The EVN Gbit/s e–VLBI data acquisition and playback system

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Original Goals

- Low cost
- Use of standard technology
- Minimal design work, fast deployment
- Modularity: Core VSI–H recorder + adapters
- 512 Mbit/s recording with one office PC
- Expandability: Gigabit/s recording with two of–fice PCs

Non–goals

(Things nice to have but not worth additional effort)

- Mixed–mode disk and tape sessions
  - No need, the new system is inexpensive
- Real–time VLBI
  - Internet is better in handling ftp than real–time data streams
  - Near real–time is easier and good enough
- Preserving the old tape formats

Things to Avoid

- Proprietary data formats
- Real–time data streams
- Need for guaranteed bandwidth
- VLBI–specific protocols
- Real–time operating systems

Initial phase

- Spring 2001: Evaluation phase
  - PCI interface: PLXtech vs. Xilinx core.
  - Architecture: Fifos, dual–port RAM, ping–pong buffers or bus–master DMA
- May–June 2001: First prototype
  - PLX prototyping kit connected to Xilinx evaluation card with flat cables
- June–July: Study of sustained disk perform–ance in Linux computers (Ari Mujunen)

Second prototype

- August 2001: First version of VLBA sampler to VSI converter
- September–October 2001: VHDL program–ming and simulation
- October–December 2001: VSI input module PCB design
- January 2002: Second version of VSI con–verter

The MRO Gigabit Solution

Just delay the 1PPS marker, that’s all.
Multi−Gbit/s data stream is fanned out to 2,3,4,5,6... units.

```
If rising_edge(VSIclk) then
  VSIdata2 <= VSIdata;
  pps_delayed <= VSI1pps;
  Pvalid2 <= Pvalid;
  if (gigabit_mode = ’1’) then
    VSI1pps2 <= pps_delayed;
  else
    VSI1pps2 <= VSI1pps;
  end if;
end if;
```

The "Metsähovi Milking Machine"

- Originally the board was to be a test vector generator and VLBA sampler interface
- Lots of differential signalling in VLBI: Made sense to wire all the signals to RS422/ECL line receivers.
- Oops, this thing can emulate Mark5, both for WDB and IOB cables, parity or no parity...
- And finally we needed a thumbwheel switch...

What we have now

- Three VSI input/output boards tested
- 512 Mbit/s sustained speed with one office PC
- Multi–gigabit/s speeds with several office PCs
- Compatibility with Mark5 and the Japanese Gigabit VLBI system
- Ready for volume production