



eVLBI Experiments in Finland

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Unix File Approach

- Data is stored into normal files
- VLBI data is normal data
- Minimal programming and development
- Use of normal Unix tools
- Data transfer with FTP (or the programs used in Mark5A)



Metsähovi VSI Data System Evolution

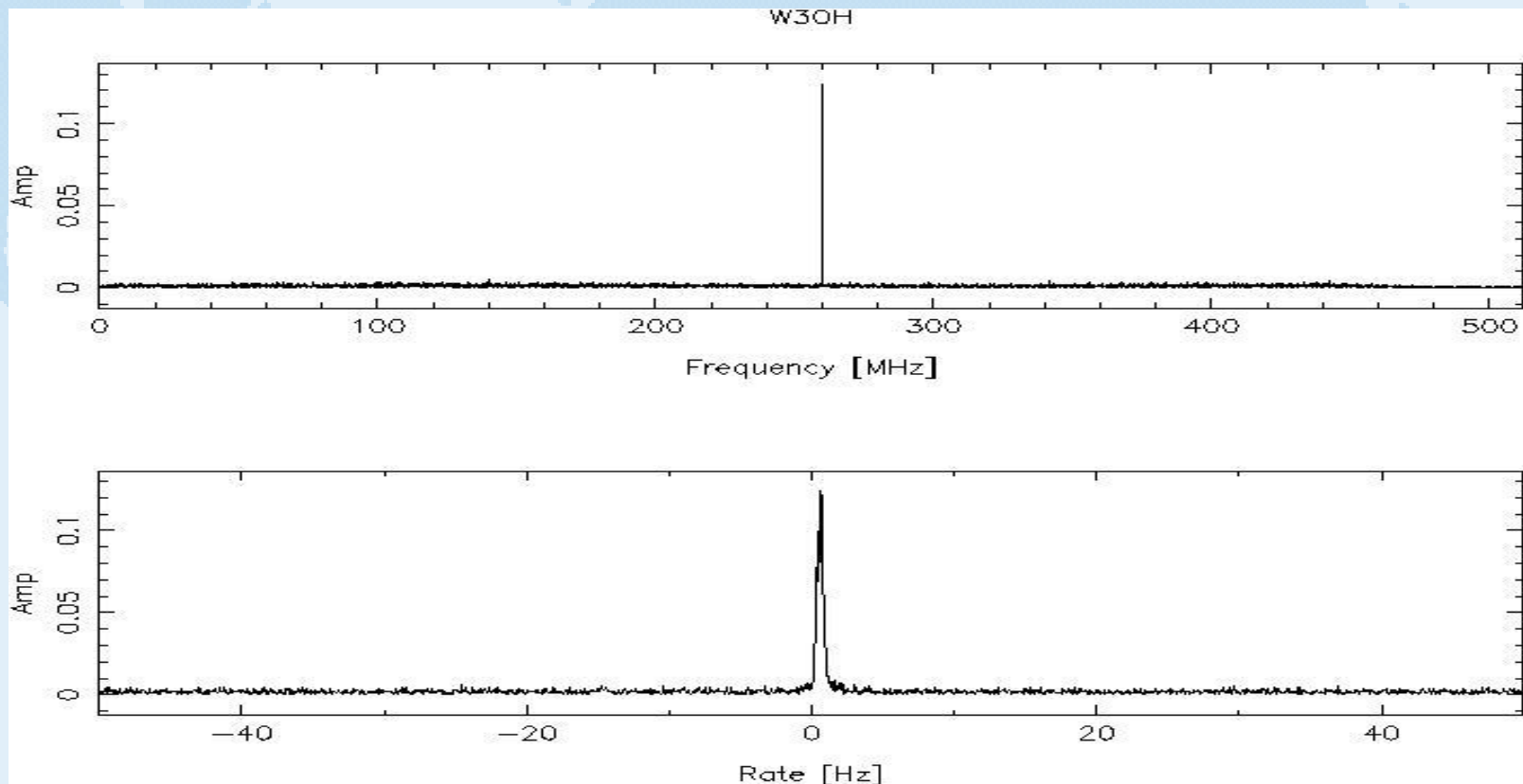
- Jun-2001 First wired prototype
- Jul-2001 Tests of sustained Linux disk performance
- Oct-2001 First prototype VHDL ready and running at 8bit@32MHz
- Jan-2002 VSIB and VSIC PCB board design ready
- Mar-2002 Second prototypes assembled and tested at 32bit@18MHz
- Apr-2002 Last PCB changes for mass-production
- Jun-2002 256Mbps VSIB&VSIC playback tests at JIVE
- 12-Jul-2002 **Fr!** 256Mbps Mk4/5P Westerbork disk-Jodrell tape at 5GHz (fringes at JIVE)
- Aug-2002 Total of 100 VSIB and VSIC boards produced
- 24..26-Sep-2002 256Mbps iGRID e-VLBI demo (JB, WB, JIVE)
- 26-Sep-2002 1Gbps ADS-1000 MH-Kashima 22GHz (RX problems)
- 2-Oct-2002 1Gbps ADS-1000 MH-Kashima 22GHz (weather problems, Kashima typhoon)
- 16-Oct-2002 **Fr!** 1Gbps ADS-1000 MH-Kashima 22GHz (fringes found on W30H at CRL)
- 22-Nov-2002 1Gbps Mk4/5A MH-Jodrell 22GHz (RX problems)
- 27-Nov-2002 1Gbps ADS-1000 MH-Kashima 22GHz (weather problems, MH snow)
- 5,7,13,14-Feb-2003 **Fr!** 1Gbps ADS-1000 MH-Kashima 22GHz (fringes found on 3C454.3 at CRL)
- 12-Mar-2003 **Fr!** 1Gbps Mk4/5A MH-Jodrell 22GHz (fringes on 3C84 at JIVE)



Experiments with Kashima/CRL

- First International 1Gbit/s fringes in Oct 2002
- First International 1Gbit/s continuum fringes in Feb 2003
- Direct IF sampling with the ADS-1000 Gbit/s sampler developed in CRL
- High-speed software correlation in CRL

First International 1Gbps Fringe Metsähovi - Kashima 2002-10-16

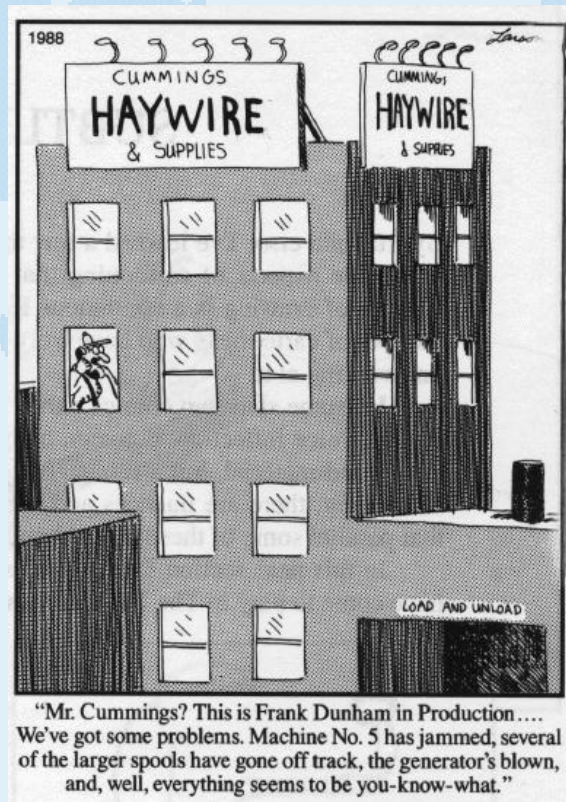




MRO/Jodrell/JIVE 1Gbit/s experiment

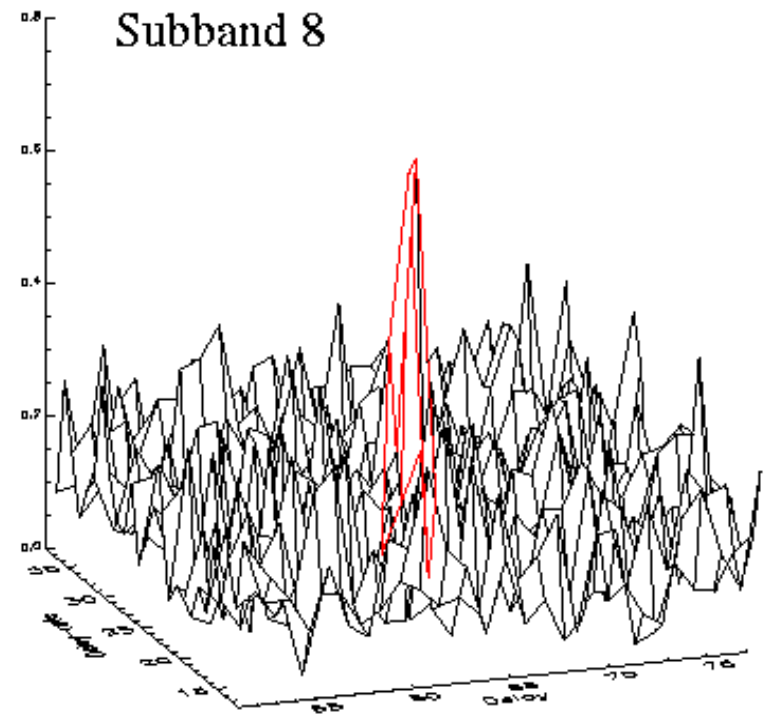
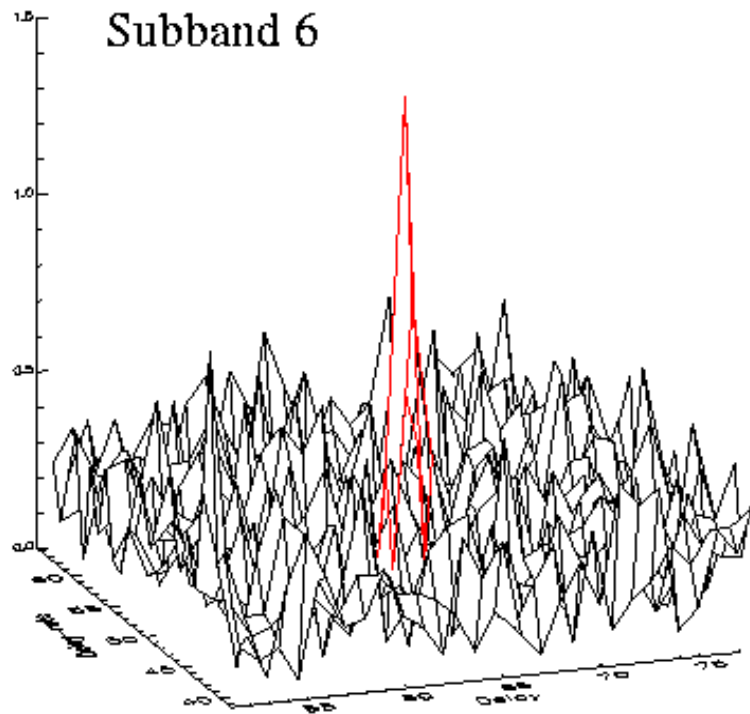
- First European 1Gbit/s fringes 12th of March 2003
- Water maser (W3OH) source for debugging and fringe search, followed by a continuum radio source (3C84)
- Recording with MRO designed systems, playback with Mark5A

Of course we had a few problems...



- Rx problems in 2002
- Rack number needed to be even
- Data had to be reformatted
- Slow eVLBI transfer due to high CPU usage

First European 1Gbps Fringe Metsähovi - Jodrell Bank 2003-03-12





Lessons learned

- Standard microcomputers are fast enough
- E-VLBI is easy as long as normal files are transferred
- A surprising number of things stop working if the file concept is not used
- ALL the motherboards have 300-600 Mbit/s performance limit, none can do 1Gbit/s



Equipment

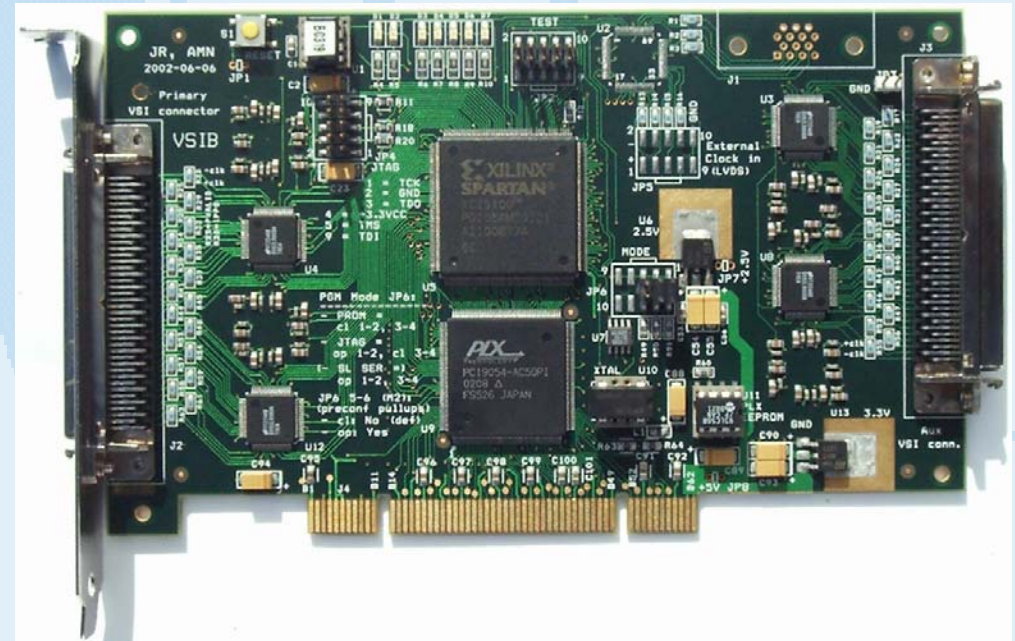
- Recording system designed at MRO
- Minimal hardware and software design
- Partly designed in the PCEVN project
- VSI compatible
- FW and SW frozen in September 2002
- No technical problems, just keeps on working



Discount eVLBI equipment



*0.5Gbps for
1200 euros!
(VSIB+VSIC+Cable)*



The whole VLBI community was enthusiastic...

