

LBA Disk Recorder Header Format

DRAFT

ATNF eVLBI Memo #3

Chris Phillips

November 15, 2005

1 Introduction

The LBA disk recorders currently use a very minimal header for recorded data files (a 16 byte string indicating the start time of the first data sample in the file). This is a problem for programs trying to decoding the baseband data as the file may contain 1 to 8 data channels, encoding using 2 or 8 bits and bandwidths of 32 and 64 MHz store samples in a slightly different time order than narrower bandwidths. This document describes a possible header format that could be added to the start of each data file.

2 Header Format

The header will consist of a 4096 byte block of ASCII characters. It will use a simple keyword/value syntax with each pair on a carriage return (<CR>) terminated line. It will be free format, case insensitive and the order of keywords is not important.

The last entry will consist of the line "END". The header block will then be padded with NUL's (0) to fill the full header size.

To facilitate a possible increase in the size of the header, one keyword (HEADERSIZE) will contain the size of the keyword. This keyword *must* be present in the first 4096 bytes of data.

3 Keywords

There will be three type of keywords:

Compulsory These are keywords which describe the format (number of channels, bits etc) and origin (i.e. telescope) of the data.

Recommended These are keywords which should be present if possible (sky frequency, band inversion etc)

Optional These are keywords which may or may not be present (e.g. observer)

3.1 Compulsory Keywords

TIME	<p>The time corresponding to the first sample in the file. This should correspond to an exact second, and the recorders should be synchronised to the 1 PPS. If this is not the case the fractional time offset can be set in the optional keyword TIMEOFFSET. The time code has the form YYYYMMDD-HHMMSS</p> <pre>TIME 20050821-150030</pre>
HEADERSIZE	<p>The size in bytes of the header block. Will usually be 4096 bytes, but may in the future be expanded. Note that if a larger than 4096 byte header is used, the headersize keyword <i>must</i> be within the first 4096 bytes.</p> <pre>HEADERSIZE 4096</pre>
HEADERVERSION	<p>The version number of the header. This will be a floating point number such as 1.0, 1.1, 2.3. (note that 1.13 is a lower version than 1.2)</p> <pre>HEADERVERSION 1</pre>
RECORDERVERSION	<p>The recording software version number</p> <pre>RECORDERVERSION 1.14</pre>
ANTENNAID	<p>The two letter code identifying the antenna. The codes used by the “Sched” scheduling software should be used.</p> <pre>ANTENNAID At</pre>
ANTENNANAME	<p>String describing the antenna. Should <i>not</i> be used to identify the antenna (use ANTENNAID). Used mostly for the benefit of someone using looking at the data.</p> <pre>ANTENNANAME Parkes 64m</pre>
EXPERIMENTID	<p>String including either project ID (e.g. vt02e2) or simple description of data (e.g test, 64 MHz test)</p> <pre>EXPERIMENTID v131ba</pre>
NUMBITS	<p>The number of bits used to encode each sample, typically 2,8 or 10. (Note that 10 bit sampled data is stored as 16 bits and bit extended).</p> <pre>NUMBITS 2</pre>
NCHAN	<p>The total number of channels recorded (typically 1, 2, 4 or 8).</p> <pre>NCHAN 4</pre>
BANDWIDTH	<p>The recording bandwidth. Note that 32 and 64 MHz bandwidths order the samples differently than bandwidth of 16 MHz and narrower.</p> <pre>BANDWIDTH 16</pre>

ENCODING Either “AT” or “VLBA” depending whether the (2 bit) data is encoded as offset binary or sign-magnitude

ENCODING AT

3.2 Recommended Keywords

FREQUENCY The lower band edge frequency of each channel in MHz, as a whitespace delimited list of floating point numbers (1665, 1665.0 & 1.665e3 are all valid). Note that this is the lowest sky frequency of the band is given. For inverted spectra this equals the effective LO minus the bandwidth.

FREQUENCY 8420 8420 8436 8436

POLARISATION The polarisation of each channel, as a whitespace delimited list of R or L (for Rcp and Lcp). The number of values must equal the number of channels

POLARISATION R R L L

SIDEBAND The sideband of each channel, as a whitespace delimited list of U or L (for non-inverted or inverted spectra). Note the Upper or Lower sideband corresponds to the net sideband after all IF down conversion and any inversion of the samplers.

SIDEBAND U U U U

3.3 Optional Keywords

REFERENCEANT The actual antenna position used for an “antenna” where there might be some ambiguity. Currently this is only useful for the ATCA where the reference antenna could be any of the many pad positions. For the ATCA the “W” form of the pad positions should be used.

REFERENCEANT W111

SOURCENAME The name of the source observed at the start of the data file. Note that the antennas may point to another source during the time-range contained within the file.

SOURCENAME 1921-293

SOURCEDIRECTION The source RA,Dec plus epoch of the source observed at the beginning of the file. The “epoch” should be J2000, B1950 or DATE.

SOURCEDIRECTION 19:24:51.055957 -29:14:30.121150 J2000

TSYS The Tsys in Kelvin of each data channel

TSYS 40 42 40 43

TIMEOFFSET An offset (in seconds) to be added to the start time of each data file, when the recording was not synchronised to 1PPS. This value could be ≥ 1 if the data is recorded with a integral second time offset.

TIMEOFFSET 0.23

CLOCKOFFSET The maser-gps (tickphase) measurement in seconds.

11.34e-6

OBSERVER Observers name. Free format

OBSERVER CJP

DATASOURCE Data source. Either LBADAS or Maxim

DATASOURCE LBADAS