Visualisation of Software Correlator Output

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1 Introduction

One of the first e-applications of the SFXC software correlator have been the so-called FTP-fringe tests. These tests have become a standard part of the observing sessions of the European VLBI Network (EVN). They are conducted to spot any problems with the setup at the telescopes before the actual science observation starts. SFXC has been used for this purpose since May 2007. Before that date, we used the KSRC/NICT software correlator package [1]. Using a correlator that is developed "in-house" for this purpose has many benefits. It is much easier to add support for new input data formats and new correlator modes.

For these tests telescopes transfer a small amount of data (typically less than 10 seconds) to JIVE using the FTP protocol. This transfer is started automatically by the field system running at the telescope. After the data arrives at JIVE a support scientist runs the correlator with the desired parameters on a single four-way SMP machine. This approach works quite well for small amounts of data but isn't really suitable for complete experiments.

2 Visualisation

In order to visualise the correlator output of these FTP-fringetests, we developed a web-interface that presents the results of the correlation. Using a web-interface has an important benefit. It makes it very easy for us to "publish" results of tests. This is very important for the FTP-fringetests as their main purpose is to give feedback to the telescope operators. An example of the results generated for such an FTP-fringetest is shown in figure 1. A "live" example can be found at `http://www.evlbi.org/tog/ftp_fringes/N09C2/scan48/index.html`.

The most important information is encoded in color. If there is a detection ("fringe") on a certain baseline for a certain sub-band, the corresponding part of the page is colored green. If there is no detection, the corresponding part is coloured red. A color somewhere in between red and green indicates a marginal detection. This allows operators to immediately see whether their telescope is operating correctly; they should see only green for the baselines containing their telescope.

To assist diagnosing problems, more detailed information is available. This includes plots for various aspects of the auto-correlation and cross-correlation functions. This informations includes:

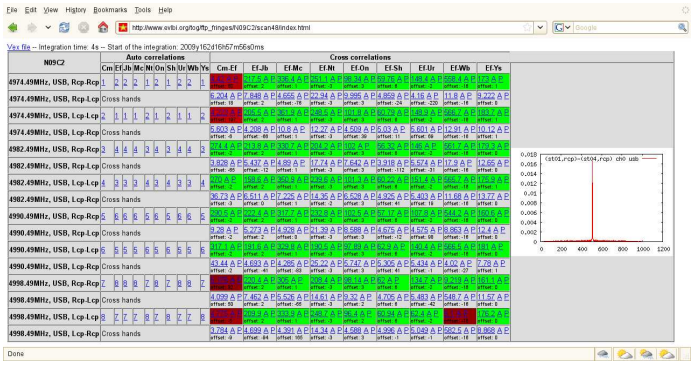

Figure 1: Web page presenting the results of an FTP fringe test

- S/N ratio for the fringe; the larger the number the better! If the mouse is positions over this field, a fringe plot for the corresponding sub-band of a baseline is shown.
- Spectrum of the autocorrelation function. This is useful for checking if there is any signal at all in a subband, or checking if the subband is affected by RFI.
- Amplitude/Phase plots of the cross-correlation function.
- Offset (in lags) of the fringe from the center. This gives an indication of the combined clock error on a particular baseline.
- Cross-polarizations (when applicable). These are useful for detecting swapped polarisations or mis-tuned polarization converters.

The web pages and graphs used for this interface are automatically generated from the correlator output and the VEX file that describes the observation. The is done using the `produce_html_plotpage` command. The syntax of this command is:

```
produce_html_plotpage [-f] <vex-file> <corr-file> [<output-dir>]
```

Here `<vex-file>` is the name of the VEX file that describes the observation, and `<corr-file>` is the output file generated by the correlator.

The optional `<output-dir>` specifies the directory in which the generated files for the web page are stored. If no output directory is specified the files will be generated in the current directory.

If the optional -f parameter is specified, existing files in the output directory are overwritten, which is useful if data was re-correlated using different parameters.

The visualisation software is distributed as part of the software correlator.

References

[1] T. Kondo, M. Kimura, Y. Koyama, H. Osaki, *Current Status of Software Correlators Developed at Kashima Space Research Center*, in proceedings

of *International VLBI Service for Geodesy and Astrometry 2004 General Meeting*, Ottawa, 2004