinax	~20m 1)	SFF-8092
100GBASE-SR10	10 pair MMF	100m	CFP/CXP
100GBASE-LR4 3)	1 pair SMF	10 km	CFP 2)
100GBASE-ER4	1 pair SMF	40 km	CFP 2)
100GBASE-SR4 (TBD)	4 pair MMF	100m	QSFP2

- 1) ~20m with active cable, ~7m with passive cable
- 2) near future: CFP2 (smaller, less power)
- 3) request for 100GBASE-LR10 (cheaper)

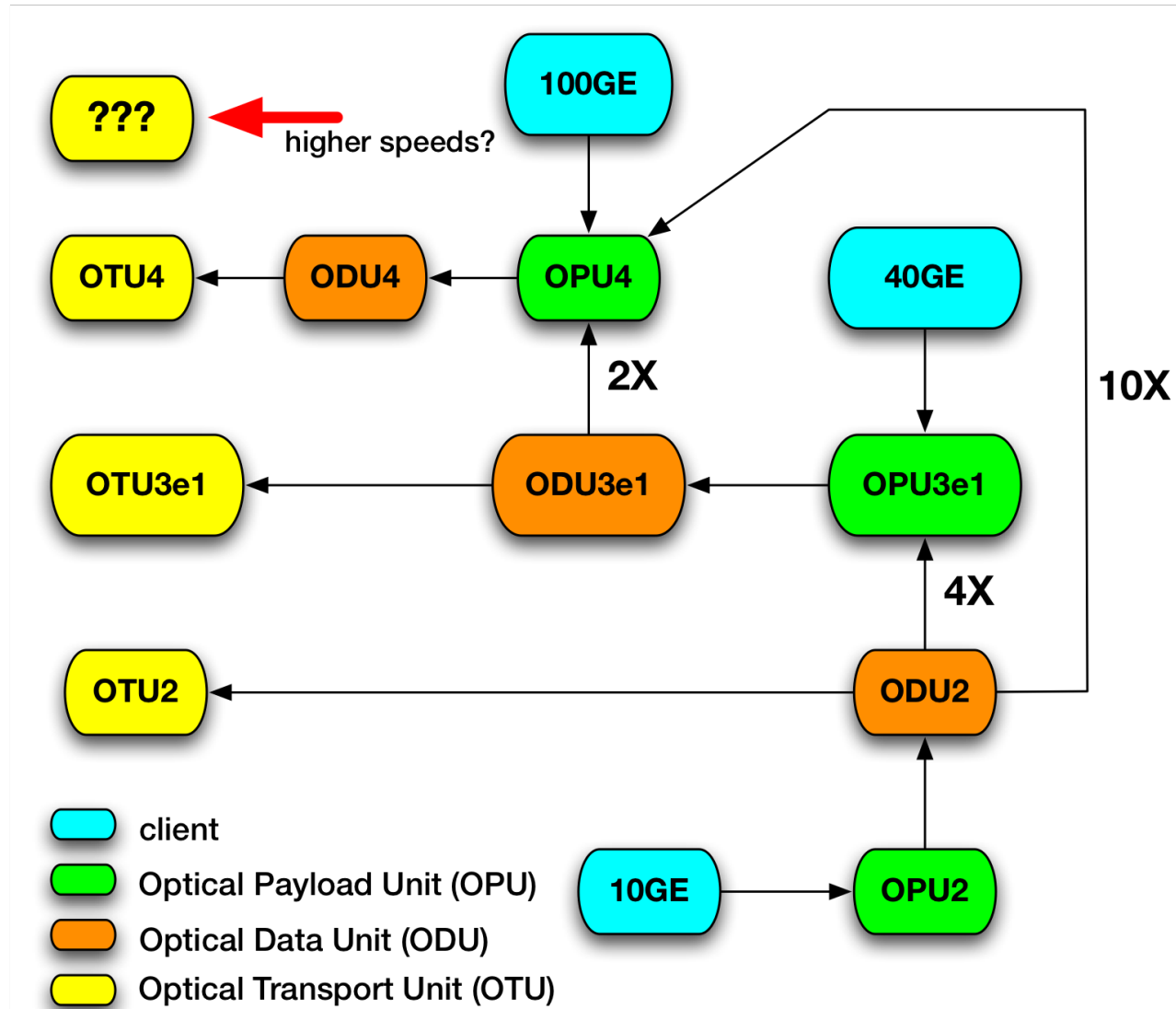
40GBASE-LR4



100GBASE-LR4

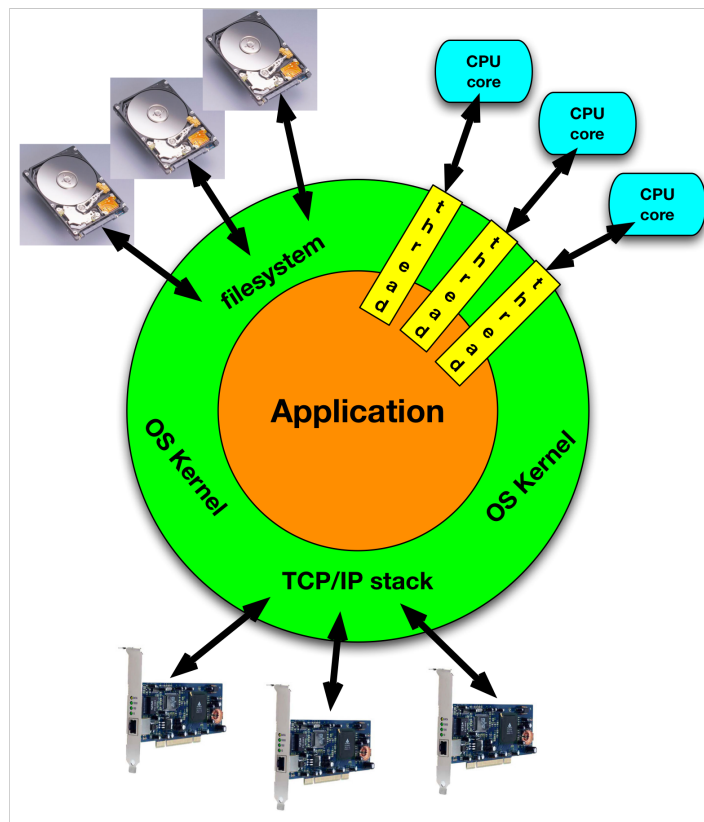


OTN Hierarchy



Multiple Disks, Cores and NICs

- Storage I/O speedup with multiple disks (RAID-1/RAID-Z)
- Compute speedup with multi-core systems
- Network I/O speedup with multiple NICs

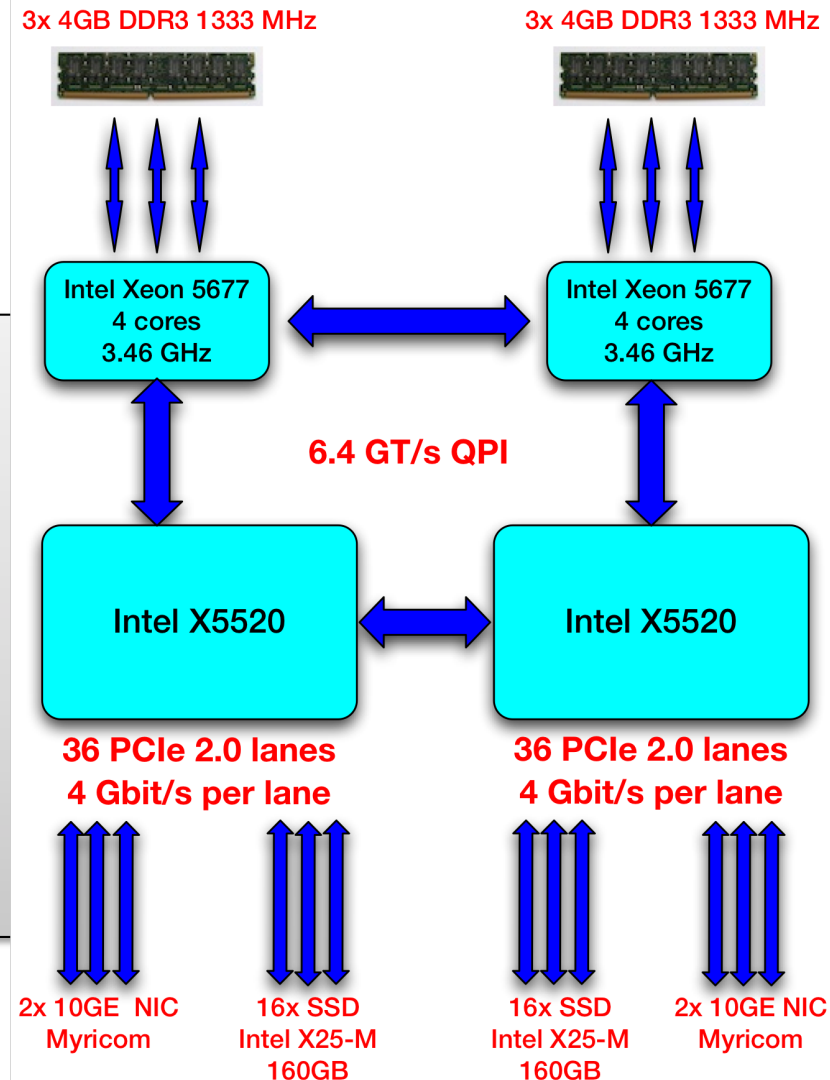




Streaming Server Architecture

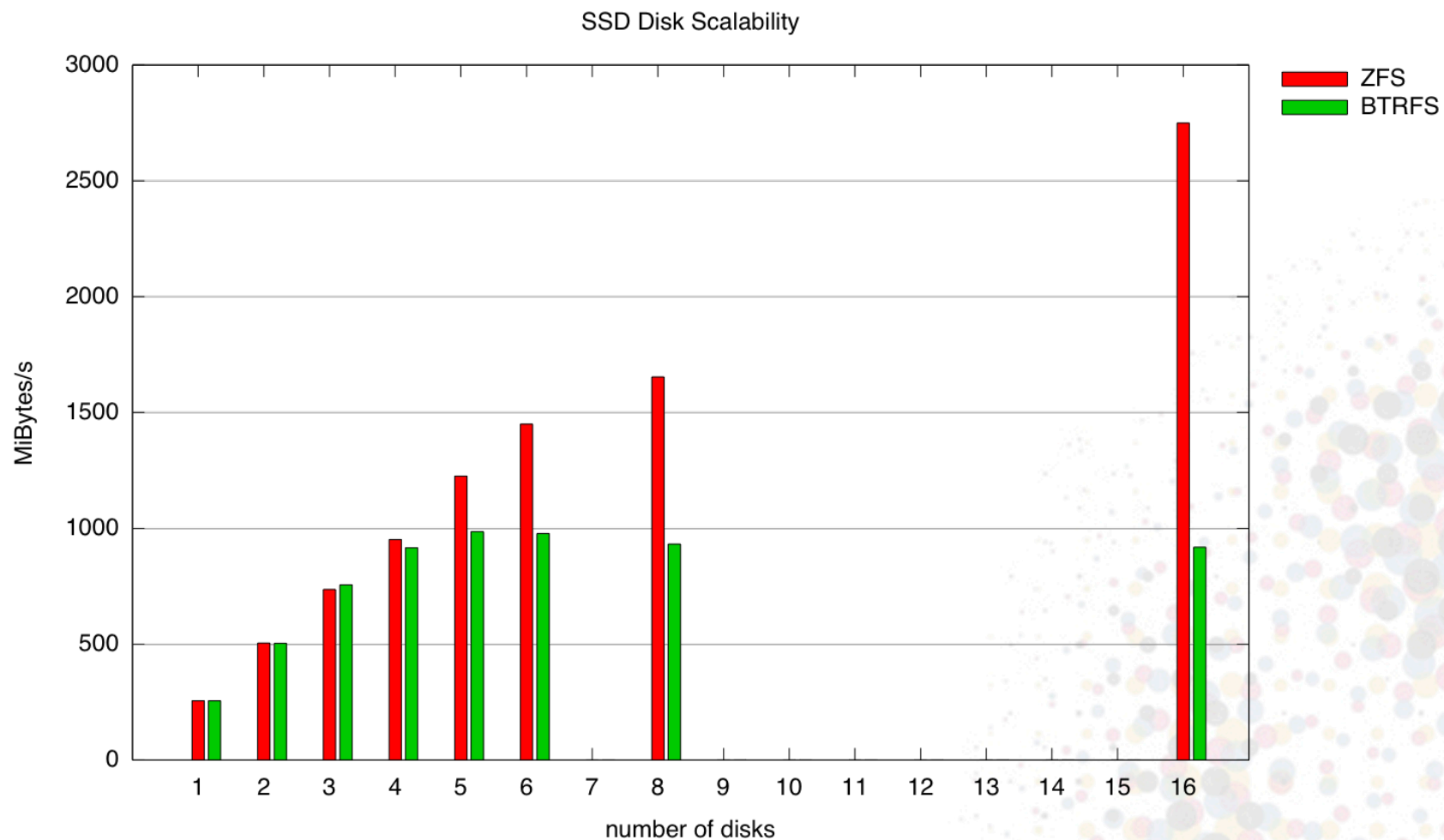
Supermicro X8DAH+-F motherboard
2x PCI-E 2.0 x16
4x PCI-E 2.0 x8
1x PCI-E 2.0 x4
8 cores @ 3.46GHz (Intel Xeon 5677)
24GB DDR3 @ 1333 MHz
4x 10GE Myricom (dual port)
32x SSD Intel X25-M 160GB

Eur 22,000 (June 2010, 50% for SSDs)





SSD Disk Scalability

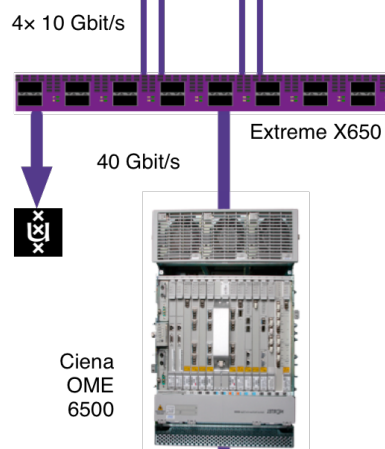
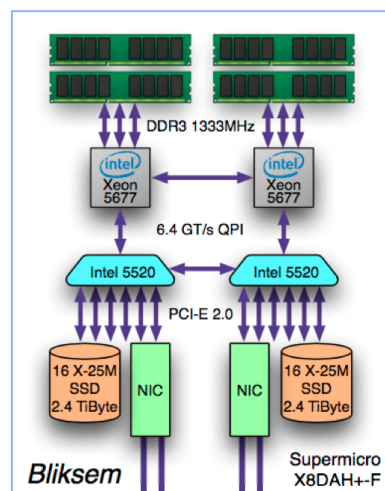


GLIF Streaming Demo

- ▀ Streaming from Amsterdam to Geneva
- ▀ From single server to 5x3 Tiled Panel Display (TPD)
- ▀ TPD has 15xLCD of 2560x1600 pixels (total 61 Megapixels)
- ▀ 15 UDP streams from 1 server in Amsterdam to TPD
- ▀ UDP streams are balanced over 4 NICs in streaming server
- ▀ CosmoGrid visualisation data
 - ▀ CosmoGrid is simulation of 2048^3 bodies of dark matter
 - ▀ Formation of clusters after big bang
 - ▀ Computed on several supercomputers, including Huygens
 - ▀ Prof. dr. Simon Portegies Zwart



Topology GLIF Demo



Science Park Amsterdam

Brussels

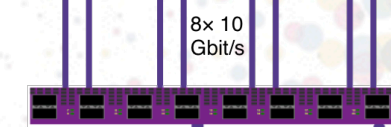
40 Gbit/s



1650 km

Paris

CERN, Geneva



Ciena
OME
6500

Relatiedagen, 8-9 dec, Noordwijkerhout



40GE Equipment

- **Extreme Networks Summit X650**
 - Ethernet switch with 24 SFP+ ports
 - 40 Gigabit Ethernet module (4 QSFP+ ports)
- **Ciena ActivFlex 6500 Packet Optical Platform**
 - TDM/WDM/Ethernet/OTN
 - 40 Gigabit Ethernet client module (prototype)
 - 40G WDM transponder module (production)
 - 4x10GE client module (production)

INLOGGEN

Het archief is tijdelijk vrij toegankelijk. Inloggen is niet noodzakelijk.

VIND EEN BAAN

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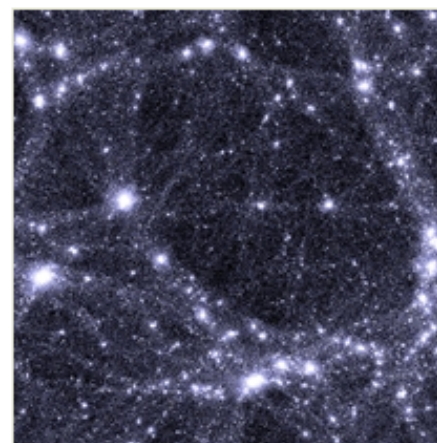
SARA breekt transmissierecord

19 oktober 2010

door: Richard Keijzer

SARA Reken- en netwerkdiensten heeft een record gebroken, door een datastroom met een snelheid van 33 Gbit/s van Amsterdam naar Genève te sturen. De recordpoging werd ondernomen tijdens de Jaarlijkse Global LambdaGrid Workshop bij CERN.

Om een dermate grote hoeveelheid informatie gedurende langere tijd over te kunnen dragen zijn wel speciale maatregelen genomen. Zo werd een dedicated glasvezelverbinding aangelegd met een [bandbreedte](#) van 40 gigabits per seconde. De optische infrastructuur werd dus bijna geheel in beslag genomen door één applicatie.





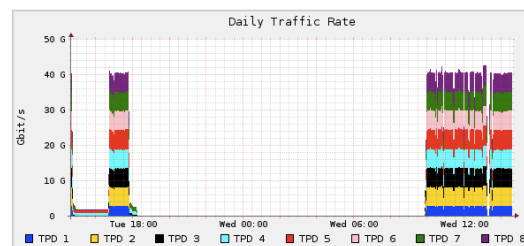
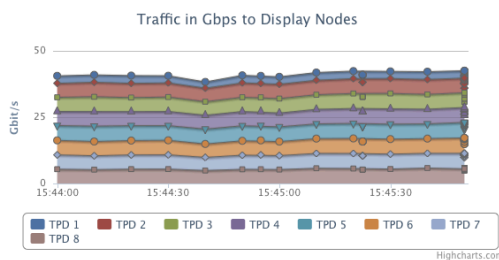
SC10 Demo



Single Server 2x 40GE Disk to Network Streaming

Live Monitoring

Network Throughput



Sending Server

6x 10GE



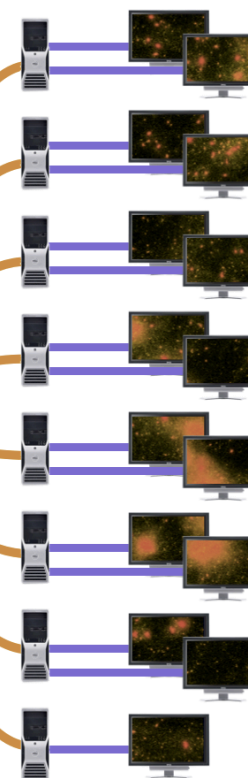
Extreme X650

2x 40GE

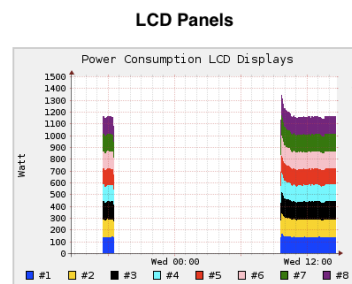
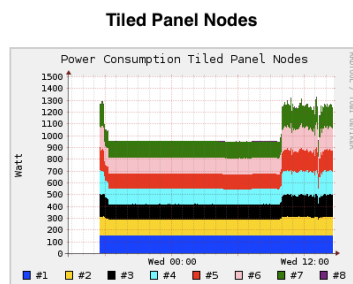
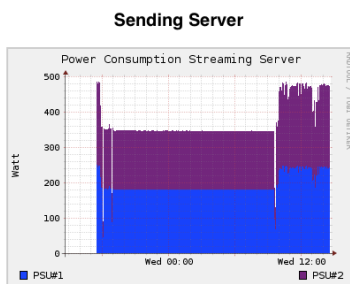


Extreme X650

8x 10GE



Power Consumption



Sponsored by:



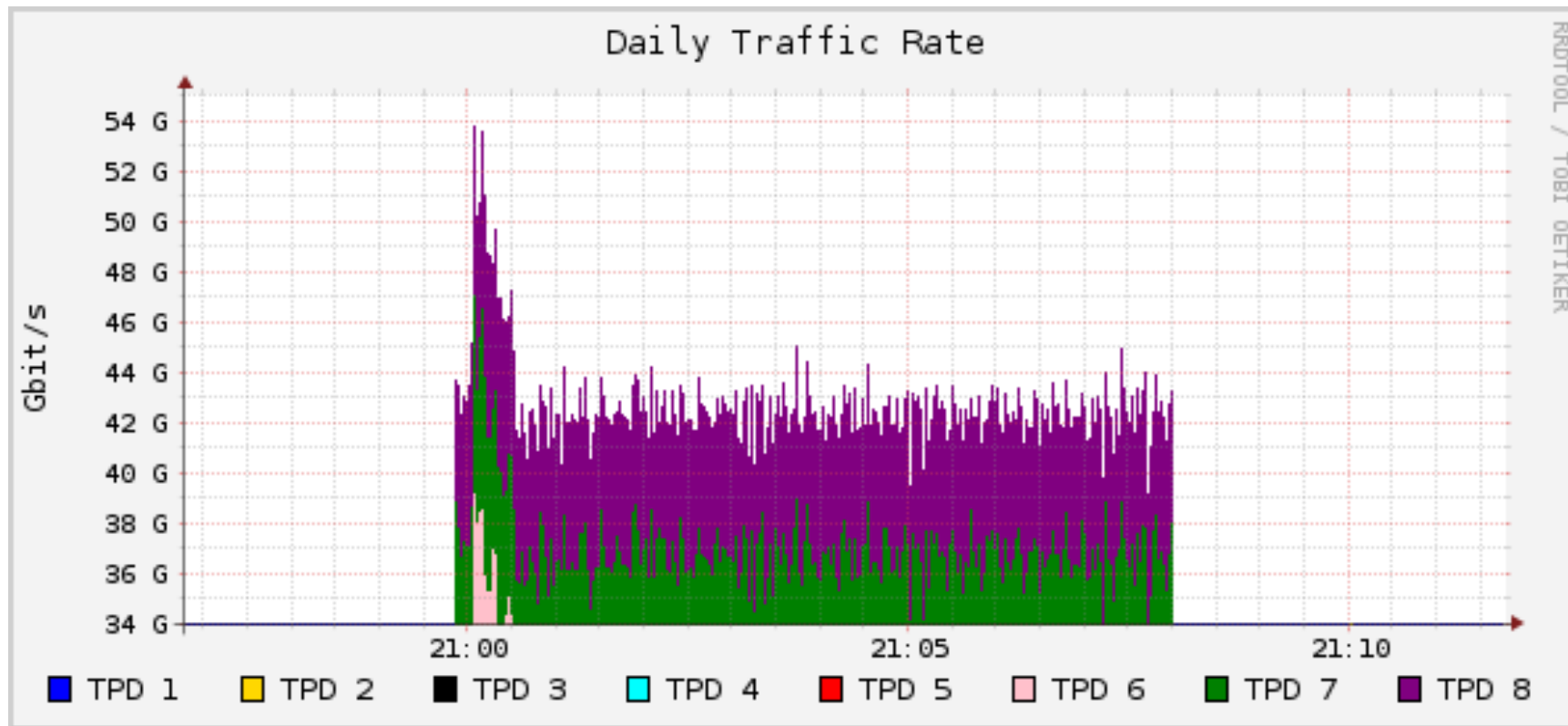
In Collaboration with:



Relatiedagen, 8-9 dec, Noordwijkerhout



Results



Relatiedagen, 8-9 dec, Noordwijkerhout



Server & Extreme X650s



Relatiedagen, 8-9 dec, Noordwijkerhout



Tiled Panel



Relatiedagen, 8-9 dec, Noordwijkerhout

Conclusions

- Modern off the shelf server can transmit 42 Gbit/s from disk to network
- 53 Gbit/s memory to network
- 40 Gigabit Ethernet not production quality yet
 - Most equipment still in beta or development
 - More interoperability testing needed
- Testing with real applications useful to find problems



Additional Information

- <http://nrg.sara.nl/>
- <http://nrg.sara.nl/publications/RoN2010-D1.1.pdf>
- <http://nrg.sara.nl/publications/40G-Applications.pdf>
- Email: nrg@sara.nl

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Thank you

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