

# **CRU Simulation and Verification**

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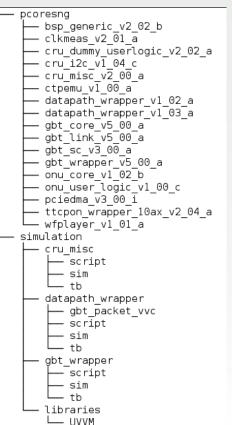
- Currently 3 simulation setups
  - cru misc
  - gbt\_wrapper
  - datapath\_wrapper
- Usage of Bitvis UVVM for randomization and concurrency
  - Especially useful for testing multiple interfaces at once
  - Produces log with all necessary information
  - Control of verbosity
- Current version reflects internal release v20170820 + bugfix



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- Simulation folder must be placed with the core-folder to function
- All simulation runs are automated by tcl-scripts
- Howto for run is found in each simulations README.md
- Updating core versions must be reflected in common.ini which serves as the basis for all created prerequisites for the simulations

```
[structure]
cores_folder=pcoresng
[core_versions]
cru_misc=cru_misc_v2_00_a
clkmeas=clkmeas_v2_01_a
datapath_wrapper=datapath_wrapper_v1_03_a
gbt_core=gbt_core_v5_00_a
gbt_link=gbt_link_v5_00_a
gbt_sc=gbt_sc_v3_00_a
gbt_wrapper=gbt_wrapper_v5_00_a
```







- cru\_misc
  - Targets the Avalon IC Module
  - Multiple Avalon VVC for concurrency
  - Multiple levels of ICs and slaves
  - Default checks. Read/write access.
  - Randomization of data
  - Randomization of timing





### cru\_misc from README.md

\$ cd ./sim

\$ vsim -do ../script/compile\_all\_and\_sim\_cru\_misc\_tb.do

### Example log message

```
ID_BFM 125447.5 ns AVALON_MM_VVC,0 avalon_mm_check_response(A:x"9005000E",x"7A6CA16A")=>
OK, received data = x"7A6CA16A". 'Check reg'
```





- gbt\_wrapper
  - Targets the gbt\_wrapper module
  - Register read/write via Avalon VVC
  - Check GBT data transmission
    - GBT frame
    - Wide frame
    - Raw
  - Currently only one link, but will be upgraded





## gbt\_wrapper from README.md

- \$ cd ./sim
- \$ quartus\_sh -t ../script/generate\_ips.tcl
- \$ vsim -do ../script/compile\_all\_and\_sim\_gbt\_wrapper\_tb.do





- datapath\_wrapper
  - Check packetized GBT data transmissions to the datapath\_wrapper
  - Register read/write via Avalon VVC
  - Multiple concurrent links via GBT Packet VVCs
  - Randomized packet length, data, idle words
  - Check for link ID, packet length, packet drops, etc





## datapath\_wrapper from README.md

- \$ cd ./sim
- \$ quartus\_sh -t ../script/generate\_ips.tcl
- \$ vsim -do ../script/compile\_all\_and\_sim\_tb.do





- Status: Work in progress
- Currently in private gitlab repository
  - https://gitlab.cern.ch/ogrottvi/cru\_simulation
- Request access: ola.slettevoll.grottvik@cern.ch





