User Logic Protocol Check Simulation

Ola S Grøttvik – 22nd September 2017

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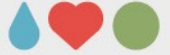
Features

- Automatic configuration of User Logic via Avalon by provided config.txt using Avalon VVC
- Concurrent data injection with multiple GBT links by provided data*.txt using GBT VVC
- Concurrent test of packet protocol on both User Logic Outputs
- Purpose: To be able to test various User Logic implementations and let each detector group provide their own realistic data streams and configuration
- Possible to extend the test to both check protocol AND data
- Assumption: User Logic will always have the same interface, with varying amount of GBT links
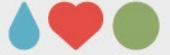
Directory overview

```
├── config.txt                          — Contain instructions to configure User Logic
├── data0.txt                           — Contain data stream for link 0
├── data1.txt                           — Contain data stream for link 1, * can increase # links
├── README.md
├── script                              — Compilation scripts
│   ├── 1_compile_src.do                — Compilation of User Logic source. May be edited.
│   ├── 2_compile_util.do
│   ├── 3_compile_tb_dep_ex_util.do
│   ├── 4_compile_tb.do
│   ├── 5_simulate_tb.do
│   ├── compile_all_and_sim_tb.do
│   └── wave_tb.do
├── sim
└── tb
    ├── test_pkg.vhd                     — Contain the test procedure. Easily configurable
    ├── text_parse_pkg.vhd               — Functions and procedures for parsing text files
    └── user_logic_tb.vhd                — Instantiation of DUT, test sequencer, etc
```

NOTE – This directory is found as part of the simulation repository. The GBT VVC is located in another directory. The location of the user logic source is specified in common.ini.

Configuration of User Logic

- Text file with fixed format

- Requires exact amount of bits

- TB will automatically write the values to the specified registers on startup

- No action occurs until after instructions are executed

- Parsing does not like extra lines, etc

```
FAILURE #1  ***
        Trying to send undefined Avalon instructions! Check your config.txt file.
```

```
Address   Data

00000010  FFFFFFFF
00000014  AAAAAAAA
00000018  BBBBBBBB
0000001C  11111111
00000020  22222222
00000024  33333333
00000028  44444444
0000002C  55555555
00000030  66666666
00000034  88888888
00000038  99999999
0000003C  CCCCCCCC
```
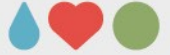
GBT Links

- # of GBT Links specified with constant NUM_GBT_LINKS in user_logic_tb.vhd. Default value=2

- One data file for each link

- Requires exact amount of bits

- Parsing is done for all links before transmission starts automatically when configuration is completed

GBT Data Words

```
000000000000000000000000000000
000000000000000000000100000000
000000000000000000000000000000
000000000000000000000000000000
000000000000000000000000000000
8000010FFFFFFFFF00000014AAAAAAA
80000018BBBBBBBB0000001C111111
80000020222222220000024333333
80000028444444440000002C555555
80000030666666660000034888888
80000038999999990000003CCCCCCC
000000000000000000000000000000
000000000000000000000200000000
```
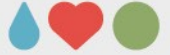
Steps for running

- Modify common.ini to point to User Logic source directory

- Add all source files to 1_compile_src.do

    - If the given User Logic requires other libraries, the compilation of these libraries may also be done from this file

- Provide config.txt and a given number of data*.txt files

- Select value for NUM_GBT_LINKS constant

- Run with: vsim -do compile_all_and_sim_tb.do

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