UNDERSTANDING THE TIMESTAMPING FOR THE BEAM OUTPUT OF THE GSB

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This brief note describes the timestamp information that is presently available with the IA and PA data recordings carried out with the standard beam data acquisition software of the GMRT Software Backend.

Each recording command in the IA and/or PA beam chains of the GSB produces 3 files, of the following kind :

fname.raw
fname.hdr
fname.h4k

where fname.raw is the main, raw data file (binary format), fname.hdr is a timestamp header file (in ascii format), and fname.h4k is a diagnostic timestamp file (in binary format).

In order to get an accurate timestamp corresponding to the start of the GSB beam data recording, one needs to look at and decode the contents of the fname.hdr file. An example of the contents of this file looks as follows :

```
#Start time and date
IST Time: 14:51:55.031470080
Date: 17:12:2010
#Start ACQ SEQ NO = 9517
```

Here, the IST time and date for the first voltage sample of the acquisition are given, and the corresponding block number, counted since the start/triggering of the GSB, is given as the ACQ SEQ NO. The IST can be converted to UTC and used as the start time for the recording. The total time since the triggering of the GSB, can be estimated as ACQ_SEQ_NO * blk_time. The exact value of blk_time is 251.658240 msec (for both the 16 and 32 MHz modes of the GSB), based on a value of exactly 5.0 MHz for the external reference signal coming from the GMRT frequency standard unit, which is used to lock the sampling clock of the GSB.

As a cross-check / diagnostic, the GPS-based start time for the block (along with a PC-based timestamp for the block) is recorded for every N-th block (typical value of N is 8), in the file fname.h4k. This is

a binary file, which can be read and decoded by the sample program "read_h4k", available on the gsb machines at :
/mnt/code/gsbuser/bin/released/read_h4k .
This program reads a fname.h4k file and produces an ascii dump of the contents on the screen, which can easily be saved in an ascii file. A sample of this output looks as follows :

```
2010 12 17 15 20 48.050921 2010 12 17 15 20 48.312606720 3053
2010 12 17 15 20 50.064255 2010 12 17 15 20 50.325872640 3061
2010 12 17 15 20 52.077605 2010 12 17 15 20 52.339138560 3069
2010 12 17 15 20 54.090945 2010 12 17 15 20 54.352404480 3077
2010 12 17 15 20 56.104276 2010 12 17 15 20 56.365670400 3085
```

which is decoded as :

```
YYYY MM DD HH MM SS.SSSSSS YYYY MM DD HH MM SS.SSSSSSSSS SEQ_NO
```

The first date-time combination is the less accurate, PC-based timestamp, the second one is the exact, GPS-based timestamp, and the last quantity is the block number. The PC-based timestamp is typically off from the GPS-based time stamp by one block time, and can also fluctuate from the expected value by upto a few 10s of millisec. It should be used ONLY as a diagnostic, to check for lost data blocks, under which condition, the difference between these two timestamps will jump in multiples of the block time. The GPS-based timestamp and sequence/block number on the first line of this output should match exactly with the GPS-based timestamp in the fname.hdr file.