WR Switch and WR PTP Core
status and plans

Greg Daniluk, Adam Wujek

CERN BE-CO-HT

14 March 2016
Outline

1. WR Switch
   - Gateware
   - Software
   - Plans for the future

2. WR PTP Core
   - Release v3.0
   - Plans for the future
WR Switch - overview

- central element of WR network
- 18 port gigabit Ethernet switch with WR features
- optical transceivers: up to 10km, single-mode fiber
WR Switch - overview

- Central element of WR network
- 18 port gigabit Ethernet switch with WR features
- Optical transceivers: up to 10km, single-mode fiber
WR Switch - overview

- ARM CPU
- Xilinx Virtex6 FPGA
- 64MB DDR2
- 256MB NAND
- 8MB boot flash
- Clocking resources
- 18 SFP cages
- Power supply 12V DC 80W
- Cooling FANs
- Debug ports
- 10 MHz in/out
- 1-PPS in/out
- Management ports
- Front panel
- Back panel
- Power supply
- Status
Outline

1. WR Switch
   - Gateware
   - Software
   - Plans for the future

2. WR PTP Core
   - Release v3.0
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Gateware release v4.2

Released on 28 August 2015
Gateware release v4.2

- 10MHz generation (only hardware v3.4)

G. Daniluk, A. Wujek
Gateware release v4.2

- Improved Ethernet switching
Gateware release v4.2

- HDL watchdog module
Gateware release v4.2

- autogenerated SDB metadata for firmware information

Virtex-6 FPGA

- Optical transceiver 1..18
- Xilinx SerDes 1..18
- Endpoint 1..18
- Switching Core
- Timestamps FIFO
- Version info
- Wishbone crossbar
- Watchdog
- Routing Table
- SDB
- Network Interface
- Stats Counters
- CPU/Wishbone bridge
- 10 MHz gen Timing subsystem
- clk2 output
- Tunable oscillators

G. Daniluk, A. Wujek
Stress-testing Ethernet switching

- Smartbits 6000C network tester
- 4 point-to-point streams
- Snake test
Point-to-point streams
# Point-to-point streams

## WRS firmware v4.0

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Snake test

RJ-45

VLAN1 VLAN2 VLAN3 VLAN4 VLAN5 VLAN6 VLAN7 VLAN8

WR Switch

WR PTP Core

G. Daniluk, A. Wujek

WR Switch and WR PTP Core

10/25
Snake test
Snake test

WRS firmware v4.0

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  - Improved root password handling
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  - Move runtime configuration to it (ppsi, ports, SFPs, fibers)
  - Configuration of management port (static, dhcp)
  - Make config on switch
  - Improved root password handling
- Snmp
  - Redesigned MIB
  - Added about 150 new OIDs
Software (since 4.1.2)

- 4.1.2 released on 12 December 2014
- Monit to supervise processes
- Setting system time from the WR time (in Slave mode)
- Remote configuration (dot-config)
  - Download in runtime
  - Move runtime configuration to it (ppsi, ports, SFPs, fibers)
  - Configuration of management port (static, dhcp)
  - Make config on switch
  - Improved root password handling
- Snmp
  - Redesigned MIB
  - Added about 150 new OIDs
  - Divide objects into Status and Expert groups
Improved LED signalization on the front panel
- Disable status LED during clean reboot
- Status port shows port configuration (master, slave, non-wr)
Software (since 4.1.2) (cont.)

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  - use hysteresis to control fans’ speed (for development)
  - print dot-config source and status after logon
Outline

1. WR Switch
   - Gateware
   - Software
   - Plans for the future

2. WR PTP Core
   - Release v3.0
   - Plans for the future
Ongoing work and plans for the future

- **Gateware**
  - Get rid of HWIU module
  - Separate resources in the Switching Core for HP frames
  - Holdover and switchover
  - Caching for RTU decisions
Ongoing work and plans for the future

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- Get rid of HWIU module
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Software
- Change the names of the interfaces from wr0-17 to wri1-18
- Include Vlans configuration into dot-config
- Link Layer Discovery Protocol (LLDP)
- PPSi audit and compliance tests
- Buildroot and Linux kernel uplift
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- HDL core
- Ethernet MAC with WR features
- WR implementation for the nodes
**WR PTP Core - overview**

- **HDL core**
- **Ethernet MAC with WR features**
- **WR implementation for the nodes**

![Diagram of WR PTP Core]

- **SFP**
- **PHY (GTP, GTX, ...)**
- **Flash / EEPROM**
- **Tunable oscillators**
- **Endpoint**
- **Fabric redirector**
- **UART**
- **Periph**
- **SoftPLL**
- **1-PPS**
- **Lattice Mico32**
- **RAM**
- **mini-NIC**
- **Control Wishbone I/F**
- **Pipelined WB MAC I/F**
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What’s new in release v3.0

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- Bugfixes to withstand heavy traffic
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- SDBFS and Flash support
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- Increased RAM size to 128kB
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Talk by Alessandro on WRPC software tomorrow.
Thank you! It’s time for demo...

More information:
http://www.ohwr.org/projects/white-rabbit/wiki/Switch
http://www.ohwr.org/projects/wr-cores/wiki/Wrpc_core
Demo setup