Hardware Lab 2: FM Modulation and Demodulation

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Aim of the experiment

- Using DVB – T (RTL – SDR) dongles to receive and demodulate locally transmitted FM signals.

Task 1: FM player

- Use the RTL-SDR dongle to build an FM player using GNU Radio.
- Your GUI should have a mechanism for choosing the FM frequency.

*You are allowed to use the built-in FM demodulation block from GNU Radio for this task.

Task 2: FM demodulation using RTL-SDR

This experiment should be performed with your own demodulation flow and **built-in FM demodulator is not allowed.**
To demodulate FM signals, you need to find the phase of the incoming sample and differentiate it with respect to time to obtain the transmitted signal.

- To demodulate the FM signal, tune your RTL-SDR block to the desired frequency **(950MHz)**. In this case, the frequency needn't be precise.
- Get the phase of the incoming signal: You can use 'Complex to Arg' block for this operation.
- Take the difference between the arguments of n^{th} and $(n-1)^{th}$ samples to obtain the demodulated message signal.
- You can use the 'Low Pass Filter' block after demodulation to filter out the out-of-band noise and down-sample (using decimation value) the signal to 32 kHz (audio card sample rate). What would be the decimation factor? Observe the demodulated spectrum and listen to the Audio. The above steps have to be carried out for the signal generated by **your own FM modulator**, and for the **FM signal from your favourite FM station.**