

海铃时钟系统进展 Progress of WR timing system

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TRIDENT
海 | 铃 | 计 | 划



WR related components in TRIDENT project



- hDOM

- **WR_NEM**

Enabler mezzanine provides necessary WR circuits assembled on hDOM mother board
Work with WRPC IP core embedded in the hDOM FPGA

- L3 junction box

- **WR-Switch** (BC mode)
 - **Acoustic Position Module**

1: current WRS has 18 ports, two needed for each string

2: acoustic positioning interface with WR

- L2 junction box

- WR-Switch (BC mode)

3: management network for WRS

- L1 junction

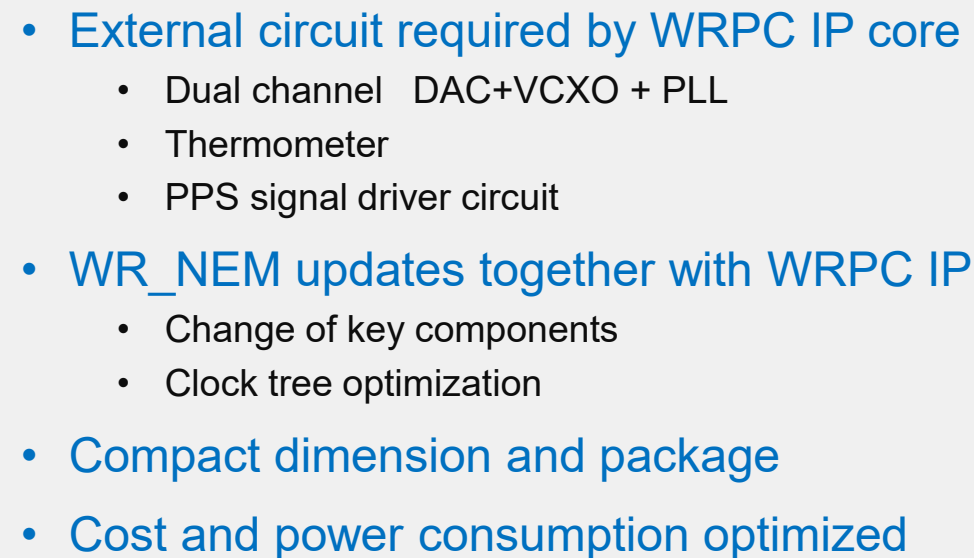
- WR-Switch (GM mode)
 - NTP/PTP Client + Atomic Osc.

4: compact WRS, instead of rack-mount version

5: optimization on reliability, power consumption, heat distribution

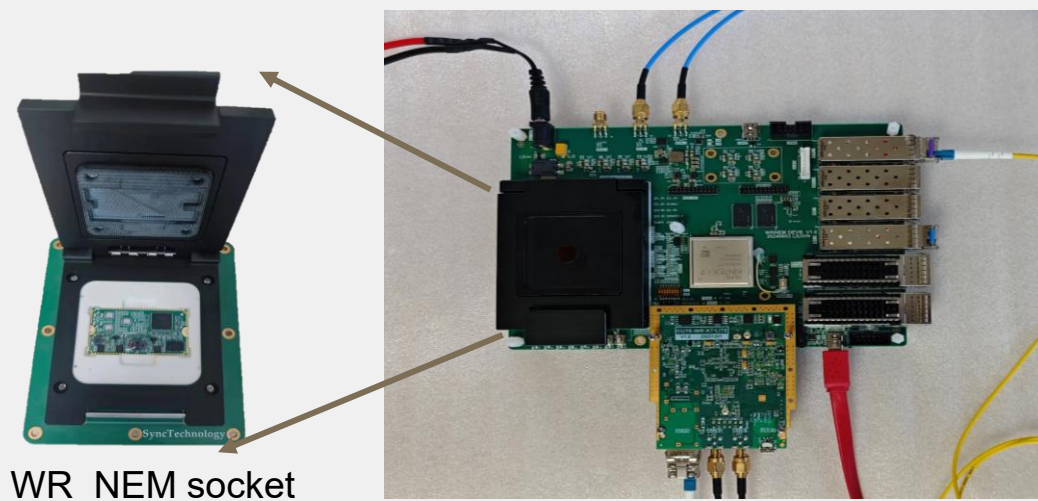
- On shore

- GNSS receiver + NTP/PTP server
 - Management / monitor

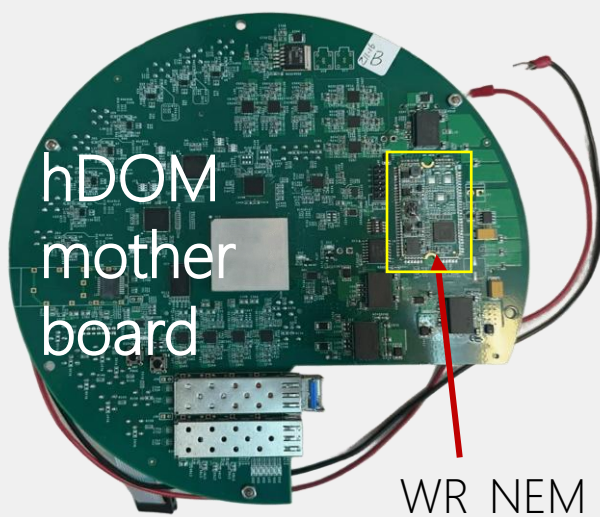




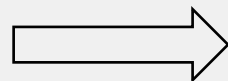
WR_NEM testing



- dedicated socket to hold the WR_NEM
- function verified on evaluation board that contains the same FPGA and pin connection with hDOM design
- Works as the production test suit



- Over 20 WR_NEM assembled on hDOM mother board
- all functions fully tested
 - time synchronization
 - remote upgrade
 - Data transmission



- **HWC_v1: 28x24mm**





WRS-CM-1st Gen for TRIDENT



- 2*8个下行WR端口，连接hDOM
- 导光指示
 - 水下版本不焊接LED，
 - 指示信号通过连接器，供测试检验
- 上下盖结构，SFP插入式冷指
- 底板机械固定螺纹孔

- 12V电源输入
- 1x2上行WR端口
- 光管理端口
- 电管理端口
- SMA端子 (10MPPS等)
- 管理串口
- 电源开关按钮

- **Hardened design for outdoor, land and sea application.**
- **clamshell with “wedge lock” card retainer to meet shock and vibration requirements**
- **Thermal conduction interface to Chassis sidewall**
- **Expand frame-box to support modular fiber panels (optional)**

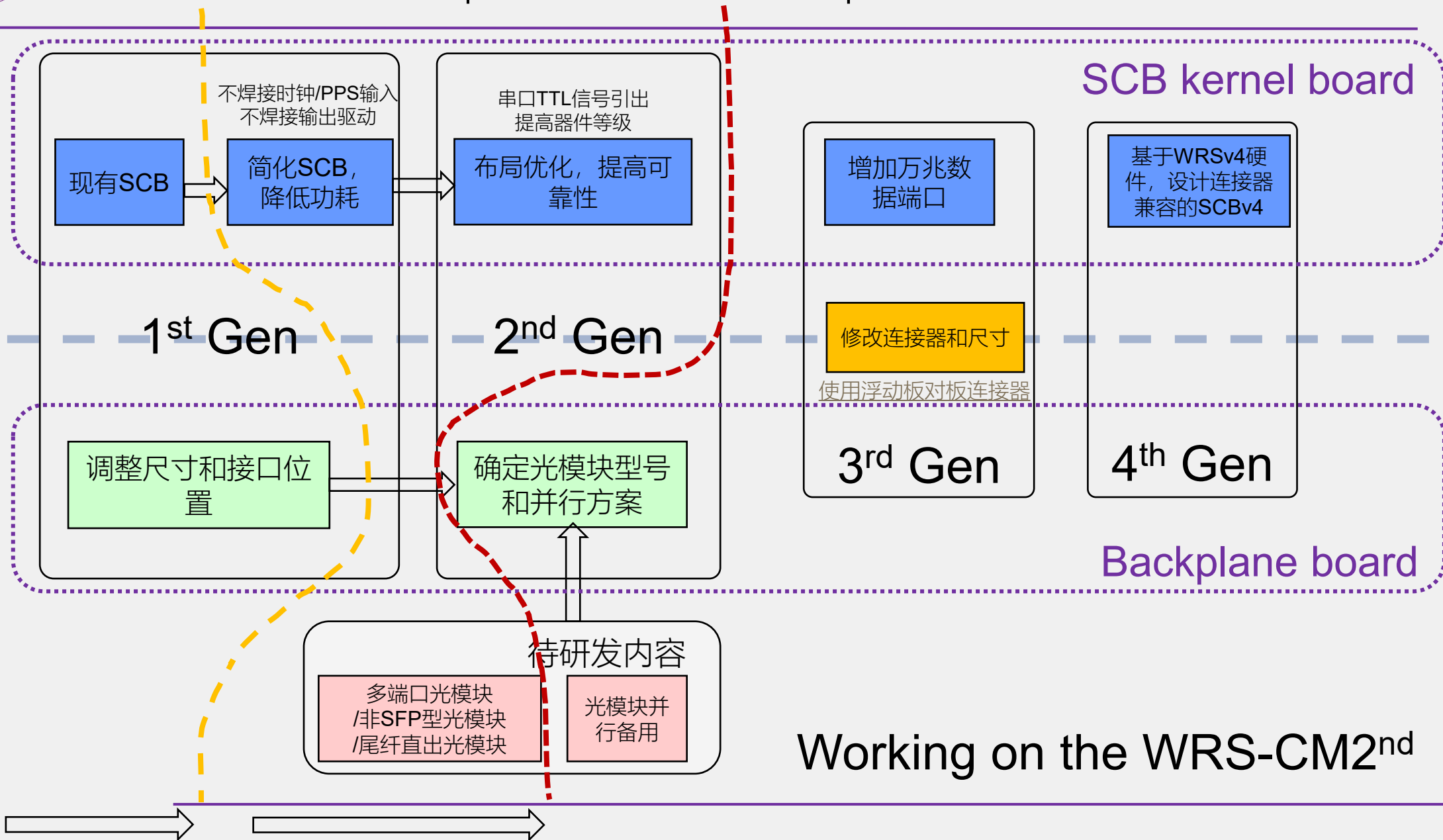


WRS-CM-v1.1

- Improved power convert DC/DC
 - Dual DC/DC module: parallel or cross-backup
 - DCM mode to increase efficiency
- modified dimension/ fix hole/ chassis etc. according to TRIDENT's requirement
- Modify component labels
- Add HDR connector for PWR and Serial ports that can be fly wired to back panel
- 30+ WRS-CM v1.1 under assembly for TRIDENT



WRS-CM development roadmap





WRS beyond switch

- WRS switch is a powerful device that perform an 18 gigabit Ethernet package exchange (Switch core), to support communication among all connected nodes in the same network, which is not essential in many applications, like TRIDENT.
- The correspond resource can be released for more meaning usage
- Besides the clock distribution, the hardware of WRS can perform as a **string supervise unit**
 - Clock distribution
 - Local trigger decision
 - data concentration
 - Bridge of monitor/configuration stream
- The whole string acts as a unified end-point to reduce the load of DAQ/DCS



USM Acoustic positioning interface module



- USM with WR support designed
 - WR interface on Cute-WR-A7
 - DDS + ADC + RS-485 on carrier board
 - Minor issues that be fixed by fly-wire
- Modified version delivered
 - With bug fixed
 - support circuit for external Atomic clock input (not used through)
- Fully commissioned
 - see yanxiao yang's talk)



Summary

- TRIDENT Timing system components are clearly defined
- WR_NEM embedded on hDOM mother board verified
- Improvements are undergoing for smaller dimension, better performance
- Design of WRS-CM finished, over 20 prototypes are verified in real deployment
- v1.1 with minor modifications are assembled for TRIDENT Phase-I
- 2nd version are under design
- Acoustic positioning interface Module (USM) tested and delivered



THANKS