Technical Operations and R&D at JIVE

Arpad Szomoru, JIVE

Mark5, SUs, MarkIV correlator

- Mark5, general
  - Decision on SDK9 was made (finally!)
  - All (-1) Mark5s at JIVE upgraded
  - USNO ready to do the same
  - But, newest Linux kernel + newest SDK break e-VLBI
  - For now, stick to old Linux, install newest SDK
  - Talk by Harro Verkouter
- Mark5B/C
  - 2 units permanently converted to B
  - 1 extra unit currently B+, 6 C units in place
  - 1 C unit on loan to Yebes
  - 1 C unit on loan to Torun for DBBC verification
- SU
  - Functioning
    - We think….
- MkIV Correlator
  - Only used for verification of gravity

Jive5AB

- Preparing for the roll-out of Jive5ab

  - Requested (repeatedly) by TOG: one code for recording and real-time
  - FieldSystem compatible
  - Extensively tested in the field
  - Incorporates full Mark5 command set
  - Robust, multithreaded, smart memory management
  - Many new features; "Swiss army knife of (e)VLBI"
    - Channel dropping, on-the-fly corner turning, sending different chunks of data to different destinations, full VDIF support

  - Will enable semi-automated fringe tests
  - Request stations to switch to Jive5AB for next EVN session

- Talk by Harro Verkouter

e-status

- Full 1024 Mbps used operationally, from most stations
  - e with DBBC working fine from Ef, together with Mh the only operationally used DBBCs
- Channel dropping available when needed (except Ar)
- Sh upgraded from 256 Mbps to 512 Mbps
  - Limitation within China
  - New connectivity via Orient+ (10 Gbps Beijing – London)
- Ar at 512 Mbps
- Irbene: first e-VLBI fringes at 512 Mbps!
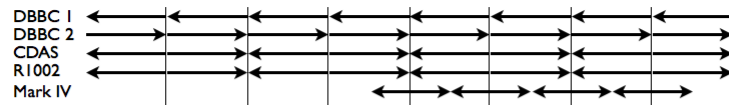- Attempts to bring e-Merlin back into array on-going

SFXC Correlator

- Enhancements to software correlator

  - More capacity, more hardware
  - 128 cores added
  - 13 stations at 1024 Mbps in real time
    - 14 should be possible with some tweaking
  - Now also used for e-sessions
    - After fixing some minor glitches

  - Mixed sub-bands (32 – 16 MHz)
  - Upper and lower side band flipping
  - Phased array mode under development
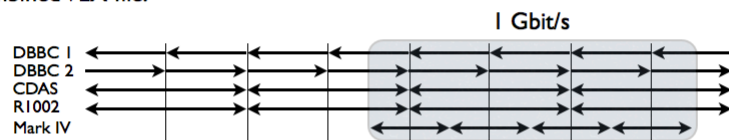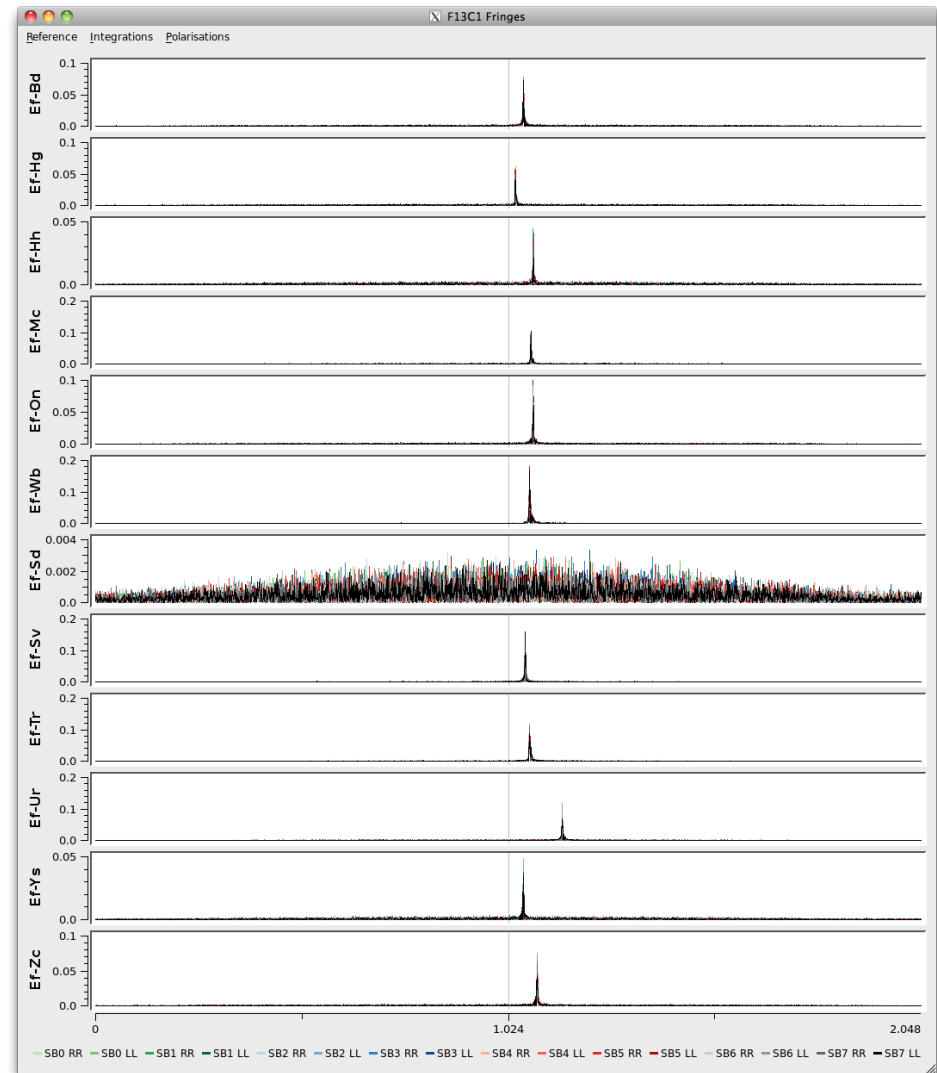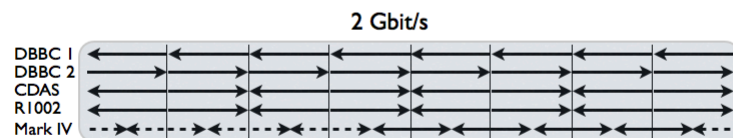 - Primary beam correction under investigation

SFXC Correlator

- ## Testing various backends
  - ### In mixed bandwidth setup
  - ### Global observations after legacy mode in VLBA will be discontinued
 - ### Mixed 2Gbps-1Gbps within EVN

UniBoard and beyond

- UniBoard-based EVN correlator
  - Correlator design review held early 2013
  - No show stoppers, process on right track
  - Fine tuning of filter bank
  - Testing and debugging of:
    - Control system
    - Delay model generation and application
    - Post correlation data handling
  - Real data in, real fringes out
- UniBoard^2
  - Aims for more CPU, less power consumption
  - Project straddles two technologies, 20 and 28 nm
  - Still waiting for definitive word on availability of FPGA technology
  - 20 nm will fit in timeline of project
    - potential path to upgrade to 14 nm (collaboration Altera – Intel)
 - Kick-off meeting before summer 2013
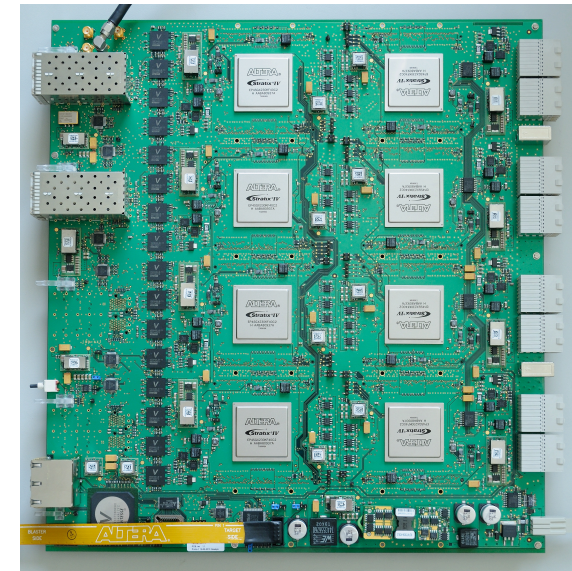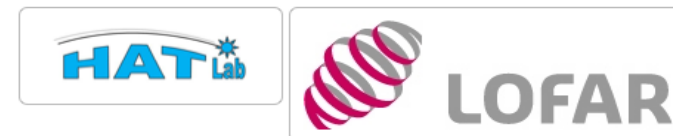
Towards 4 Gbps

- First test last year June
- More or less successful

- Demo planned during final NEXPReS review, September 2013
    - In order to impress review panel

- Most problems are solved
    - HarroBox performance
    - Faulty Mark5C recorder

- But one remains
    - Most likely related to Fila10G firmware
    - Unfortunately, hardware failure of new Fila10G boards…
    - And the only working Fila10G in Bonn has been taken to Chile. Again!!

Telescopes

Max-Planck-Institut für Radioastronomie
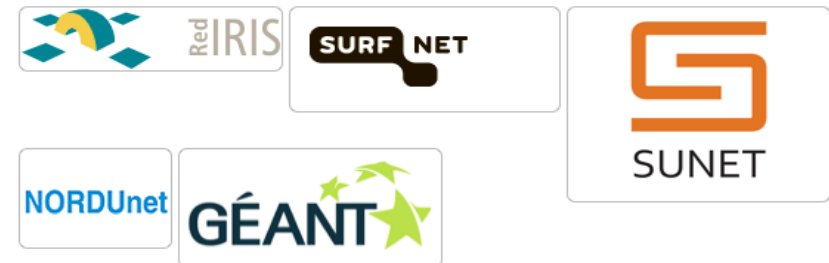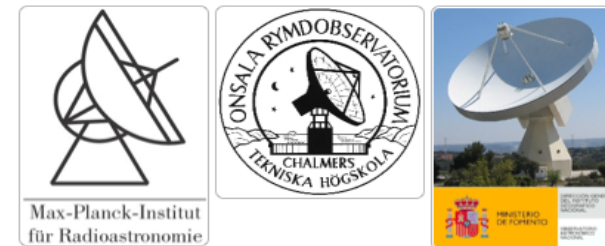
With thanks for the kind cooperation of

2nd NEXPReS Board Meeting– Copenhagen June 20, 2012

NEXPReS status

- Semi-automated fringe tests
  - Without interruption to science schedule
  - As often as wanted/needed
  - Will select suitable calibrator automatically, store data on local disk, transfer at whatever speed is available, run pypeline when all data has arrived

- FlexBuff (aka AriBox) shaping up well
- Extensive stress test:
  - Send 2Gbps pre-recorded data streams from FlexBuffs at 4 stations to JIVE
  - Simultaneously, record on each local FlexBuff at highest rate possible
  - Record incoming 4*2Gbps data streams on FlexBuff at JIVE
  - Read data into correlator while recording is ongoing

  - Model for future operations?

NEXPReS status

- ## High bandwidth on demand
  - Tr joined
  - Several successful demo's
  - Migration of SURFNET6 to 7 broke lightpaths to UK
  - e-sessions saved by BoD-procured 10G connection

- ## Computing in a shared infrastructure
  - Several demos coming up:
  - Automated triggered observation with sub-set of EVN
  - Distributed correlation: JIVE, Poznan, Curtin
    - Using both SFXC and DIFX correlators