e-VLBI and NEXPReS

- e-VLBI works great!
  - Stable, robust connectivity
  - Big telescopes, long baselines at full 1024 Mbps in real time
  - Enabling new science, increasing demand
- But, limitations remain…
  - Some (important) telescopes will not (ever?) be able to join
  - No such thing as a perfect system/hardware, failures do occur
  - Re-correlation with different parameters currently impossible
  - Best of both worlds: combine real-time with disk VLBI
  - Higher bandwidth/data rates becoming available, crucial for science
  - Need to accommodate 2, 4, 10? Gbps per telescope
  - 4 Gbps dBBCs being rolled out in EVN
• Follow-up to the EXPReS project

• NEXPReS is a three-year project aimed at further developing e-VLBI services of the European VLBI Network (EVN), with the goal of incorporating e-VLBI into every astronomical observation conducted by the EVN.

• 15 Astronomical Institutes and NRENs participating:

  JIVE, ASTRON, SURFnet, Nordunet, DANTE, PSNC (pl), TUM (de), INAF (it), MPG (de), UMAN (uk), OSO (se), VENT (lt), FG-IGN (es), AALTO (fi), CSIRO (au)

NEXPReS is an Integrated Infrastructure Initiative (I3), funded under the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° RI-261525 NEXPReS. This material reflects only the author's views, and the European Union is not liable for any use that may be made of the information contained therein.
Tasks in WP6

1) Integration of e-VLBI with Bandwidth-on-Demand
   JIVE, SURFnet, NORDUnet, OSO, CSIRO

2) On-demand access for large archives
   ASTRON (LOFAR), SURFnet

3) Testing and validation of on-demand circuits
   UMAN, JIVE

4) Multi Gb/s on demand for e-VLBI (4Gb/s, 10Gb/s)
   JIVE, SURFnet, NORDUnet, OSO
Networking Services Infrastructure (NSI) is a standard for BoD under development by the OGF.

In WP6, we decided to focus on NSI, to not have to build a client for each national BoD system.

Open source tools, standards, and licence (NSI, SOAP, HTTP(S), PHP, MySQL, Apache, SNMPv3).

Client was successfully demonstrated, report and source-code available on the WP6 Wiki.
The NEXPreS NSI client

Built using Linux, Apache, PHP, MySQL
NSI client screenshots
NSI client screenshots

Bandwidth on Demand
NSI reservation tool.
NSI client screenshots

JIVE

Bandwidth on Demand
NSI reservation tool.

New Connection

Source
urn:ogf:network:stp:netherlight.ets:jive1-1901

Destination
urn:ogf:network:stp:netherlight.ets:jive2-1901

Period
Start: 2012-05-10 14:29:08
Start after: 1 min.
End: 2012-05-10 14:30:08
Period: 1 min.

Bandwidth
10 Gb/s

Reserve & Provision

Connections

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NSI client screenshots
NSI client screenshots

JIVE

Joint Institute for VLBI in Europe

Bandwidth on Demand
NSI reservation tool.

Login Logout Log files

New Connection

- STP
  - Source
    - urn:ogf:network:stp:netherlight.ets:jive1-1901
  - Destination

- Bandwidth
  - 10 Gb/s

- Period
  - Start: 2012-05-10 14:29:08
  - Start after: 1 min.
  - End: 2012-05-10 14:30:08
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- Reserve & Provision

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D6.07: Demonstration of International BoD at 4Gb/s

- Due to possible lack of network resources, set up as two independent tracks:
  - OSO to JIVE (NSI)
  - Metsähovi to UMAN (AutoBahn)

- 10Gb/s equipment in Copenhagen was provided (temporarily) by SUNet

- Both demonstrations completed on (revised) time, deliverable report on the Wiki
D6.07: Demonstration of International BoD at 4Gb/s
NEXPREs D6.7: 4Gb/s international BoD
NEXPReS D6.7: 4Gb/s international BoD
4 Gbps demo (WP5, but used NSI)
Created 10G link between 'Target' in Groningen, and BigGrid storage at SARA, Amsterdam

Configure using NSI command line client

Tested at 10G, now in use for LTA transport

Delivered on time, report on the WP6 Wiki
WP6 Deliverables in P3

- **D6.04**: Month 30
  BoD Scheduling interface for LOFAR LTA

- **D6.06**: Month 30
  Demo of integrated BoD testing and validation

- **D6.08**: Month 30
  Demonstration of international BoD at 10Gb/s

- **D6.05**: Month 33
  Demonstration of BoD for an operational LTA

- **D6.02**: Month 36
  Operational use of BoD on at least one e-VLBI link
D6.06: Demo of integrated BoD testing and validation

- Using UMAN testing software
- Schedule testing of link as part of reservation
- We have all the separate parts ...
- Due end of December
D6.08: Demonstration of international BoD at 10Gb/s

- Could have done this when we did 4Gb/s
- Requires better testing than ‘iperf’.
- NORDUnet BoD 10G interfaces are gone ... Possibly as production in December
- D6.08 due end of December
- Investigating 10G BoD from Poznan/PSNC
D6.02: Operational use of BoD on at least one e-VLBI link

- Concluding deliverable for WP6

- Integrate and demonstrate all parts:
  - Schedule observation + bandwidth
  - Automated testing of link
  - Automated configuration of link/network

• “At least” one e-VLBI link, but ambition is to use more than one

• Due at the end of the project (June 2013)
Challenges for the final year

- International BoD is still experimental, and the testbeds have limited bandwidth and connectivity

- Integrating dynamic paths within network
  - Turning our ‘client’ into a full ‘NRM’
  - At both ends of the link
  - SNMPv3 to add/remove ports from VLAN

- NSI standard is a work-in-progress