Australian experience with the PC-EVN recorder

The Australian team:

Tasso Tzioumis, Chris Phillips (ATNF)

Steve Tingay, Craig West (Swinburne)

Frank Briggs (ANU)

The rest of the World:

Jouko Ritakari (MRO)

Australian experience with the PC-EVN recorder

In 2002 I purchased our first PC-EVN cards, for use as a pulsar machine.

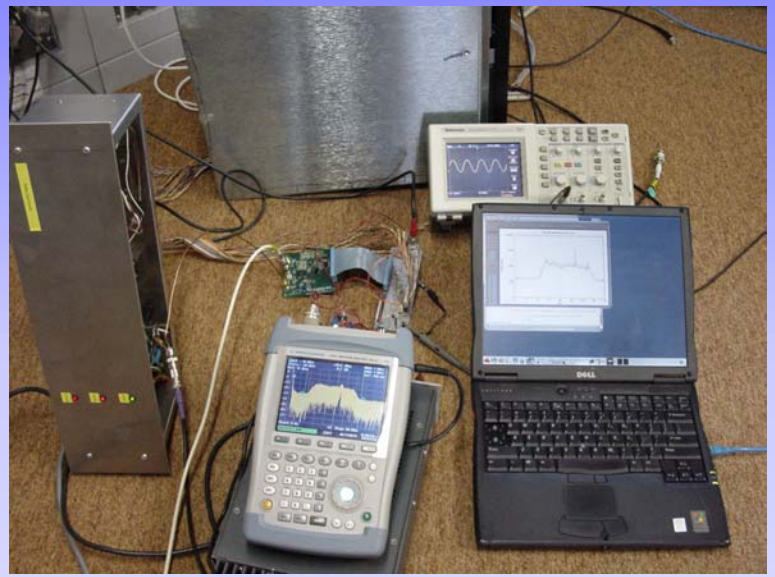
It was obvious that we could do much more.

I will now report on the Australian progress toward Gbps eVLBI with this system.

PC-EVN and Ozzi-eVLBI

With the wizards of Oz

Woof Woof



Pulsar system

VLBI system

PC-EVN's adventures in Oz

VSI-B DMA card

VSI-C converter card (prototype)

Ooooh look at those

Conventional (MkV) PC based recorder ~AU$2000
DMA card (VSI-B) Euro 565

Converter card for legacy signals (VSI-C) E 565
IDE RAID0 array ~AU$2000 = 800GB
total cost AU$5500

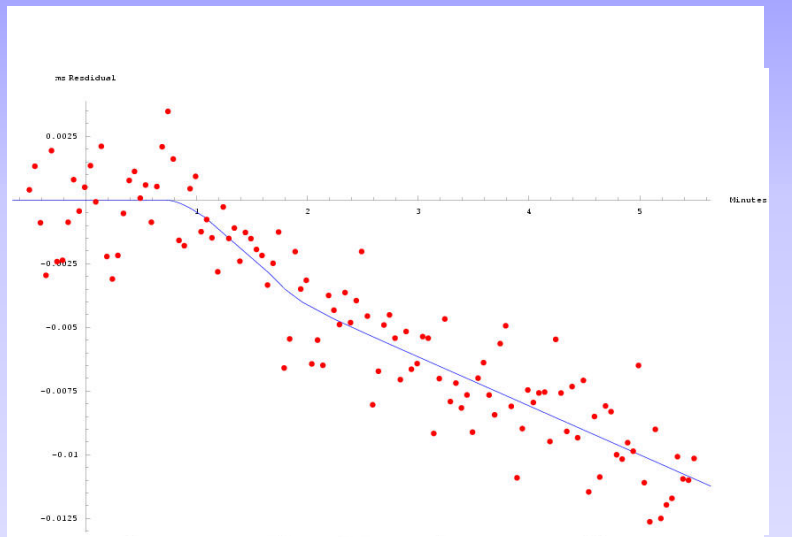
PC-EVN's adventures in Oz

Pulsar Physics from the 14m antenna:

2000/4 glitches showed a 1 minute decay process & no detectable spin up.

Digitiser: a Maxim AD card, $330

New device increased the sensitivity by ~ 10 to check the decay terms & find the spin up. ***(Lewis 04 (promised))***



No detectable spin up -> crust mass=zero
Fast decay -> component with very high inertia – or rapid crust core interaction.

PC-EVN's adventures in Oz

Magic -- but a good kind Magic --

F. Briggs, G. Torr at ANU
Portable 4 channel RFI machine.

Working on the Bell, Briggs and Kesteven RFI mitigation approach.

Photon bucket collects a reference signal to be subtracted from the astronomical signal.

PC-EVN's adventures in Oz

The speed makes my legs go wobblerly

Network upgraded to 10 Gbps for ATNF telescopes, & almost certainly Tidbinbilla

AU Gov purchased dark fibres for Aust. Res. Ed. Network (AREN) which will cable ATNF+Tid.

So we can transfer all the data.
But can we collect it? Can we correlate it?

Stage 1
Fringe checker – i.e. Addition to the S2

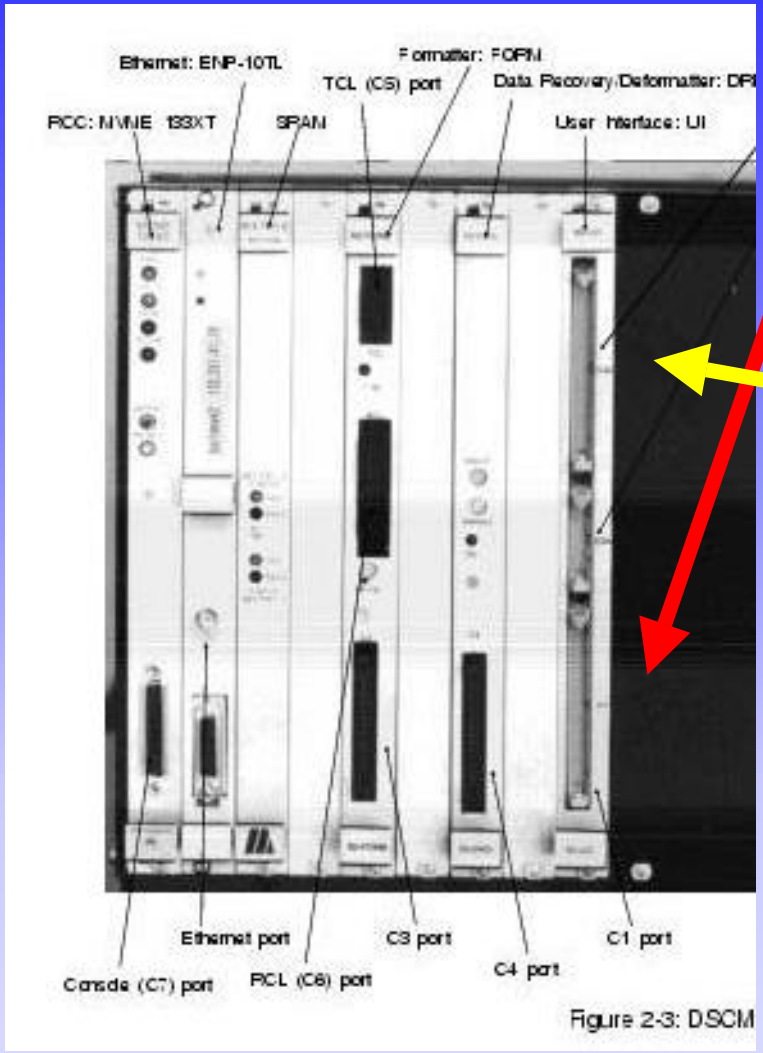


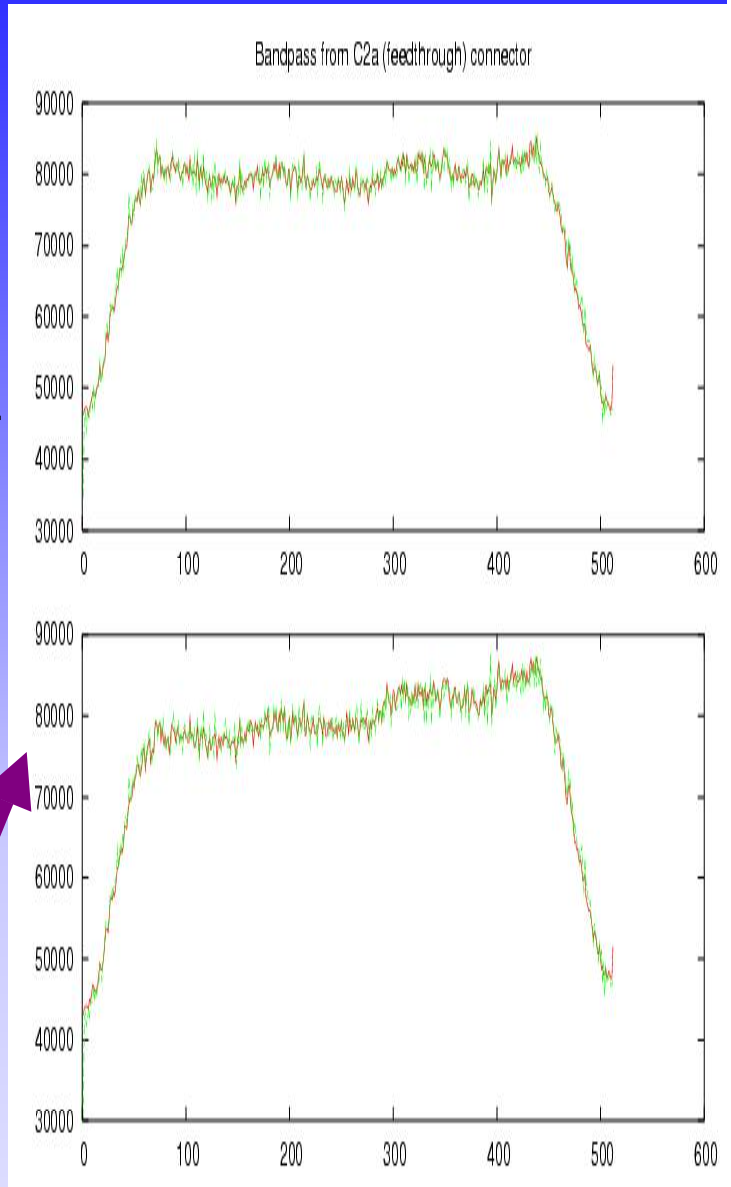
Figure 2-3: DSCM

DATA in on the C1 port.

Formated DATA out on the C2a port.

BUT it is mangled into a Mk3-ish pin order.

We have a cable to fix it and give this.



Bpass recorded off the C2a using BG2

Stage 2 (or 0) replace the S2

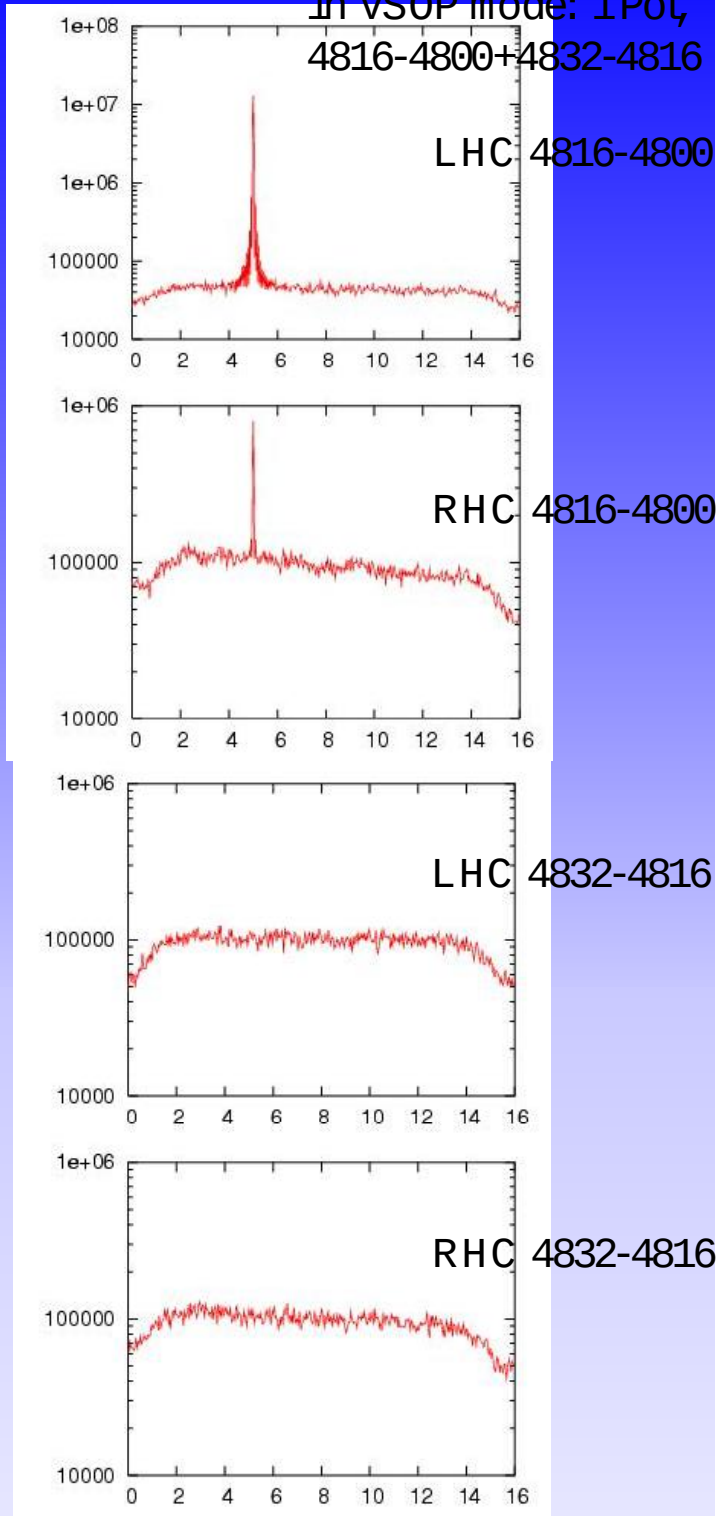
S2 records a maximum of 128 Mbps
Usually this is 2 16 MHz bands
(2 pol **or** 2 adjacent bands)

The DAS has two outputs per 64 MHz input (which are usually different polarisations at the same central frequency) each 16 MHz wide.

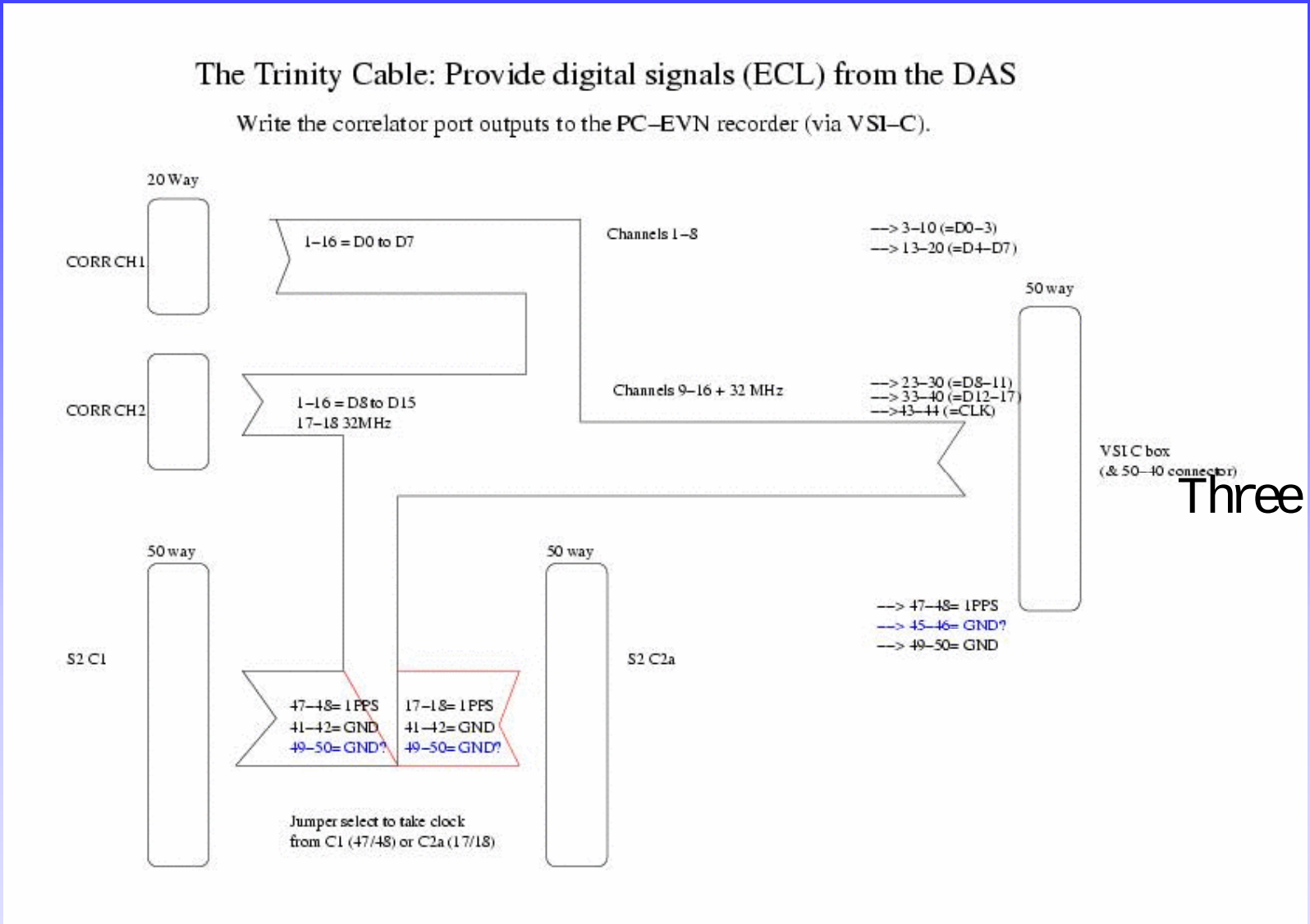
Therefore it provides 2 pol **and** 2 bands to the PC-EVN recorder. I.e. Doubled.

WICB it is so SIMPLE. Plug it in & Go.

LHC tone at 4813 Mhz, in VSOP mode: 1Pol, 4816-4800+4832-4816



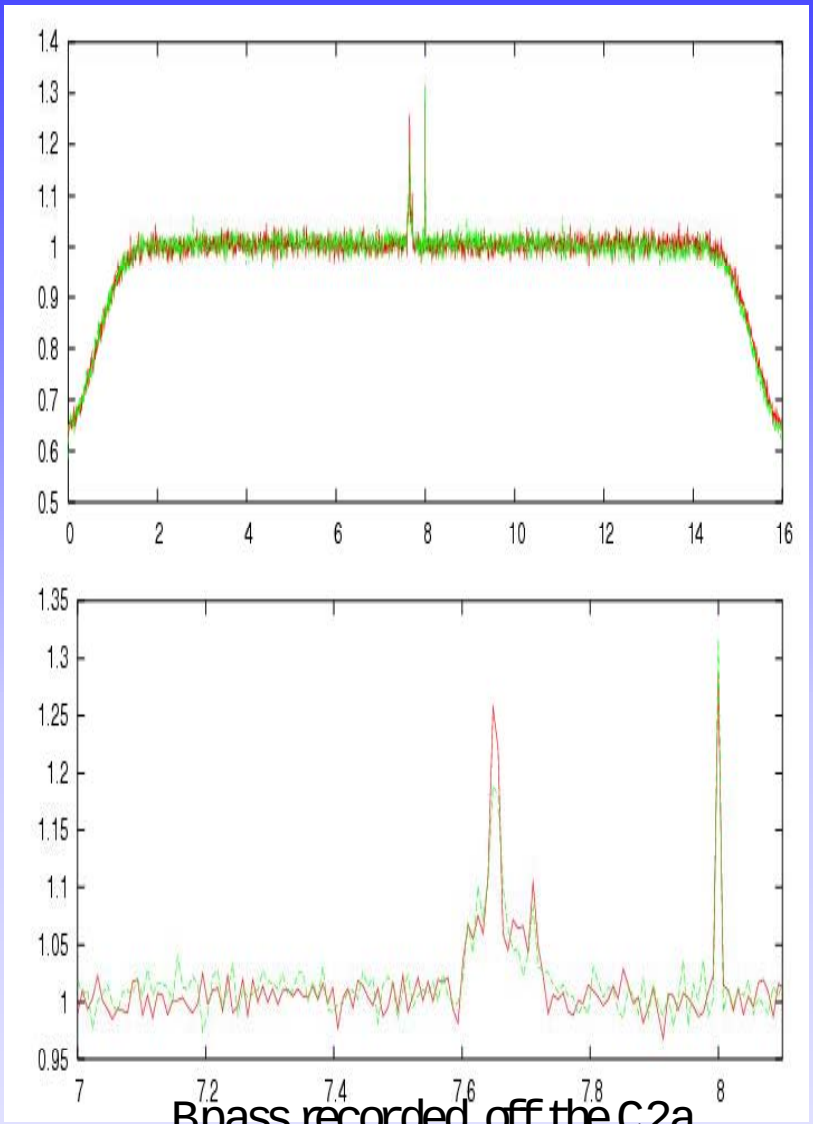
Stage 3
Give me everything!



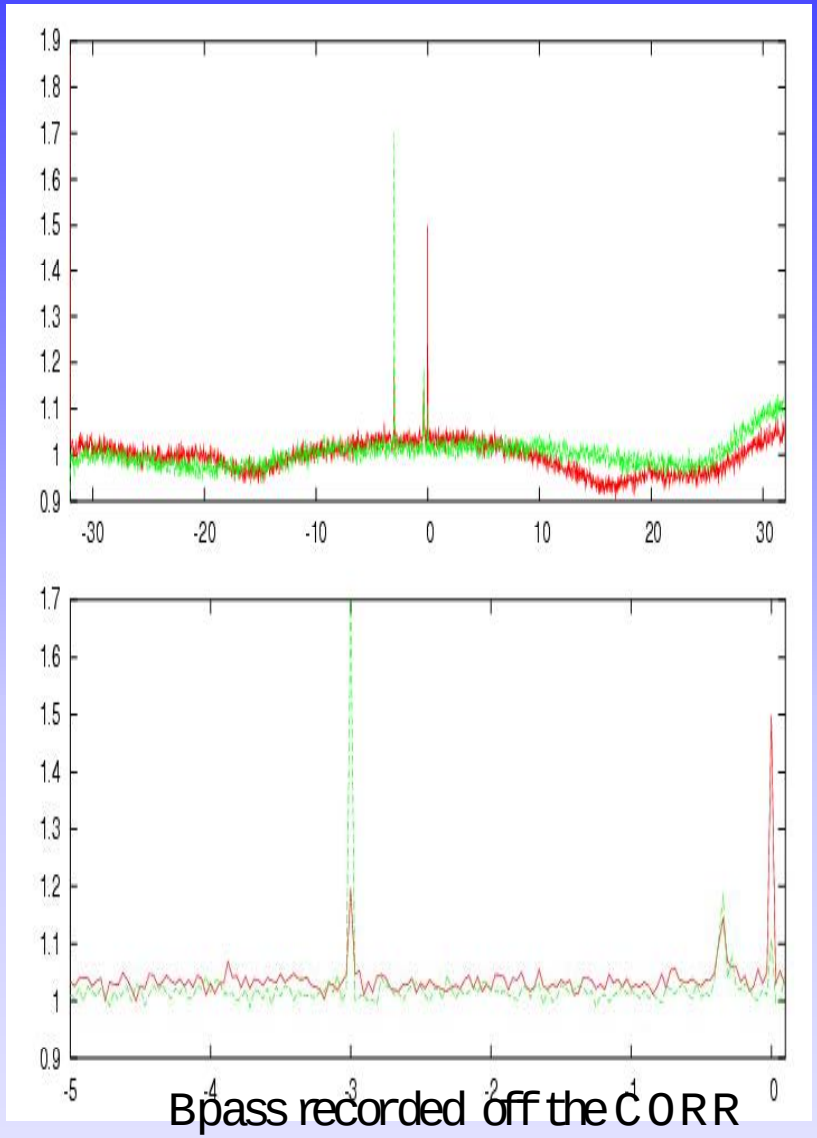
Three into one

Now called BG3 (originally the trinity cable .. no romance nowadays)

Plenty of mouth – any trousers? I.e. does it work?

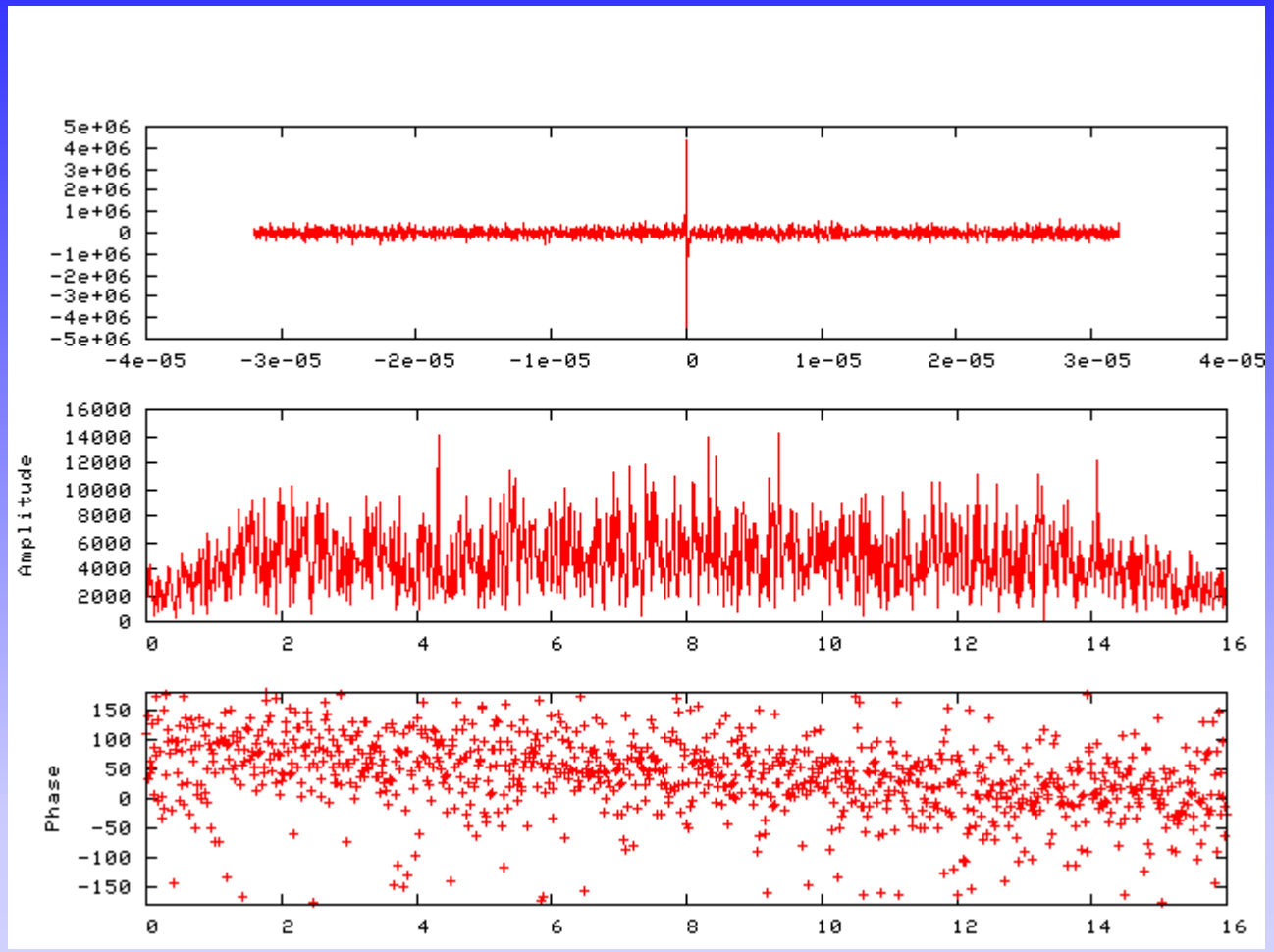


Bpass recorded off the C2a using BG2 during S2 record



Bpass recorded off the CORR using BG3

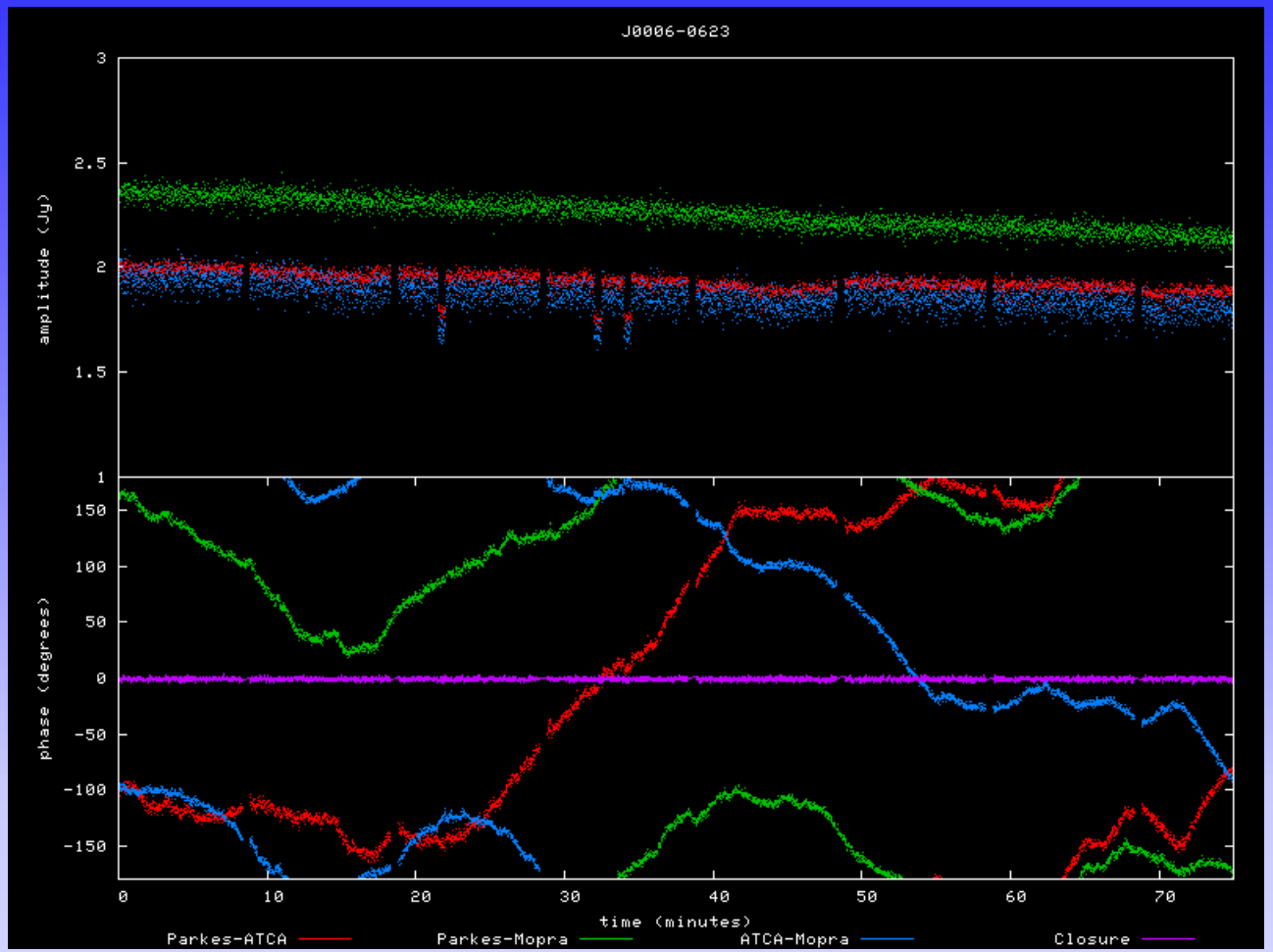
Does it work?



Fringe check from experiment vt001g, where data was recorded to tape and also Disk.

It is transfered to Swinburne for correlation in real time.

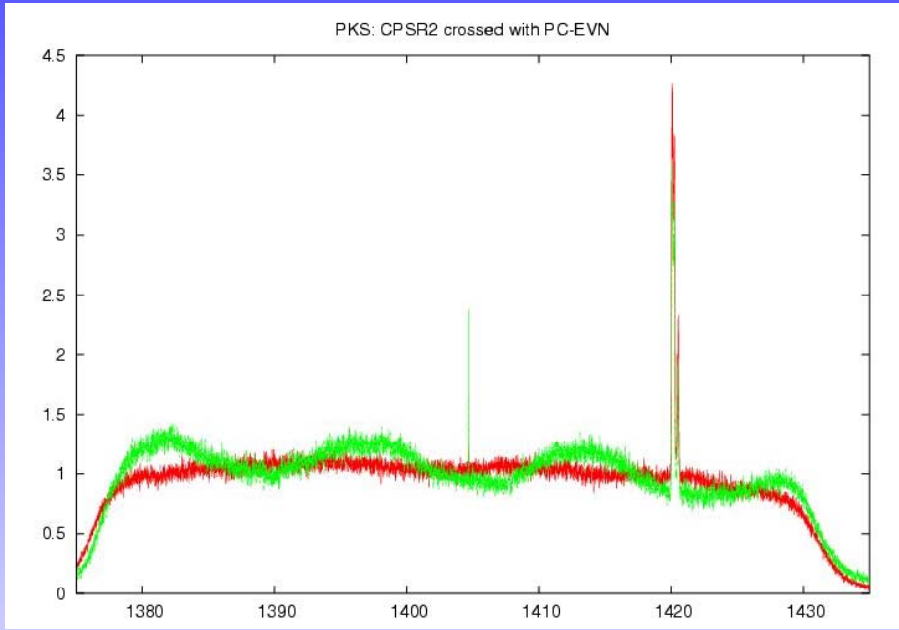
Does it work?

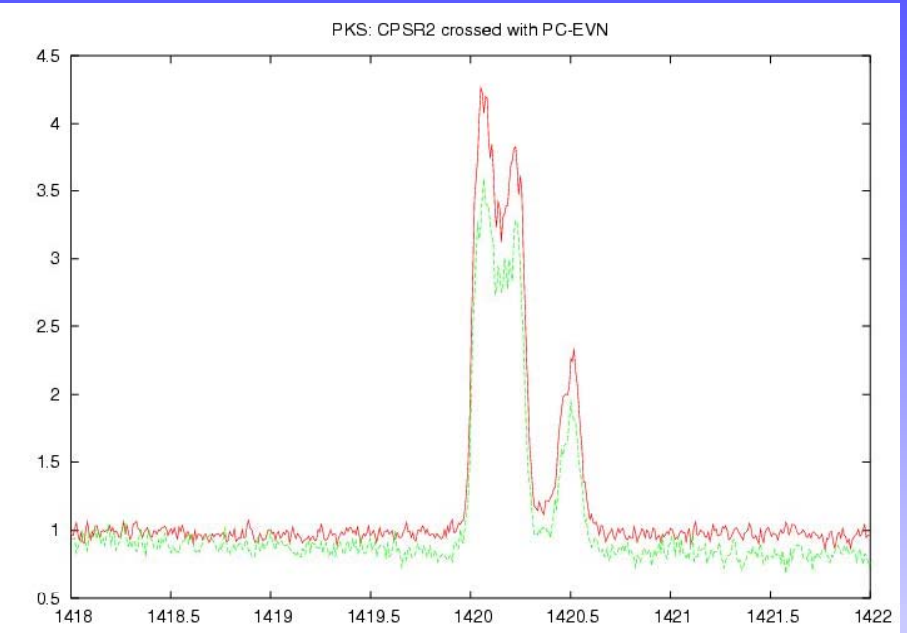


Closure phase from vt001e.

Data (2 polarisations, 2 frequencies, 16 MHz) recorded to disk and tranfered (by post) to Swinburne

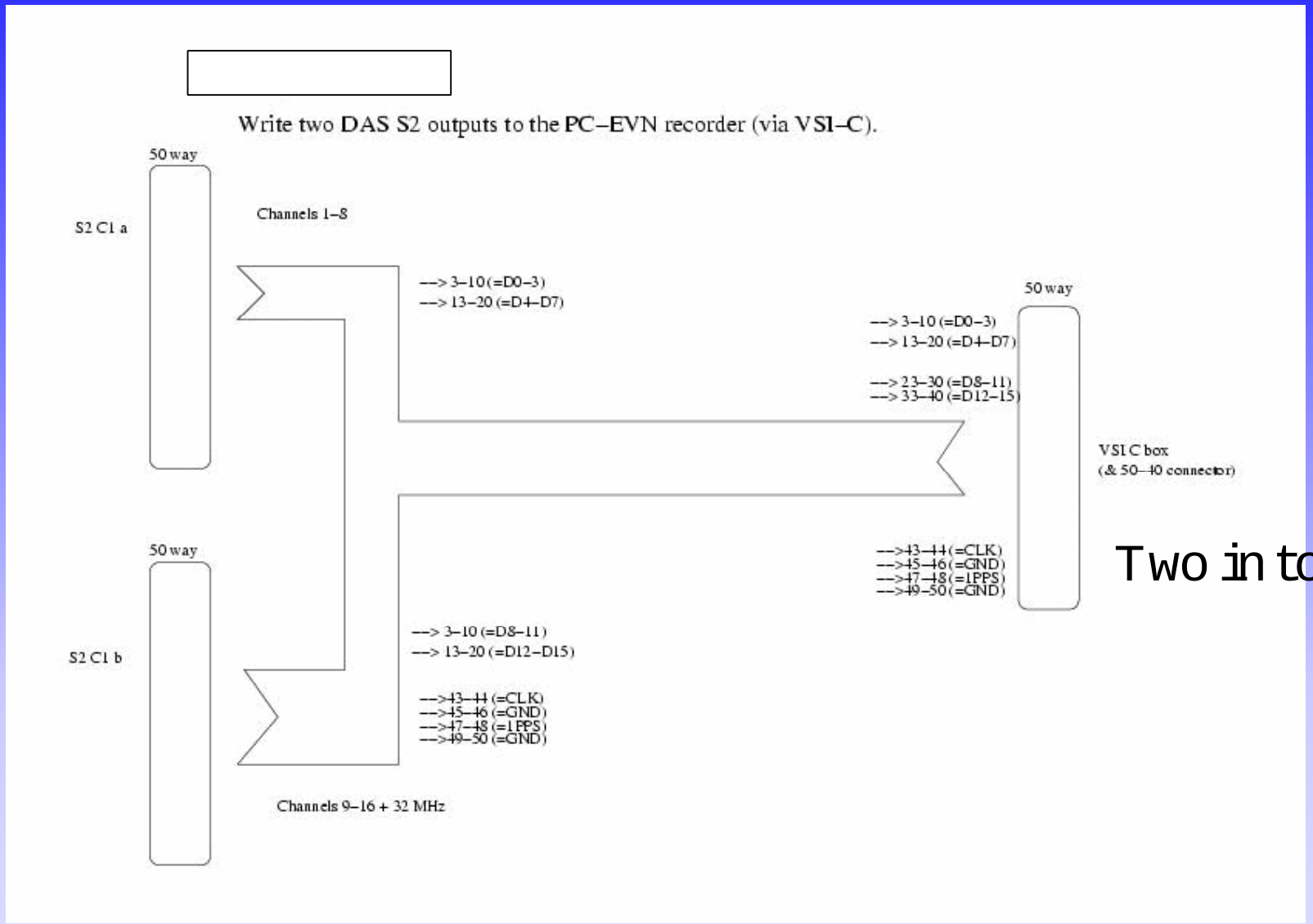
Does it work?





Cross correlation between PC-EVN recording at 512Mbps
(2 bit, 2 pols, 64Mhz) and half the CPSR2 (which records 2 frequencies)

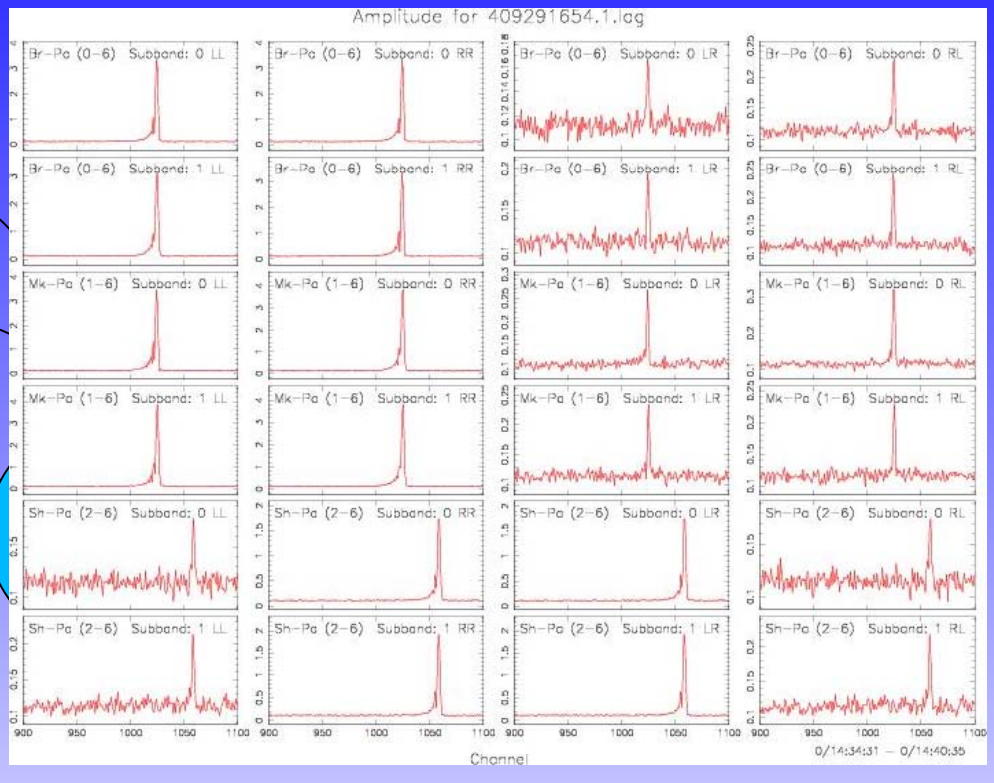
To Titan Toto!



Two in to one

The ANTF-DAS cannot provide wide coverage, but to match, say, MkV we combine two DAS'

PC-EVN's adventures in Oz



Leonid's talk on this.

We have used our system to record 0.5 Gbps and got fringes.

PC-EVN's adventures in Oz

we can:

- Do miscellaneous base band projects

- Record S2 data off the S2 formatter. I.e. Fringe check
- Replace the S2 on the S2 connector (limited to 4x16)

- Record the entire input to the DAS. (2x64)

- Using 2 DAS' we can record MkV-like 8x16.
- Using 2 DAS's and 2 PC-EVN's record 1Gbps of data & correlate with CPSR2 (½ done)

BUT

We have reached a bottle neck; with the PC-EVN & the DAS, but most of all people.

Never the less, we have plenty to be going on with.
We will collect & correlate 0.5 Gbps in 2005.

When that works we will think about the next system.

PC-EVN's adventures in Oz

Click your heels 3 times

Other issues in the future:

PC-EVN or MkVa/b?

VSIB++: 100MHz@64 bit PCI bus (cf. 33@32bit)?

HardDrives as a buffer & stream the files?

Fibreing up of UTAS baselines?

International eVLBI?

Australian experience with the PC-EVN recorder or back to reality

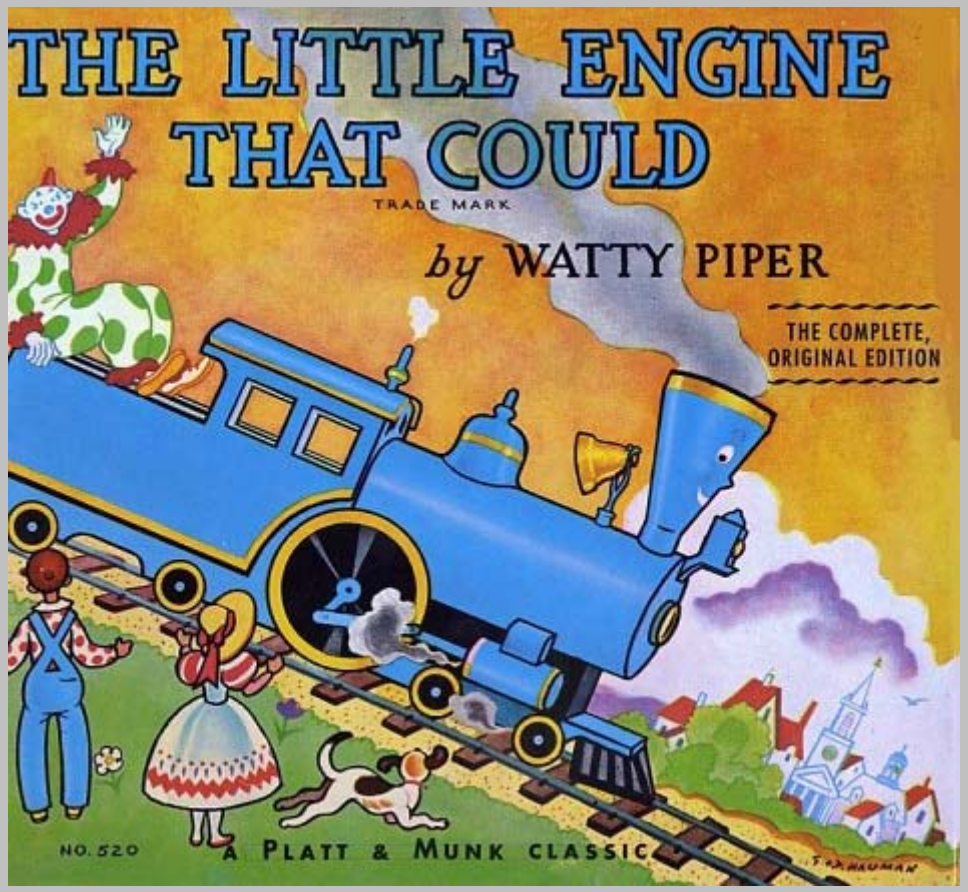
What do we do now?

–Buy more PC-EVN cards. We will have enough for two everywhere. Ordered

–SBA (ATCA, Mopra, Parkes) is of limited use. >Widen the fibering plans. Tid looks likely. >Applied for Hobart. Ceduna? New Norcia.

–Software correlator will (IMO) always be a development program (i.e. Not open access). >General Acccess Wideband will come with the real-time Narrabri correlator. That requires real time connections from all telescope.

Picture credits: Wizard of Oz, Hollywood. 14M, M. Howlett. Fringe checker & correlator, C. West. Pa fringes, S. Pogrebenko. LETC, P. Piper



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