

D73: e-VLBI test observations with CSIRO/Metsähovi

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17-January-2008

The ATNF telescopes taking part in EXPRoS SA2 make use of “VSIB” (or PCEVN) data acquisition technology developed at Metsähovi Radio Observatory. Chris Phillips at ATNF extended significantly the data acquisition software supplied by Metsähovi by integrating a Mark5B compatible software-only data formatter into VSIB wr software. This enabled their commercial-off-the-shelf Linux-based VSIB systems to join in real-time the network of legacy Mark5A/Mark5B data acquisition systems of EVN.

The following email messages document the details of the Australian e-VLBI experiments with JIVE within the EXPRoS SA2 context. Illustrations of the fringe plots are shown in Figures 1—3.

Date: Fri, 10 Aug 2007 17:11:33 +0200 (CEST)
From: Arpad Szomoru <szomoru@jive.nl>
To: evntech@jb.man.ac.uk
Subject: EVNtech: eVLBI from down under

Yesterday we achieved the first successful real-time correlation at JIVE of data generated at three Australian telescopes (Mopra, Atca and Parkes). The data were test data generated on the Australian acquisition systems, converted on-the-fly to Mark5B format, transferred to JIVE and fed into the correlator system through Mark5A+ units. The data conversion program and correlator interface (which makes it possible for the EVN correlator control system to send commands directly to the LBADR units) were developed by Chris Phillips. Green leds were obtained from three telescopes at 128 Mbps, using BIC TCP as transport protocol, and from two telescopes at 256 Mbps, where we used a home-grown circuit TCP (no ramp-up, no congestion control). The path between ATNF and JIVE is a single 1 Gbps lightpath via Hawaii and North America. We will next test 512 Mbps from one telescope and UDP based transfers. And of course, as soon as we get some actual telescope time, we will attempt our first fringes. Regards, Arpad

Date: Wed, 15 Aug 2007 15:32:28 +0200
From: Arpad Szomoru <szomoru@JIVE.NL>
Reply-To: European VLBI Network discussion. <EVN-NREN@SEGATE.SUNET.SE>
To: EVN-NREN@SEGATE.SUNET.SE
Subject: eVLBI fringes from down under

Hi all. Last night we obtained the first fringes between two Australian telescopes, correlated in real-time on the EVN MarkIV correlator at JIVE (see attached plot). The telescopes involved were Mopra and ATCA (single dish), while Parkes participated for part of the run with dummy data. Data rates were 128 and 256 Mbps, the transport protocol used was a locally made version of Circuit TCP (basically TCP without congestion control). The data were converted at the stations on-the-fly to Mark5B format and played back on Mark5A+ units at JIVE

Currently one 1G lightpath between ATNF and JIVE is available. Data from Mopra was sent via this lightpath, while the data from ATCA was sent over the normal routed research networks. Also on the routed network 256 Mbps was easily sustained, and CTCP dealt very adequately with the occasional packet losses.

The interface between the EVN correlator control software and the LBADR units and the data conversion program were written by Chris Phillips, who also helped debug Circuit TCP. Mark Kettenis implemented Circuit TCP, adapted the control system for A+ and helped with debugging the data conversion. Paul Boven and Shaun Amy took care of the many networking issues at JIVE and ATNF. And of course we could not have done this without the support of our friends at the NRENs, AARNET, SURFNet and CANARIE.

Regards, Arpad

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Date: Tue, 28 Aug 2007 16:52:30 +0200 (CEST)

From: Arpad Szomoru <szomoru@jive.nl>

To: EVNtech@jb.man.ac.uk

Subject: EVNtech: demo at APAN, press release and fringe plots

Hi all. Today a demo was held at the APAN (Asian Pacific Advanced Network) meeting in Xi'An, involving quite a number of EVN partners. In this demo we switched between between observing one source (bright calibrator) with Shanghai, Mopra and ATCA, and another source with Shanghai, Torun, Darnhall, Jodrell Bank, Westerbork and Medicina (although Mc could only send formatter data), and correlated the data in real-time at JIVE.

The data rate was a modest 256 Mbps (we have pushed data from Sh and Mp at 512 Mbps), but we felt that the short duration of the demo (30 minutes) and the increased chance of failures at higher data rates do not make a good combination. Besides, we have only one lightpath from Australia, and sending 512 Mbps with TCP (even CTCP) over the routed network is not really feasible. As it happened, this time we could not even get 256 over the routed network, which pleased some proponents of lightpaths no end. This meant that we could not correlate any data from ATCA.

The demo followed immediately on the talk about EVN and e-VLBI by Huib van Langevelde, so interest was quite keen, and we managed to get our first fringes on display within minutes of the first spectators arriving. As an extra bonus, at the end of the run we managed to get fringes from one of the sources between Mp and several European telescopes (see attached fringe plot) for a short time. Certainly some of the

longest (Earth) baselines ever..

Attached is the press release that JIVE has sent out, and a few fringe plots.

Regards, Arpad

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Date: Mon, 8 Oct 2007 13:34:16 +1000

From: Chris Phillips <Chris.Phillips@csiro.au>

To: EVNtech@jb.man.ac.uk, VLBI observers <vlbiobs@atnf.csiro.au>

Cc: Lewis Ball <Lewis.Ball@csiro.au>, Brian Boyle <Brian.Boyle@csiro.au>, Dave McConnell <David.McConnell@csiro.au>, Graeme Carrad <Graeme.Carrad@csiro.au>

Subject: EVNtech: eVLBI science run from LBA to JIVE

Hi all,

We have just finished a 12 hour evlbi "science" observation of the supernova remnant 1987A, using the three LBA antenna Parkes, Mopra and the ATCA. Data were sent from each telescope at 512 Mbps over three dedicated 1 Gps lightpaths to JIVE for realtime correlation (RTT 350msec). UDP data transport was used based on the "Verkouter" UDP implementation on the Mark5.

The lightpaths were provided by a collaboration between AARNet, CENIC, CANARY and SURFNet. Physically the paths goes from the observatories to Sydney, across the Pacific to LA, Seattle, Chicago, Amsterdam the finally to JIVE.

At the Australian end, data were recorded using the LBADR vlbi system (a derivation of the PCEVN) with a Mark5 emulator wrapper and realtime conversion of the data to Mark5b format. The data was received at JIVE on a Mark5a+. The lightpaths worked well and we could easily sustain 512 Mbps transfer for more than 12 hours. The run went very smoothly.

Many thanks to all those who helped this happen - Particularly Mark, Paul and Arpad at JIVE who have given us a lot of help setting up for this experiment.

This work is part of the EXPReS project.

Regards Chris Phillips, Shaun Amy and Tasso Tzioumis CSIRO ATNF

Date: Wed, 10 Oct 2007 14:22:15 +0200 (CEST)

From: Arpad Szomoru <szomoru@jive.nl>

To: Chris Phillips <Chris.Phillips@csiro.au>

Cc: EVNtech@jb.man.ac.uk, VLBI observers <vlbiobs@atnf.csiro.au>, Lewis Ball <Lewis.Ball@csiro.au>, Brian Boyle <Brian.Boyle@csiro.au>, Dave McConnell <David.McConnell@csiro.au>, Graeme Carrad <Graeme.Carrad@csiro.au>

Subject: Re: EVNtech: eVLBI science run from LBA to JIVE

Hi. From the correlator viewpoint this was an impressively smooth run. As you can see from the appended graph, we had uninterrupted runs of nearly 3 hours. Restarts were only needed because of Station Unit-related problems, (causing fringes to one or more stations to disappear). Apart from this, both correlator and Mark5s performed flawlessly. Regards, Arpad

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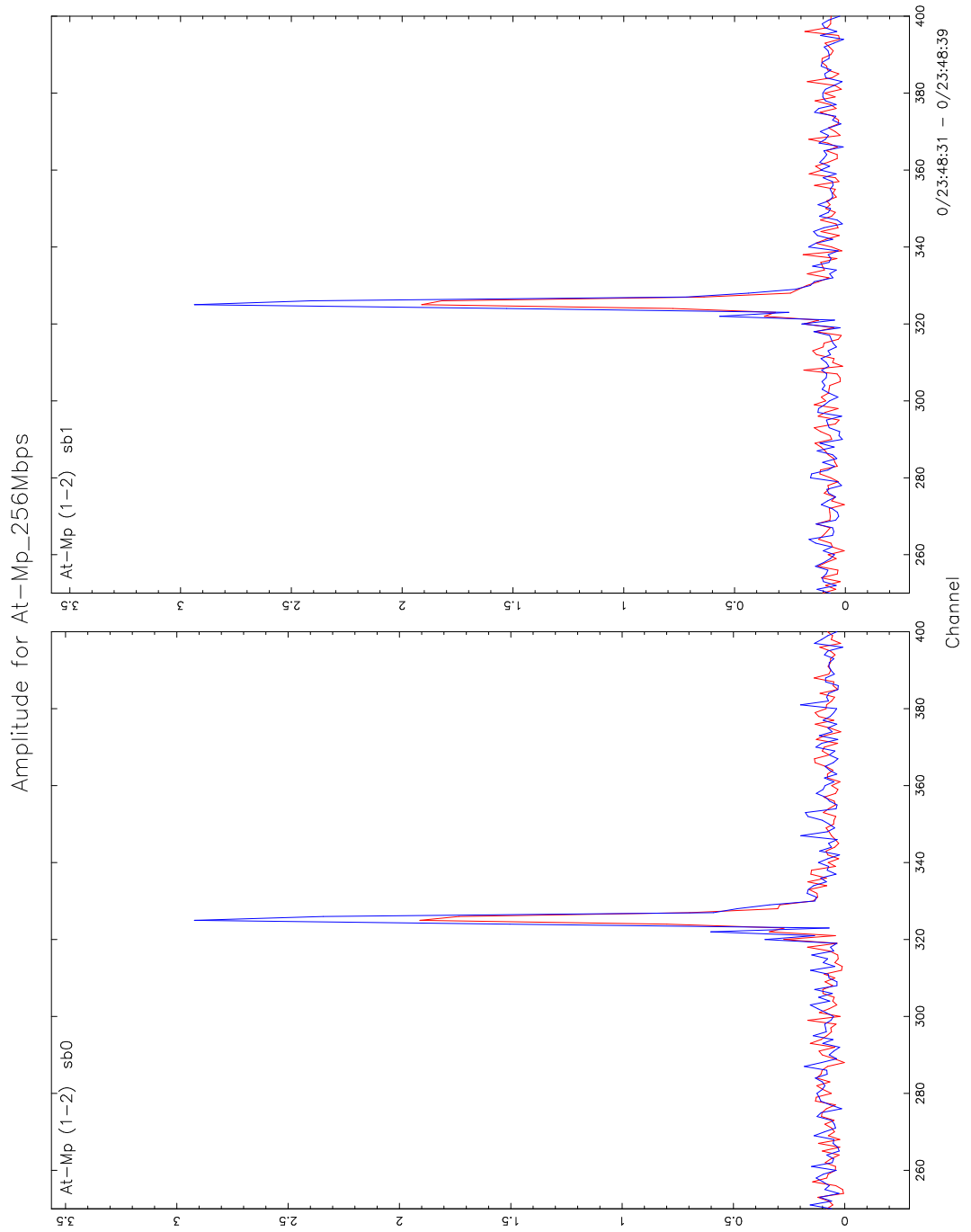


Figure 1: eVLBI fringes from down under. The first fringes between two Australian telescopes, correlated in real-time on the EVN markIV correlator at JIVE.

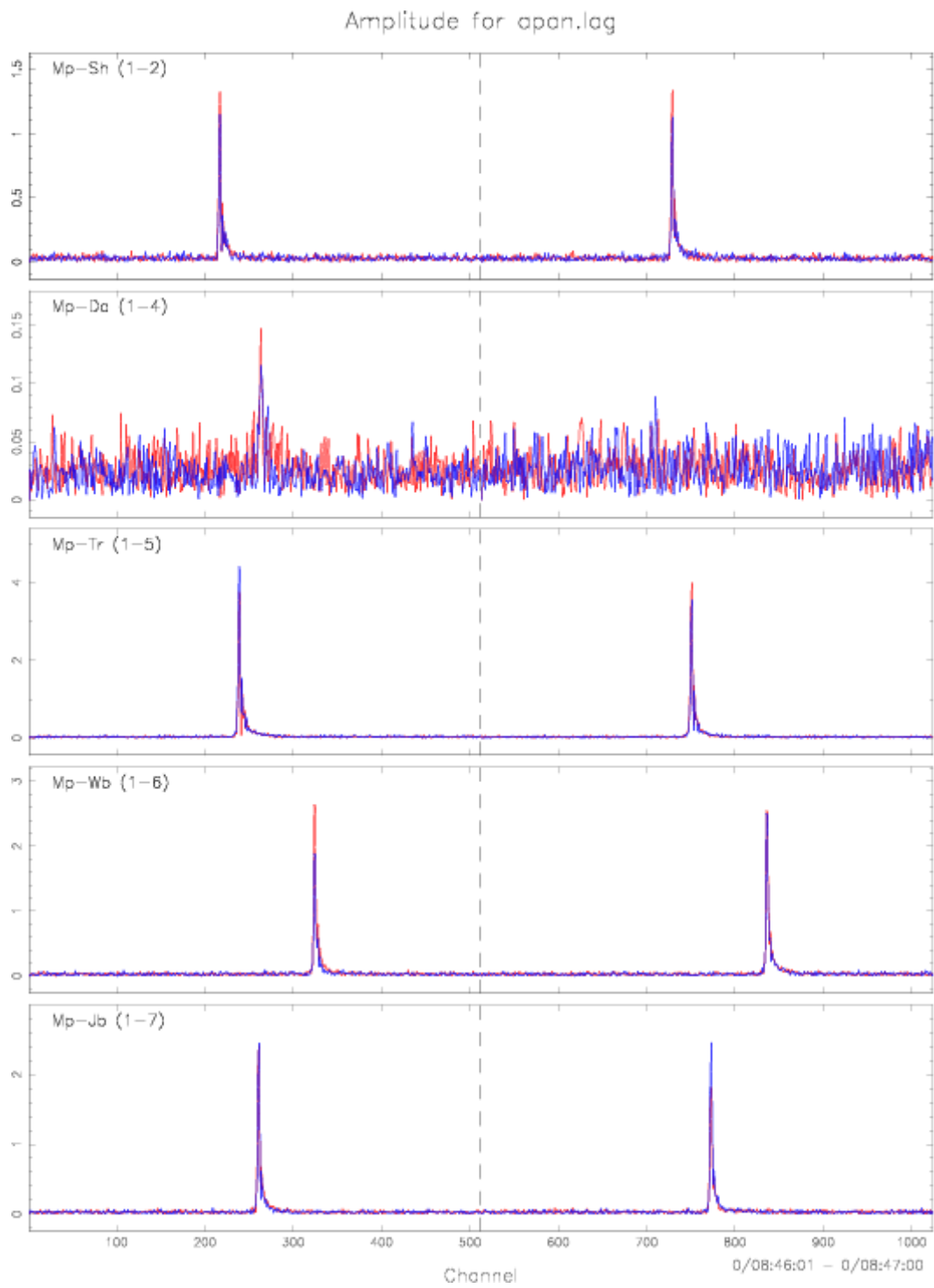


Figure 2: APAN demo figure 1.

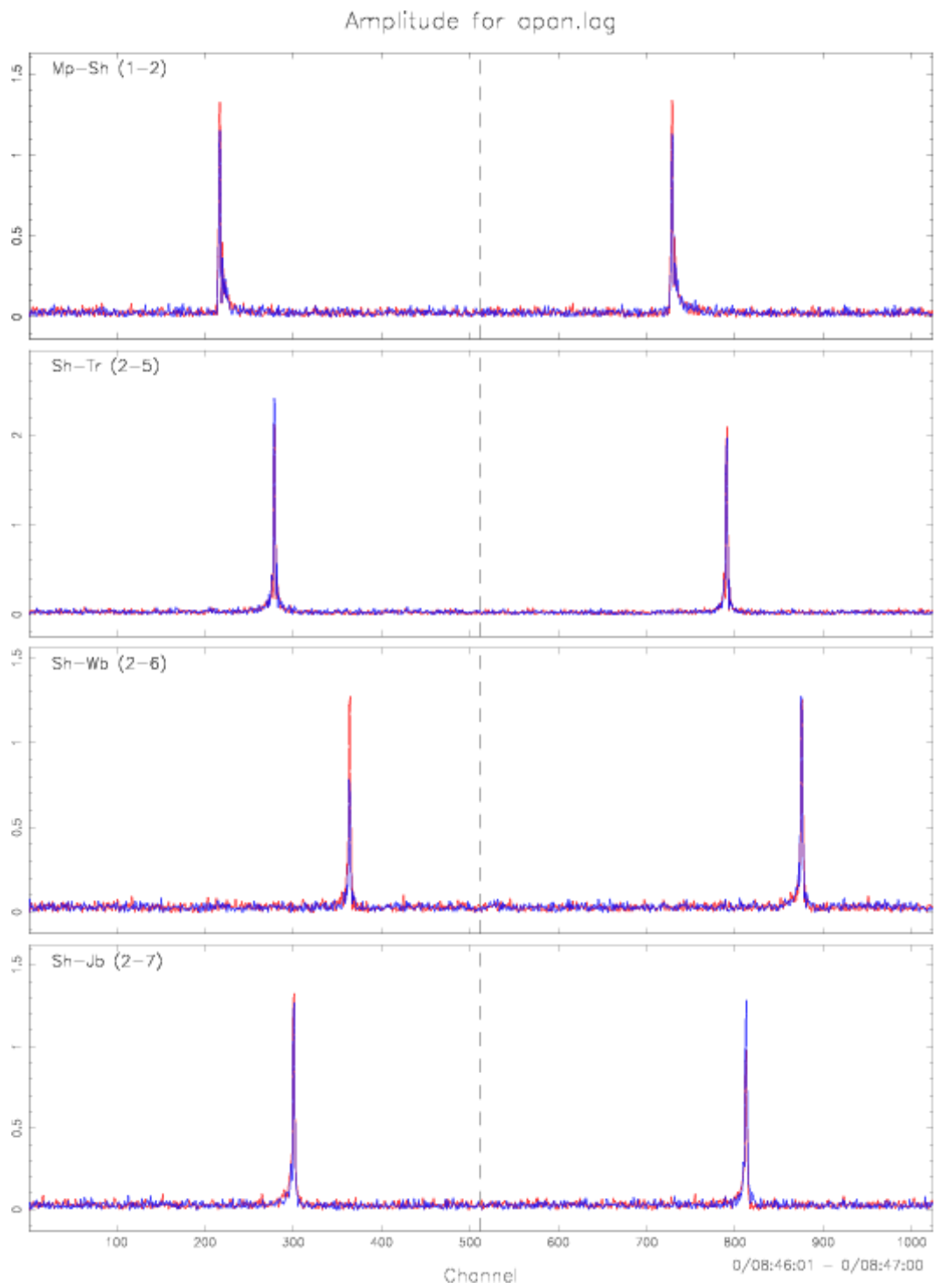


Figure 3: APAN demo figure 2.