Justin Cray

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AMRUPT, SP18

**Goals**

My goals for the week were to develop both a list of questions for Prof. Kan and also to update the technical approach as per our new SDR architecture. This involves largely modifying previous work. See attached for some progress.

**Problem**

Here are Dr. Kan questions:

1. What is the nature of the SDRs you use in your work? How similar are they to the RTL?
2. What precision is required for clock?
3. Sampling rate?
4. What is the purpose of the noise card?
5. What parts are essential in the clock card?

**General Approach**

The focus of my problem solving this week was meeting with Dr. Kan in order to elaborate on the architecture, how it works and what parts are essential for a redesign. I hope to better understand how he envisions modifying the coherent-receiver architecture.

**Planned Course of Action**

Once I have Dr. Kan’s information (and some from Julian) I will update the final report content.

**V. Coherent Detection**

**I. Receiver**

The coherent-detector SDR is based on the improved RTL-SDR v.3 dongle with slight modifications. The TCXO 28.8 MHz was eliminated from the dongle and additional headers were added.

**II. Clock Card**

The clock card provides a clock signal for all of the SDRs and would also be sent to the Raspberry Pi. It generates a 28.8 GHz signal. This gives us better stability in the system due to the shared clock and will help with clock drift.

The clock card includes the following components:

* **TXCO 28.8 MHz**
  + *Default***:** 2 PPM initial offset, 0.5-1 PPM temperature drift.
  + *Optional***:** higher precision (0.1/0.5/1.0 ppm) is available on request.
* **Buffer Gate**
* **Clock Buffer**
* **LPF** (cut-off 35 MHz)
* **SMD LED indicators**
* **I2C interface**
* **I2C 8bit Register**
* **Power indication LED** (+3.3 V)
* **Ultraminiature Coaxial Connectors**

Note the I2C interface which the clock signal is sent over. This is what can be used for the Pi or other peripherals. Also note the Ultraminiature Coaxial Connectors. These are installed on the card in order to distribute the clock frequency to all receivers using coaxial pigtails.

**II. Noise Generator**

The Noise Generator Card is used to calibrate the initial latency in the channels of coherent receivers. This time delay occurs due to the signal propagation delays between antenna, input circuits, tuner, etc. as well as different bootstrapping time.