New WRS-4
Introduction

Maciej Lipinski
CERN

New WRS-4 Workshop
2020-06-26
Workshop Agenda

13h30 – 13h40: Welcome
13h40 – 14h00: Introduction
14h00 – 14h30: State of the art and requirements
14h30 – 15h15: Hardware features + questions (no discussion)
15h15 – 15h30: break
15h30 – 16h15: Main board + questions (no discussion)
16h15 – 17h30: Feedback and discussion

While we will accept questions for clarifications during the presentations, please keep our feedback until the last session.
Agenda

● Goals of WRS-4 project and this workshop
● Project Roadmap
● Strategy for WRS-4 dev. and WRS-3 support
● Current status and plans
● [side note] Migration to IEEE1588-2019 High Accuracy
Introduction

- The current WRS-3
  - Provides only 1GbE ports
  - Getting old - component obsolescence
  - Limited FPGA resources - hard to add new features

- The new WRS-4
  - Discussed since long (2014)
  - Project: https://ohwr.org/project/wr-switch-hw-v4/wikis/home
Goals of the new WRS-4 project and this Workshop

- **WRS-4**: create new WR switch that
  - supports 10 Gbps
  - provides industry-level reliability features
  - meets needs of the WR Community

- **Workshop**: consult with the WR Community hardware specification for the new WRS-4
Project roadmap (so far)

2014/03  first idea of next generation 10 Gbps switch

2016/07  first collection of input from WR community via wr-dev mailing list

2018/10  second collection of input from WR community at the 10th WR Workshop

2018/10  design study to prepare Technical Specification
         - consulted CERN IT experts (see), disassembled a number of switches
         - estimated FPGA resource utilization in the new switch: WRS-v4-resource-utilization.pdf
         - studied and proposed hardware architecture, features and interfaces
           Study_on_the_new_hardware_features_for_the_WRS_4.pdf
         - studied and proposed main board architecture
           WRS-4_main_board_Hardware_Architecture_v1.7-2020-06-09.pdf

2020/06  feedback to the proposed features and architecture
         - New WRS 4 Workshop
Project roadmap (into the future)

2020/Q4
- Clocking FMC (WP5.1), validation of clocking circuit & 10GbE (WP4)

2021/Q1
- First hardware prototype of PCB (WP5, WP6) and enclosure (WP7)

2021/Q2
- Board Support Package (WP10) & port of gateware to the new HW (WP11)

2021/Q3
- Production Test Suite (WP9)

2021/Q4
- Port of software to the new HW (WP12, WR13)

2022/Q1
- Release v1 of WRS-4 with 1Gb for timing and data (WP14)

2022/Q3
- Prototype of WRS-4 with 10Gb for timing

2023/Q4
- Prototype of WRS-4 with 10Gb for timing and data

2024/Q1
- Release v2 of WRS-4 with 10Gb for timing and data
Strategy for WRS-4 dev. and WRS-3 support

- Modular HW design of WRS-4 (more in next presentation)
- Incremental GW/SW design of WRS-4
  - **First**: port the software/gateware of WRS-3 into HW of WRS-4
  - **Second**: make WR synchronization work for 10Gb
    (no support for Ethernet traffic forwarding at 10Gb)
  - **Third**: make Ethernet traffic forwarding work at 10Gb
- HW published under CERN Open Hardware Licence Version 2 - Weakly Reciprocal
- Long-term support for WRS-3
  - **No foreseen end-date, large installed base**
  - Very likely, the SW (PTP, RTU, etc daemons) will be common to WRS-3 and WRS-4
  - Lock HW/GW - no new features added
  - SW new features only in common SW, if HW/GW support available
  - Bug-fixes
Status

- **FPGA/CPU** - US+ selected, competitive price negotiated
- **WR over 1Gb GTH transceiver on US+** - validated
- **Technical specification** - being finalized (as we speak)
- **Clocking FMC** - under development
- **WR over 10Gb GTH transceiver on US+** - ongoing work
- **Main Board schematics design** - to be started after summer 2020
- **Enclosure design** - to be started after summer 2020
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Questions?
Migration to IEEE1588-2019 High Accuracy

WR Node/Switch - a device that implements WR Spec and/or IEEE-1588-2019 HA

2018-2019: Compliance tests developed for WR Spec and IEEE1588-2019 HA (see)
2019  : Prototype HA implementation on the WR Switch
2020  : WRS-3 v6.0 release - prepared to support WR together with HA
2020  : update of WR Specification to reflect the current implementation
202x  : Prototype HA implementation on the WR Node
202x  : WRS-3 v6.1 release - support for HA and WR
202x  : WR Node release with HA support

WR Nodes will support only IEEE-1588-2019 HA (no WR Spec)
WR Switches will support both IEEE-1588-2019 HA and WR Spec, providing interoperability between the legacy (WR Spec) and the new (HA) devices