



Next generation network management

23.04.07

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End to end QoS measurements

- Goal : Knowing the QoS by measurements
- Traditional SNMP/netflow measure volumes not quality
- Both customer oriented and engineering statistics
- User deserve end-to-end inter domain view
- Passive probes see the flows quality

Geant2 - NRNs

- 40 Gbps European backbone
 - ◆ Services : circuits, performance team (PERT)
- Development projects - 3/4 years
 - ◆ perfSonar - e2e traffic measurement protocols
 - ◆ security – attack detection – tools
 - ◆ Edugain – authentication
 - ◆ Autobahn – User controlled lightpath

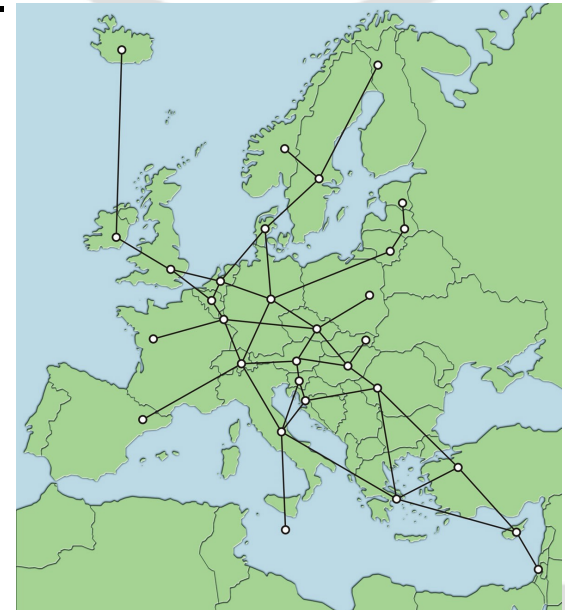
perfSonar

- Service Oriented Network monitoring Architecture – with Internet2
- Inter domain authentication
- XML/SOAP interfaces
- Lookup Service, Measurement Points, Measurement Archives, Topology Service
- European-wide measurement system infrastructure
- Edugain authentication architecture



LOBSTER

- 2 year Specific Support Action project supported by the EU project - October 2004-2007.
- Main goal: deploy a passive measurement infrastructure based on SCAMPI throughout Europe.
- SCAMPI – Tools and API(MAPI) for passive measurements (preceeding project)
- Partners:



FORTH
Vrije University
TNO Telecom

CESNET
UNINETT
FORTHNET
TERENA

ALCATEL
ENDACE
Symantec

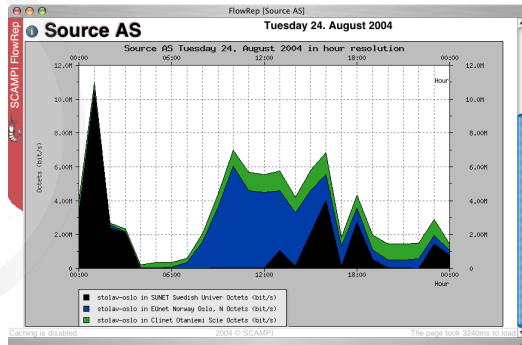
Software developed

- Common programming environment
 - ◆ Distributed Monitoring Application Programming Interface (DiMAPI)
- Sharing - Anonymization
- Applications
 - ◆ Extended flow analysis – Stager
 - ★ Subsecond bandwidth measurement(SSB)
 - ◆ Service detection - appmon
 - ◆ Polymorphic attack detector

Flow characterization

- MAPI with passive monitoring cards
 - ◆ Investigate flows in subsecond intervals
- Extended IPFIX flow records with statistics for intensity, intervals, sizes
 - ◆ Will allow us to assess quality by service and location (AS or IP prefix).
 - ◆ Research actual quality of services

Framework



Stager user interface



<http://www.ist-lobster.org>



- Flow collector based on NERD
- Stager backend

- Passive monitoring card
- MAPI

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Stager DB

Collector

Exporter

Splitter



Destination IP report

Stager - Firefox

File Edit View Go Bookmarks Tools Help

Destination IP table Standard 20 Show

All interfaces ??? In none 1

Destination IP

Monday 18. September 2006, 15:00
??? (in, 1/1)

Pie chart Plot graph

| Select | Dst IP | Octets | Rate 1 second | | Rate 100 milliseconds | | Rate 10 milliseconds | |
|--------------------------|-------------------------------------|--------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| | <input type="checkbox"/> IP address | <input type="checkbox"/> Total | <input type="checkbox"/> Max | <input type="checkbox"/> Min | <input type="checkbox"/> Max | <input type="checkbox"/> Min | <input type="checkbox"/> Max | <input type="checkbox"/> Min |
| <input type="checkbox"/> | w.x.y.z | 18.8M | 10.5M | 780k | 15.8M | 0 | 53.8M | 0 |
| <input type="checkbox"/> | w.x.y.z | 8.91M | 5.21M | 583k | 5.37M | 0 | 32.4M | 0 |
| <input type="checkbox"/> | w.x.y.z | 7.75M | 195k | 75.3k | 1.33M | 163k | 4.72M | 5.78k |
| <input type="checkbox"/> | w.x.y.z | 8.79M | 143k | 140k | 937k | 731k | 7.62M | 315k |
| <input type="checkbox"/> | w.x.y.z | 7.48M | 45.9k | 2.38k | 143k | 1.88k | 1.22M | 7.34k |

Stager, 2004-2006 © UNINETT AS Processing the report took 131.8ms

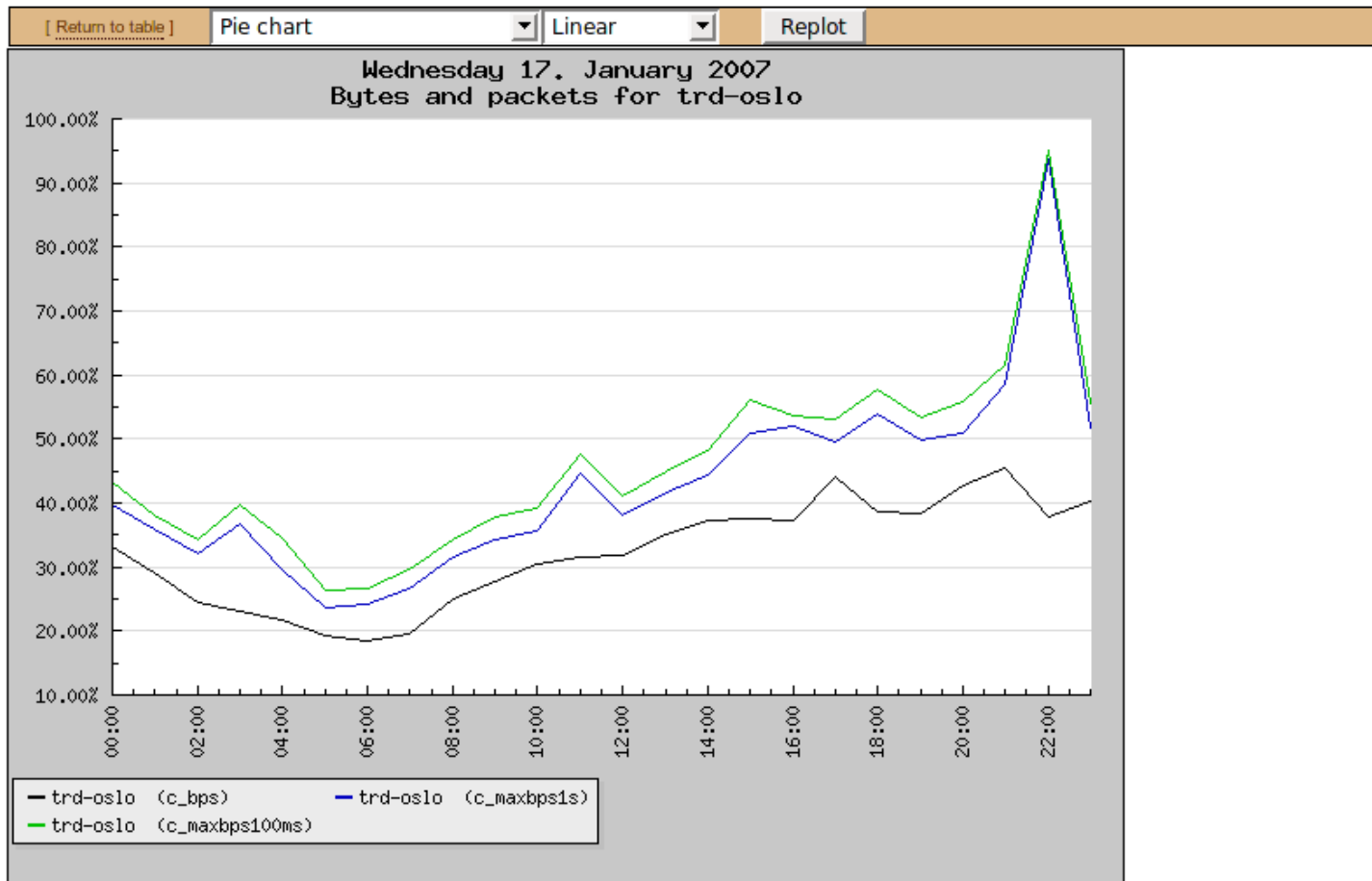
SSB

(Sub-Second Bandwidth)

Setup Bytes and packets summary Capacity 20 Show Add << < > >> > > hour...
All interfaces trd-oslo In none 1

Bytes and packets

Wednesday 17. January 2007



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Measurement beacons

- Målepåle – Measurement Beacons in UNINETT at customers
- Passive measurement on access with GPS time
- Measurements :
 - ◆ Internet 2 NDT/Surfnet detective
 - ◆ Multicast beacon, mping, ssmpping
 - ◆ Attack analysis (Lobster)
 - ◆ Q2S research – NTNU – university of Trondheim.

Measurement Beacons



Scaling MAPI

- MAPI works on 2.5Gbps
- 10Gbps demands
 - ◆ parallelism - splitting captured data on more cpus for processing
 - ◆ offloading processing to hardware
 - ◆ flow generation is too complex for hardware ?

Future

- Continue to cooperate with research
- Work on international arena to facilitate true end to end statistics
 - Traffic research – Q2S
 - End-to-end - perfSonar – Geant2 /Internet2
- More and better Measurement Beacons
- Scampi-tools
 - Attack detection
 - Flows – Stager
 - MAPI for 10Gbps
- Open software

References

- Our research : <http://www.uninett.no/nettforskning/index.en.html>
- Our software : <http://software.uninett.no>
- Statistics : <http://drift.uninett.no>
- Q2s : <http://www.q2s.ntnu.no>
- Geant2 : <http://www.geant2.net>
- Lobster : <http://www.ist-lobster.org>