SKA Eng Mtg, Penticton

Thoughts on Clock Offset Scheme
RT Approach

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Outline

• What is it?
• Why do it?
• Investigation approach
What is it?

Sample data at each antenna at a “slightly” different sample rate, $f_{\text{ant}}$.

- Not clock dithering.
- Antenna digitizer sees a sample clock as usual, it is just that its frequency is slightly different (few hundred kHz/few MHz less) than the “spec’d” clock rate.
- Phase of $f_{\text{ant}}$ is predictable on every $f_{\text{common}}$ clock cycle.
- Before correlation, the $f_{\text{ant}}$ sampled signal is digitally re-sample to $f_{\text{common}}$ before channelization and correlation.
- Some band edge bandwidth is lost...usually throw-away anyway.
Why do it?

• Self-interference in the sample signal that is a function of $f_{\text{ant}}$ is “imprinted” in the signal.
• This includes birdies from interleaved samplers.
• Aliased signals whose frequencies are a function of $f_{\text{ant}}$ are also present.
• After re-sampling to $f_{\text{common}}$ these signals don’t correlate and correlation is prop $1/(2\pi T_{f_{\text{diff}}})$
Investigation Approach

• Benefit analysis—first cut has been done, hence this investigation. Need to formalize and peer review.
• Negative effects analysis...data/science quality.
• Signal processing modelling—Thushara Gunaratne CSP Memo 12 completed. Need to peer review.
• SKA1 MID timing system analysis – SaDT/SAT, DISH, CSP. First discussion this meeting.
• DISH and CSP preliminary design investigation...is it feasible?
• Write report; TT sign-off.
• Anything missing?
Questions?

Thank-you