Lab C-1: Designing a Block in GNU Radio

Points 200

Objective:

- To develop a processing block for GNU Radio Companion.
- To implement basic packet frame and handle transmission and reception of the packets.

Description

Part 1 (100 points) –REPORT AND IN-CLASS UPDATE!!! – prepare power point or other document to present in class.

Create two processing blocks in GNU Radio

1) Packet Creator
    a. Should accept stream of raw user input data
    b. Should generate packetized stream of output data
    c. Packet should include the following fields:
        i. Fixed ***preamble*** – 2 bytes (binary= 0011 0111 1000 1001)
        ii. ***Flow id*** field – 1 byte – configurable by user as property of the block, used to filter packets only from the particular flow
        iii. ***Packet size*** (size of data) – 1 byte – configurable by user as property of the block
        iv. ***User Data*** – n bytes of payload (raw data from the block input)
        v. Simple ***checksum*** – 1 byte – to verify correctness of the data in the packet
    d. Packet size and flow id should be configurable – as properties of the block (properties menu in GRC)
2) Packet Receiver
    a. Detect preamble in the input stream (drop the remaining input items)
    b. Once the preamble is detected, match the ***flow id*** (field in packet and the block property).
    c. Output data only if the preamble and flow if are matched
    d. Print warning if error detected (checksum field does not match)

Part 2 (100 points) – IN-CLASS PRESENTATION (e.g. power point) + REPORT

Design a set of tests to demonstrate the blocks and run a set of simulations to study performance the blocks (e.g. under varying noise, number of errors, etc.). Provide tabulated or plotted performance metrics. Use one of the modulations and channel models available in the GRC!

Deliverables

1. Main source files with implementation
2. Example project in GRC that uses the blocks
3. Documentation of the project (report)
4. Demo of the project to the instructor

Highly recommended tutorials:

- http://www.youtube.com/playlist?list=PL618122BD66C8B3C4&feature=plcp
- https://wiki.gnuradio.org/index.php/Tutorials
- https://wiki.gnuradio.org/index.php/OutOfTreeModules
- **Writing the XML file for a block** (for 3.7)
- **Writing the YAML file for a block** (new in 3.8)
- https://wiki.gnuradio.org/index.php/Guided_Tutorial_GNU_Radio_in_C%2B%2B (Block in C++)