poster AG First-TF 2016

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hello

## Aims of the First-TF CAN working group

Create exchange and develop high-precision digital methods and realtime instrumentation.

- Fully digital signal analysis, quantification, noise
- Servo controls
- Digital Lockin amplifiers
- DDS & PLL
- Atoms & objects manipulations
- Time to Digital converters, Electronic counters
- Noise generators, . . .
- GPS systems
- Time in Networks
- Software-defined Radio
- Open-Source instruments

Research, Amateur Radio, Education, Popularization

Application: A dds-based phase and frequency tracking system

Applications under investigation: GPS, precision PLL, controllers, analyzers (noise/stability meters), synthesis chains, clock transfer...
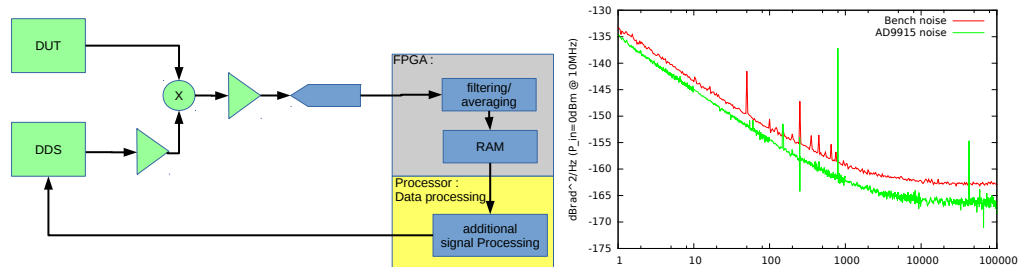
- DUT & DDS are maintained in quadrature

- The controller tracks the phase and the frequency

- A low-cost experiment (Redpitaya or Zedboard with LTC2158, AD9915 eval board) provides easily 3 ms phase tracking and 0.7 s frequency rates

- Prefiltering stages within FPGA (e.g. Box car with 2^{18} averages lead to a time constant of 2 ms)

- Servos implemented either realtime or userspace depending on chosen sensitivity (allows for saving ressources).

For the sake of reconfigurability demonstration and ease development, we present here simple tests on medium quality quartz oscillator while data analysis is performed through the embedded CPU unit. Concurrent RAM transfer and calculations benefits from multithreaded techniques.

Phase Correction

Frequency Measurment (Red HP53132A ; Blue Redpitaya)
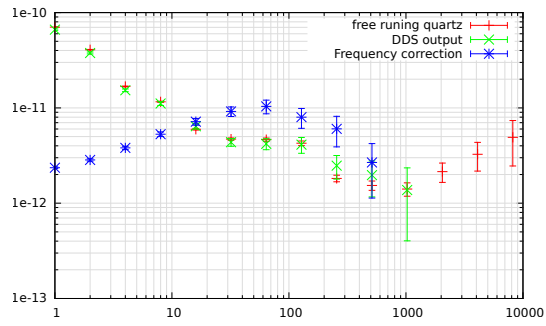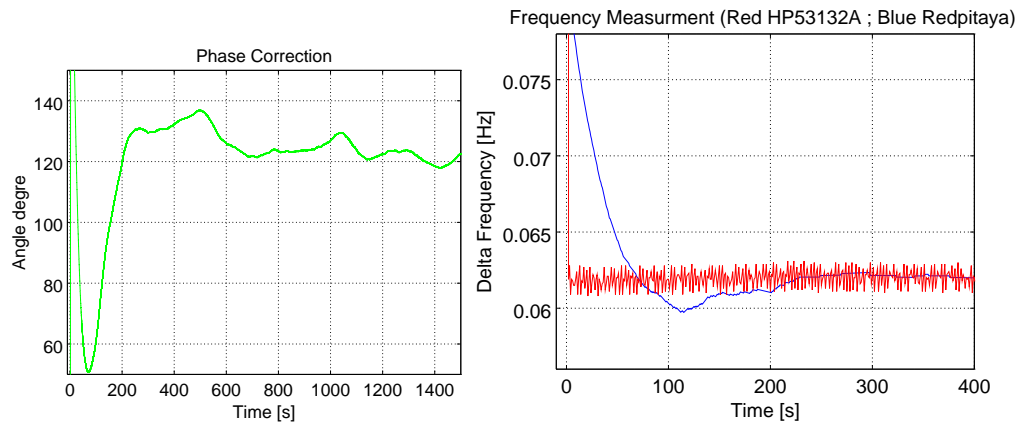
- red: spare free-runing quartz oscillator (meas: HP53132A)

- green: stability measurement at DDS output

- blue: Frequency correction calculation