

NEXPREs and the EVN

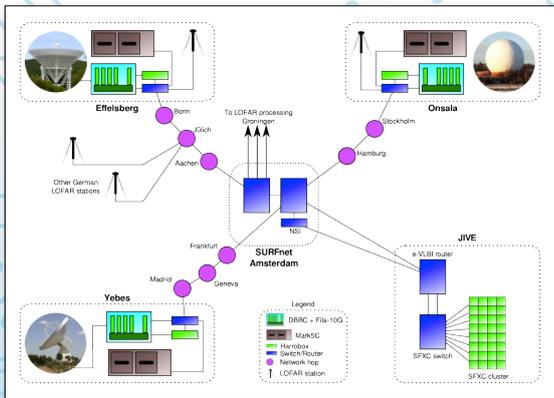
Towards 4Gbps operational VLBI

Arpad Szomoru, Paul Boven

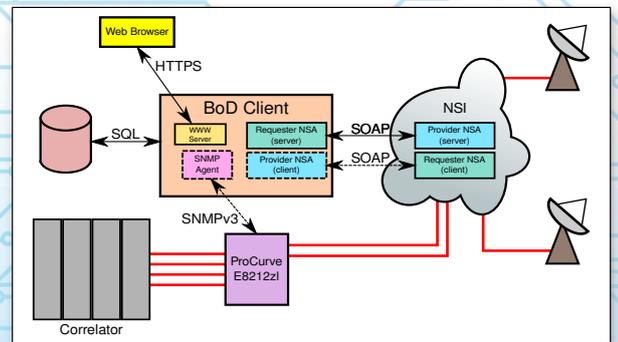
NEXPREs

The NEXPREs project kicked off July 2010. One of its aims is to prepare the EVN for the higher bandwidths that are becoming available. With the rollout of DBBCs throughout the EVN and the steady increase of international network capacity, 4Gbps operations may soon become a reality, both recorded and in real-time.

At the same time, efforts are underway to make international high-bandwidth Bandwidth-on-Demand (BoD) operational. Several NRENs are already offering such a service within their network, but international BoD is much more difficult because the path must cross multiple administrative boundaries.



4Gbps network and equipment lay-out



Block diagram of the NEXPREs NSI client for requesting BoD lightpaths

4Gbps demo

As part of one of the deliverables of NEXPREs a live demonstration was set up, to take place before the end of the second year. This demo involved the telescopes at Effelsberg, Onsala and Yebeis, in collaboration with the NORDUnet, SURFnet, RedIRIS and GEANT research networks. The aim would be to record at 4Gbps and simultaneously stream data to the SFXC software correlator at JIVE for real-time correlation, at a minimum of 1Gbps.

For this purpose, during the first half year of 2012 new equipment was purchased, new and existing soft- and firmware written, modified and debugged. Fila10G boards, a MarkSC unit, special-purpose servers (HarroBoxes) and lots of modules and cables were shipped around Europe. All these activities were held together by countless telecons and far more email exchanges.

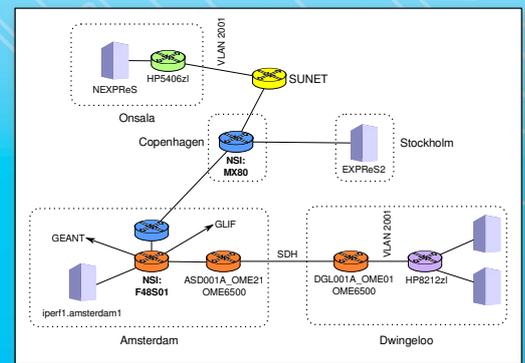
The demo took place on June 20, 2012. Apart from some minor problems and some occasional local network flooding, everything worked out of the box. Data were recorded on MarkSC units at the stations at 4Gbps and correlated in real-time at 1, 2 and even 4Gbps.

Unfortunately, no fringes were found, most likely due to our (still) poor understanding of the many modes of the DBBC. In spite of this, the demo conclusively showed the feasibility of the concept, and technologically was a great success.

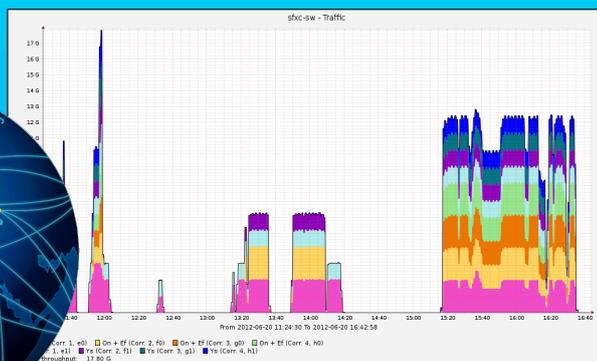
Bandwidth-on-Demand and e-VLBI

In real-time e-VLBI, the data is currently transported on static (always on) dedicated lightpaths from telescope to correlator. Bandwidth-on-Demand (BoD) promises a much more efficient use of scarce international networking resources by making it possible to set up these circuits only when needed, and releasing them again after the observation.

A new network protocol called Network Services Infrastructure (NSI) is being developed to create a standardized interface to set up these circuits internationally. We are active in the development and testing of NSI in NEXPREs, and have used it to transport data at 4Gb/s from Onsala to JIVE.



Dynamic (NSI-controlled) circuit from Onsala to JIVE



Data throughput at JIVE. The 18Gbps peak is caused by internal flooding

