Version 10.1 Xilinx Tools Update

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Overview of the CASPER Library

- Platform independent DSP library
  - Blocks can be used on any CASPER board (BEE2 or iBOB, ROACH coming soon...)
  - However using the Xilinx System Generator restricts our library to Xilinx chips

- Large set of parameterizable DSP building blocks
  - FFTs (tunable bandwidth, number of channels, real or complex)
  - PFBs
  - Accumulators

- All library blocks are built from Xilinx primitive blocks
- Matlab scripts ("mask scripts") are used to configure parameterized blocks
Example – Adder Tree

Adder Tree block diagram

Adder tree mask script
History of the CASPER Library

- Astro Library aka “Pink Blocks”
  - A collection of many separate libraries (FFT, PFB, Correlator)
  - Difficult to debug/maintain (uses Matlab scripts rather than functions)

- Casper DSP Library v 7.1 aka “Green Blocks”
  - Gathered together astro lib and added some commonly used blocks (e.g. power, pos_edge)
  - Simplified debugging with Matlab functions (that can be run on the command line)

- Casper DSP Library v 10.1
  - ROACH-compatible version of the Casper library
Why port to 10.1?

- **Virtex 5 and ROACH**
  - Version 7.1 designs can’t be compiled for Virtex 5 chips
  - Virtex 5 chips require the Xilinx blockset introduced in version 9.1 of the tools

- **Matlab/Simulink support**
  - Matlab and Simulink have proven to be buggy platforms for development
  - We hope by keeping up with the latest versions of the tools more Matlab and Simulink bugs will be resolved

- Easier for collaborators to get licenses
Overview of Porting to 10.1

- Joint effort between KAT (Andrew Martens) and CASPER (Mark Wagner, Terry Filiba)
- Updates to Xilinx primitive blocks require updates to every block in our library
- xlUpdateModel
  - Tool to replace old Xilinx blocks with the new ones
  - This only solves half the problem…
- Mask scripts must be updated by hand to find references to old Xilinx blocks
- A test case will be added for each block to help maintain library consistency
Roadblocks in Porting

- Digging through the mask scripts to find updates to:
  - Block names
  - Parameter names (some were just pluralized between 7.1 and 10.1)
  - Parameter types (check boxes, drop down lists, radio buttons)
- Testing and debugging large blocks (PFB and FFT)
- New Simulink bugs in the form of
  - Segmentation faults
  - Issues loading the library
XSG 7.1 vs 10.1 Blocks

Version 7.1 Slice

Version 10.1 Slice
Current Progress

- All blocks have been run through xlUpdateModel
- All of the mask scripts have been updated
- We are in the process of simulating the blocks in Simulink
- The large blocks (FFTs and PFBs) still require thorough testing but most of the smaller blocks are working correctly

- Details for each block are available on the wiki http://casper.ssl.berkeley.edu/wiki/index.php?title=DSP_Blockset_Port
Future of the CASPER Library…

- Waiting on a working ROACH board to test the library on the hardware
- In the meantime blocks that simulate correctly can be compiled for BEE2 or iBOB for verification
- Nightly verification using regression testing
- Documentation, documentation, documentation
- Addition of blocks from collaborators (either in Casper library or in other libraries created by you)