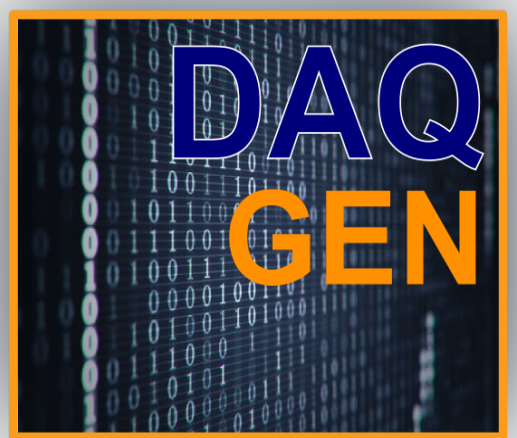
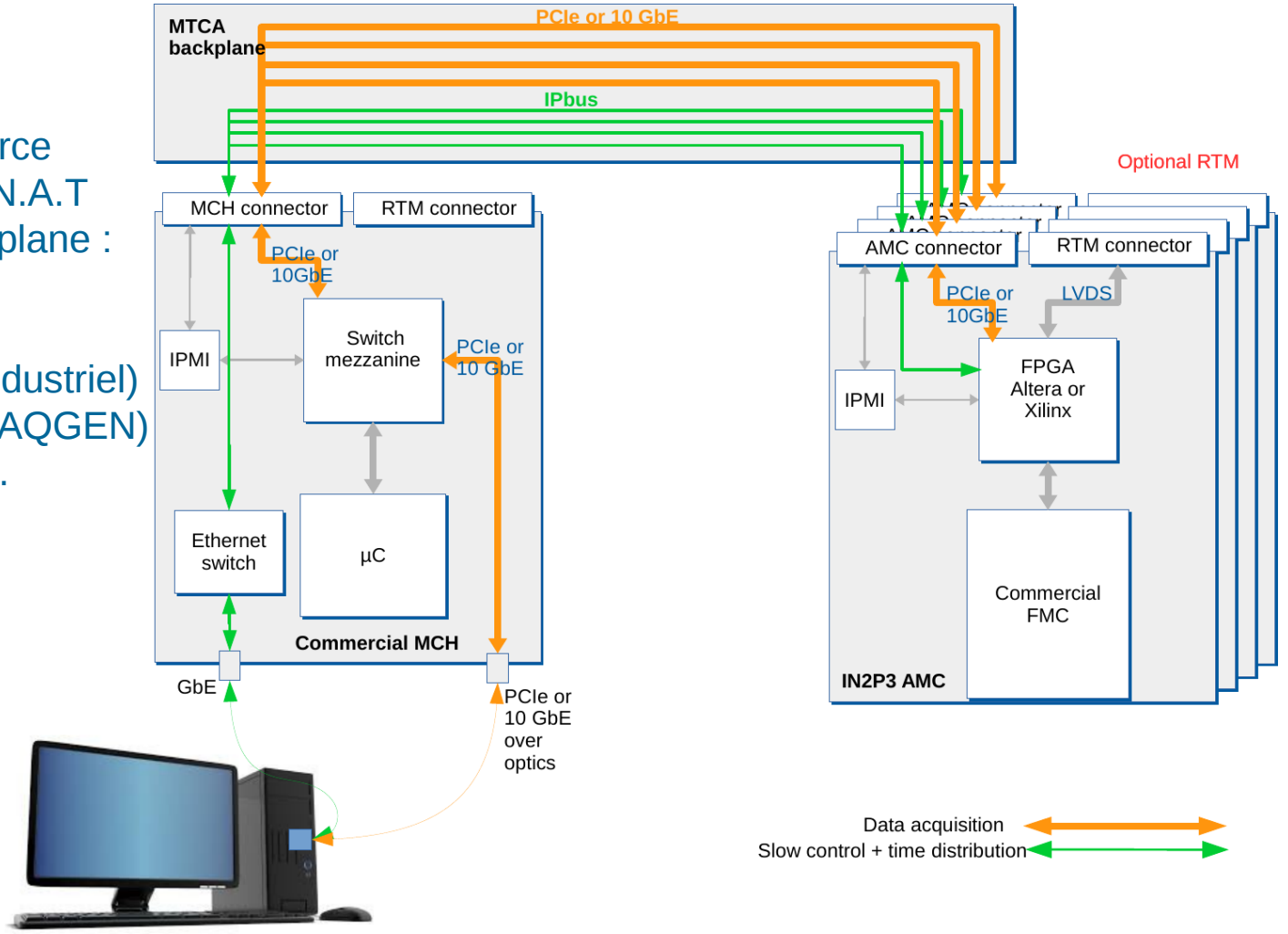
PROJET DAQGEN



- DAQGEN
- NEBULA
- IDROGEN
- White Rabbit

ARCHITECTURE

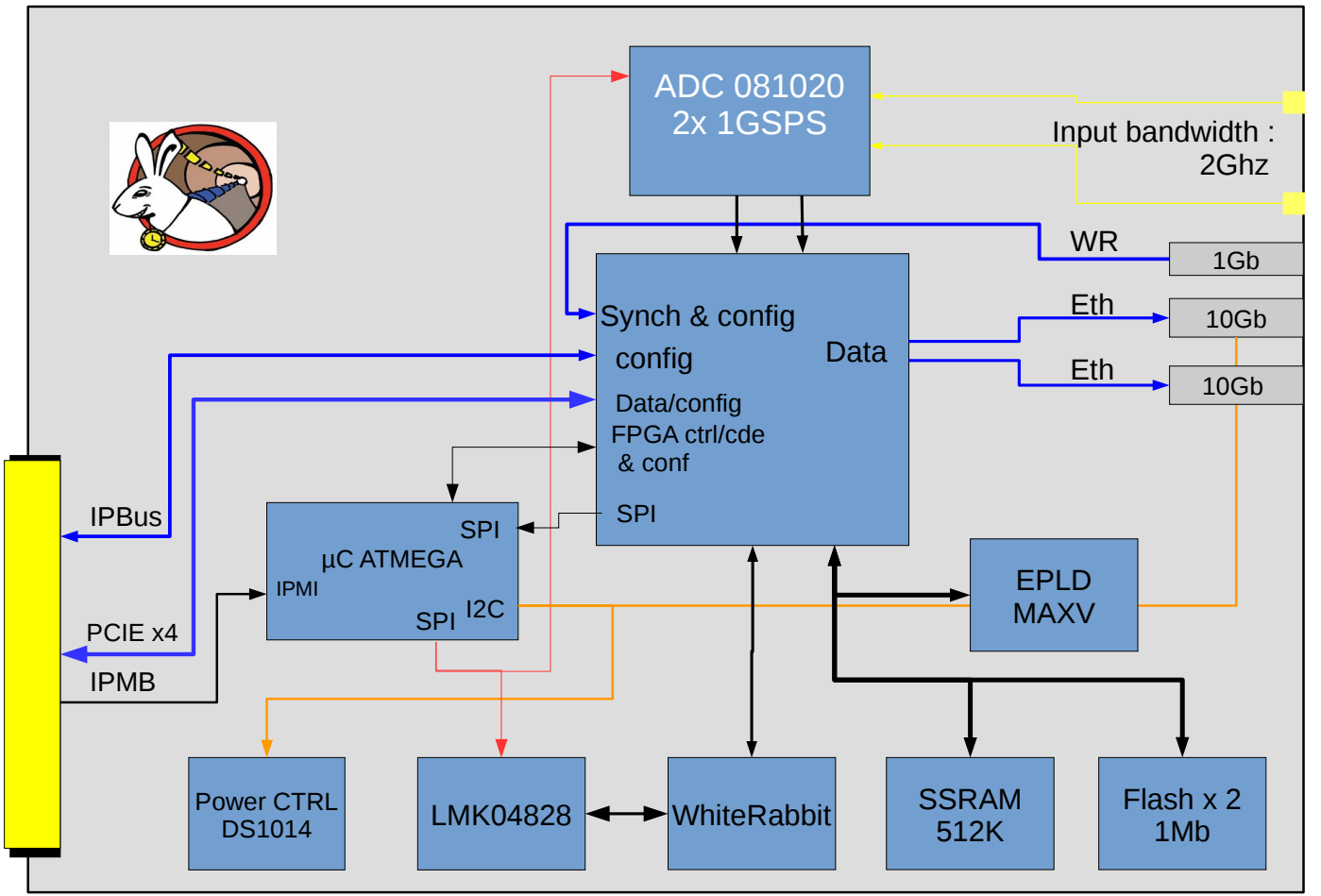
- Standard : xTCA for Physics
- Basée sur du matériel du commerce
- Contrôleur de châssis : MCH de N.A.T
- Lecture des données par le Backplane : PCIe 4x Gen3 ou Eth10G.
- Transfert des données :
  - Eth10G, PCIe-over cable (industriel)
  - 100GEth (developpement DAQGEN)
- Configuration : 1GEth par IP bus.



Carte NEBULA

Carte NEBULA

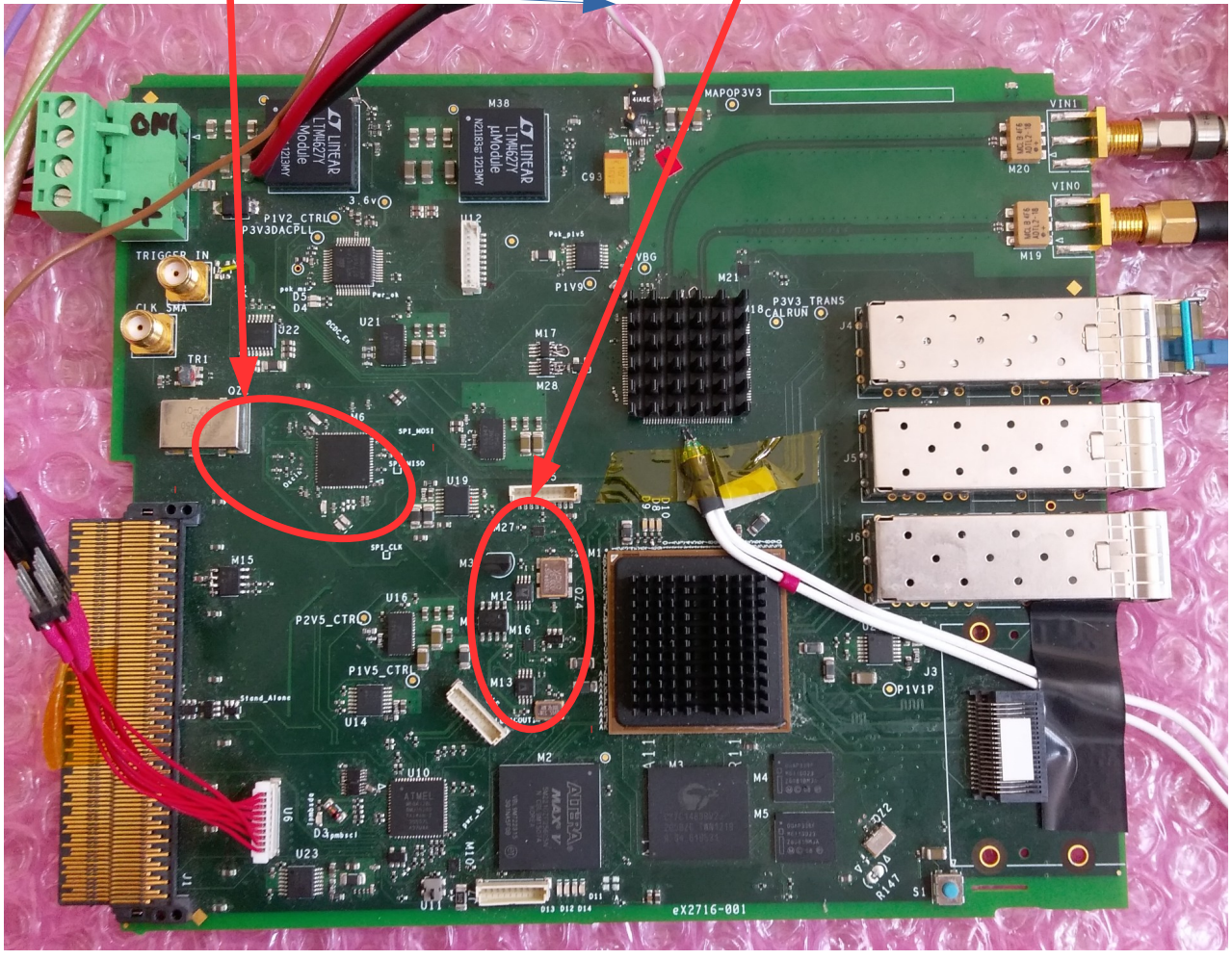
- MTCA 4.0 standard, Double-width, full size AMC.
- FPGA : 5AGTMC7G3F31
- Stand alone mode (power)
- ADC 2 channels 1GSPS.
- White Rabbit compliant.
- On board configuration (µC)
- Very low noise synthesizer PLL synthesizer cleaner (LM04828)
- Front panel : WR SFP+
  2x SFP+ 10GbEth
- Backplane connectivity :
  Gbe IP bus,PCI 4x Gen3,
  IPMB, CLK & trigger lane.



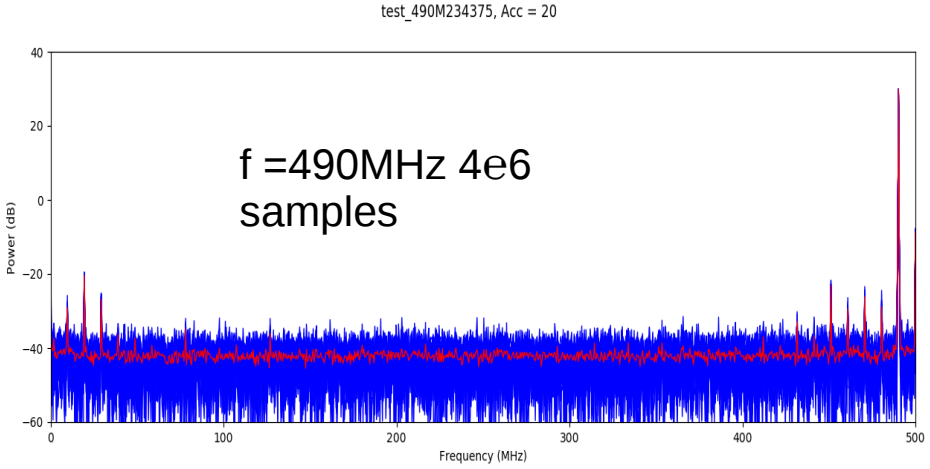
Carte NEBULA

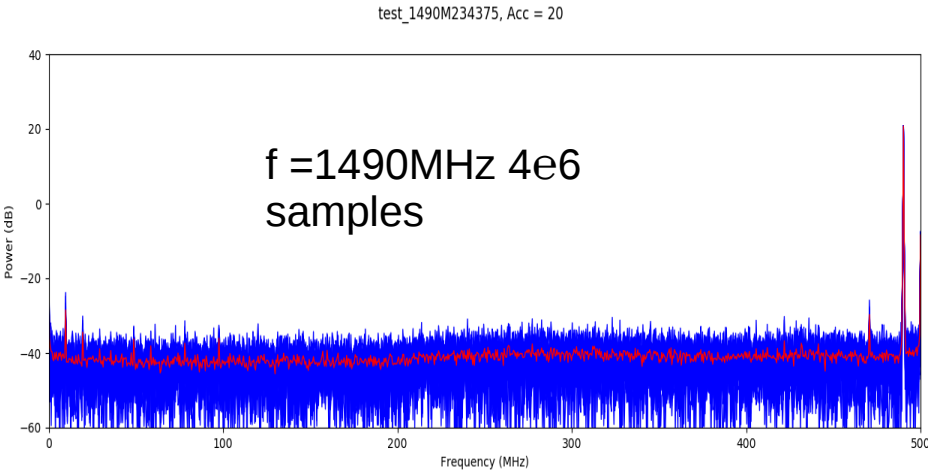
PLL Cleaner

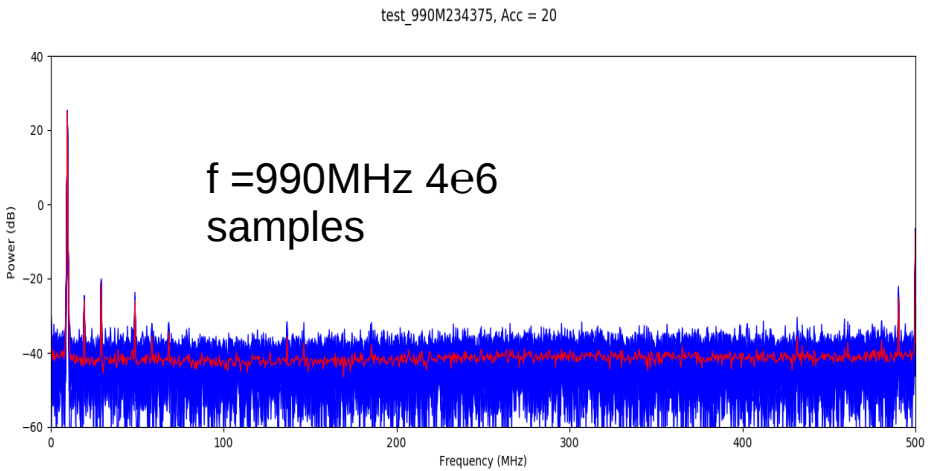
WR components

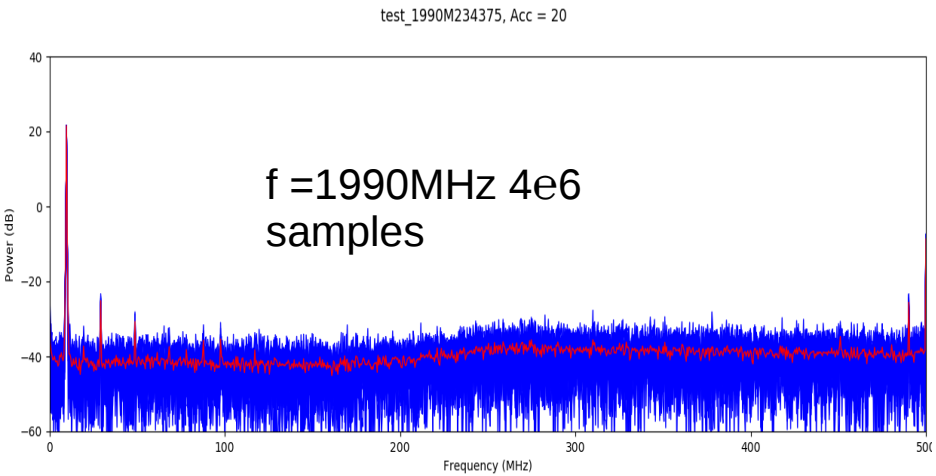


Carte NEBULA, Test ADC

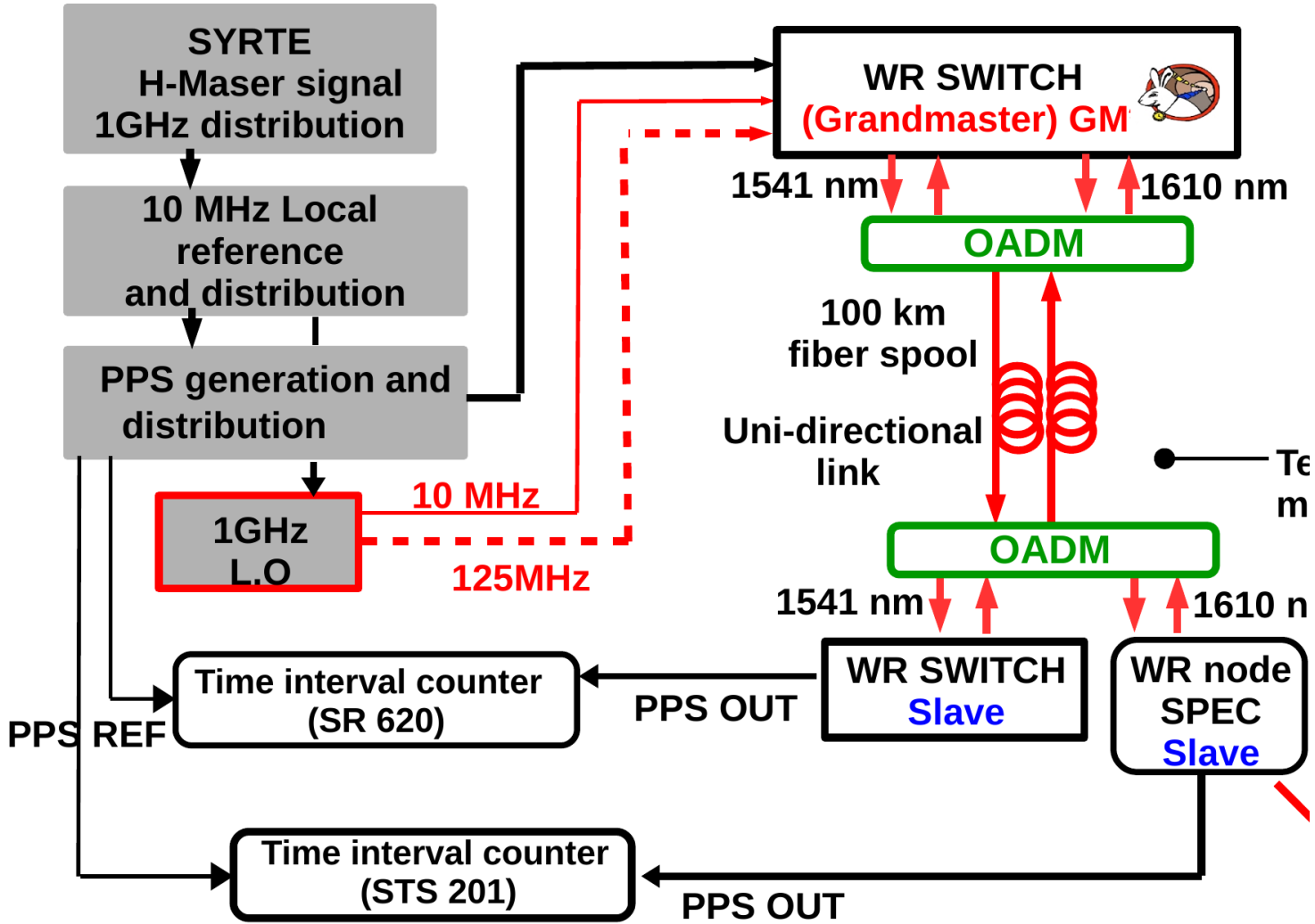




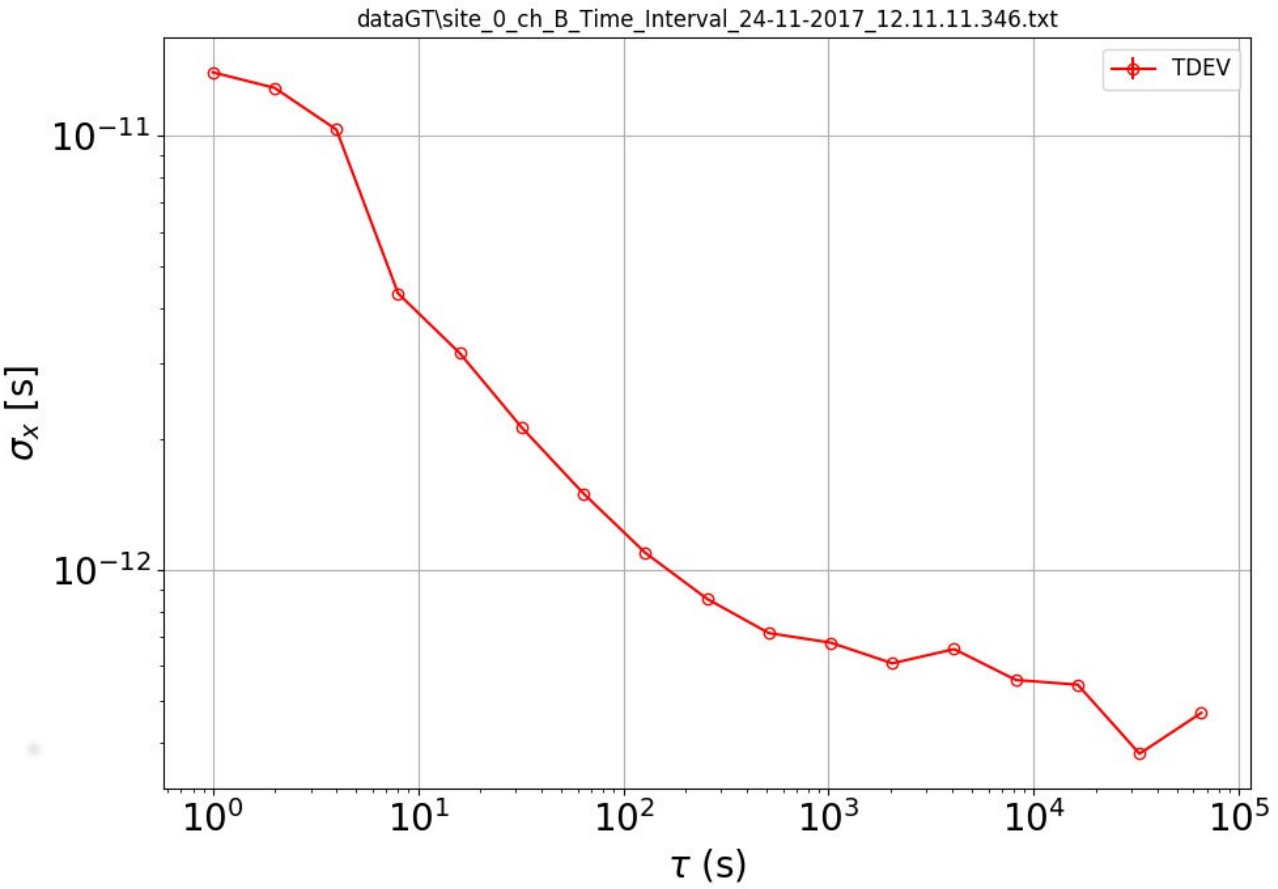




Carte NEBULA, systéme de test WR



Carte NEBULA, Test PPS



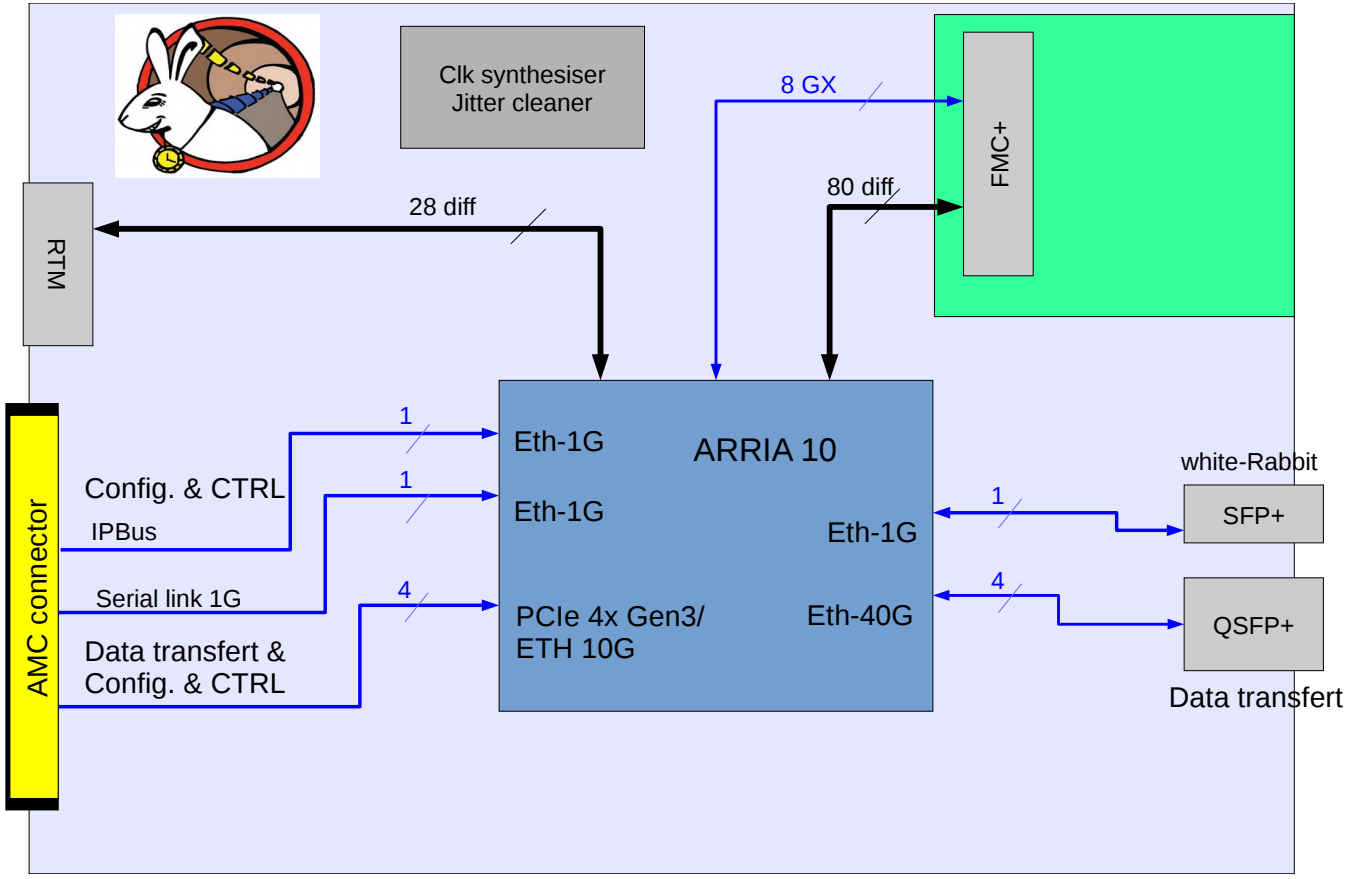
- En collaboration avec le laboratoire SYRTE (Obs Paris INSU).
- 400 Fs apres 1000s et 100 Km fibre
- Tests à venir :
  - long période d'analyse (Etude des dérives lentes
  - Reproductibilité de l' IP WR en fonction des firmware.
  - Modification des fréquences de la DDMTD.
  - Modification de la soft PLL

Carte IDROGEN

Carte IDROGEN

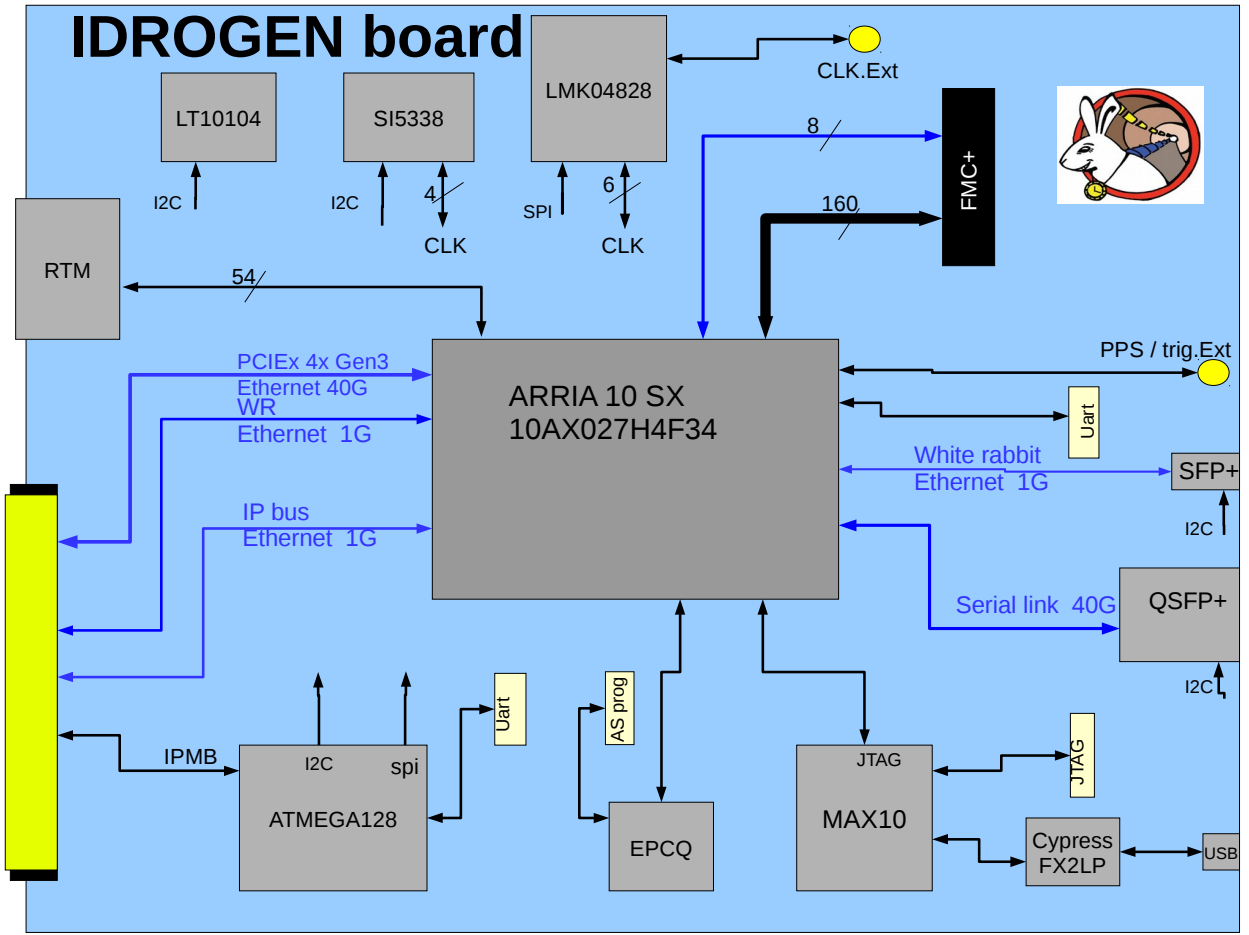
- MTCA 4.0 standard, Double-width, full size AMC.
- FPGA : 10GX027H4F34
- Stand alone mode (power 12v)
- HighPinCount FMC slot.
- White Rabbit compliant.

- Front panel connectivity : WR SFP+ QSFP+ 40G, USB
- Backplane connectivity : 1Gbe IPbus,PCI 4x Gen3, IPMB, CLK & trigger lane.
- RTM connector : J30.
- Low cost

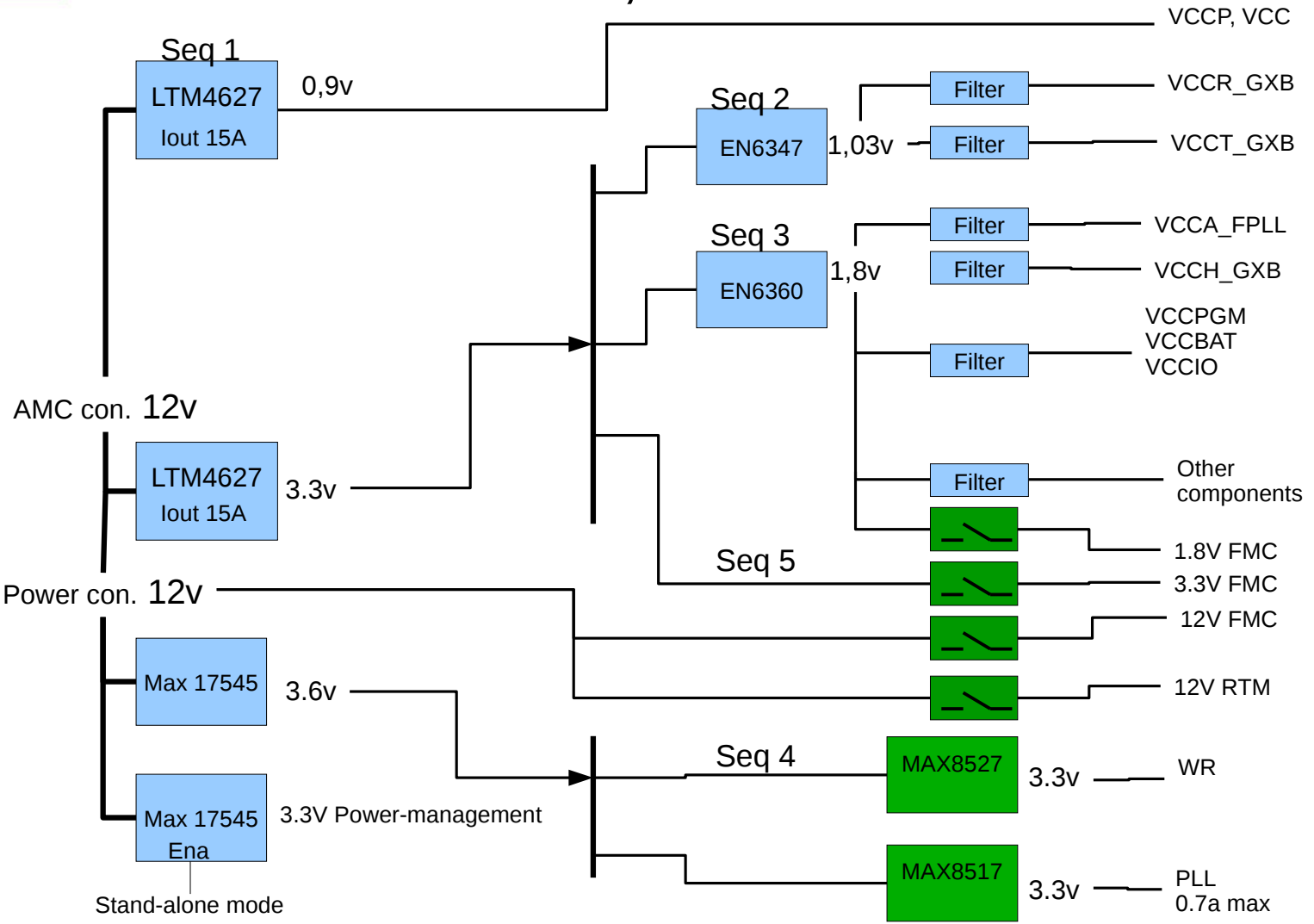


Carte IDROGEN

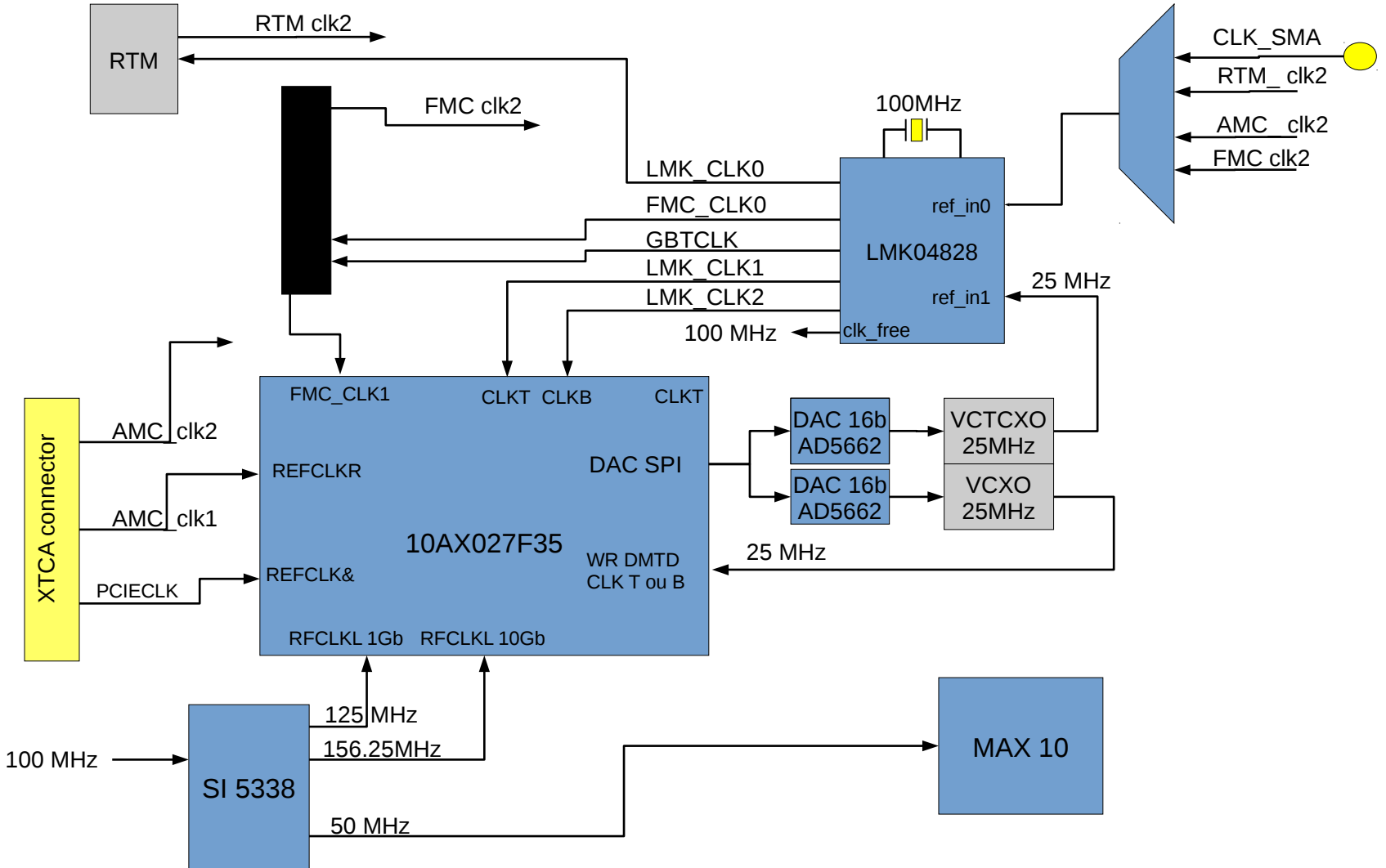
- On board configuration (µC)
- Very low noise synthesizer PLL synthesizer cleaner (LM04828) for WR clk and derived clkl.
- Dedicated PLL for serial links
- Integrated USBBlaster II.
- FPGA configuration : Active serial, IP bus.
- External connectivity : PPS, Trigger, Ext CLK.



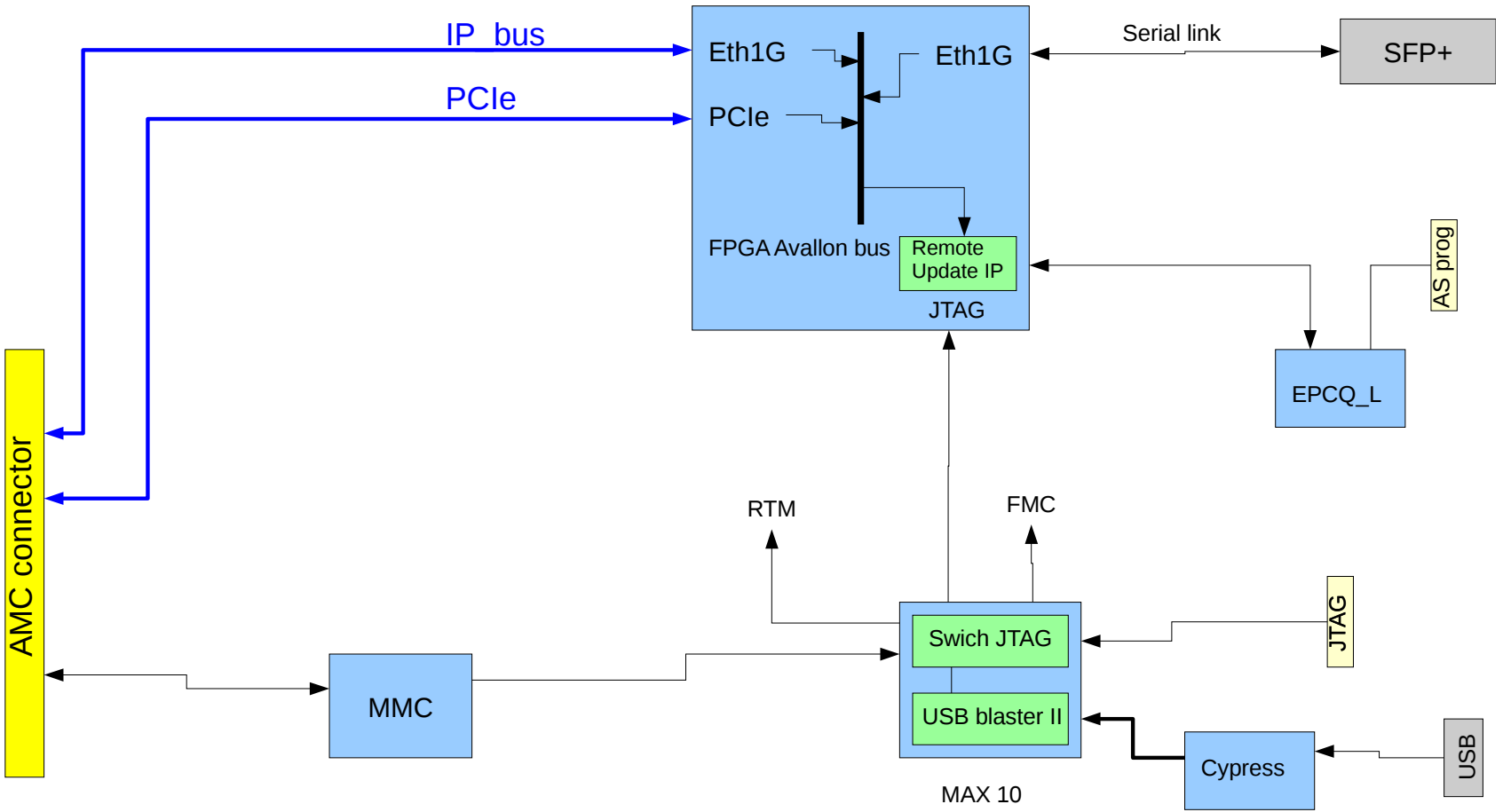
Carte IDROGEN, arbre des alimentations



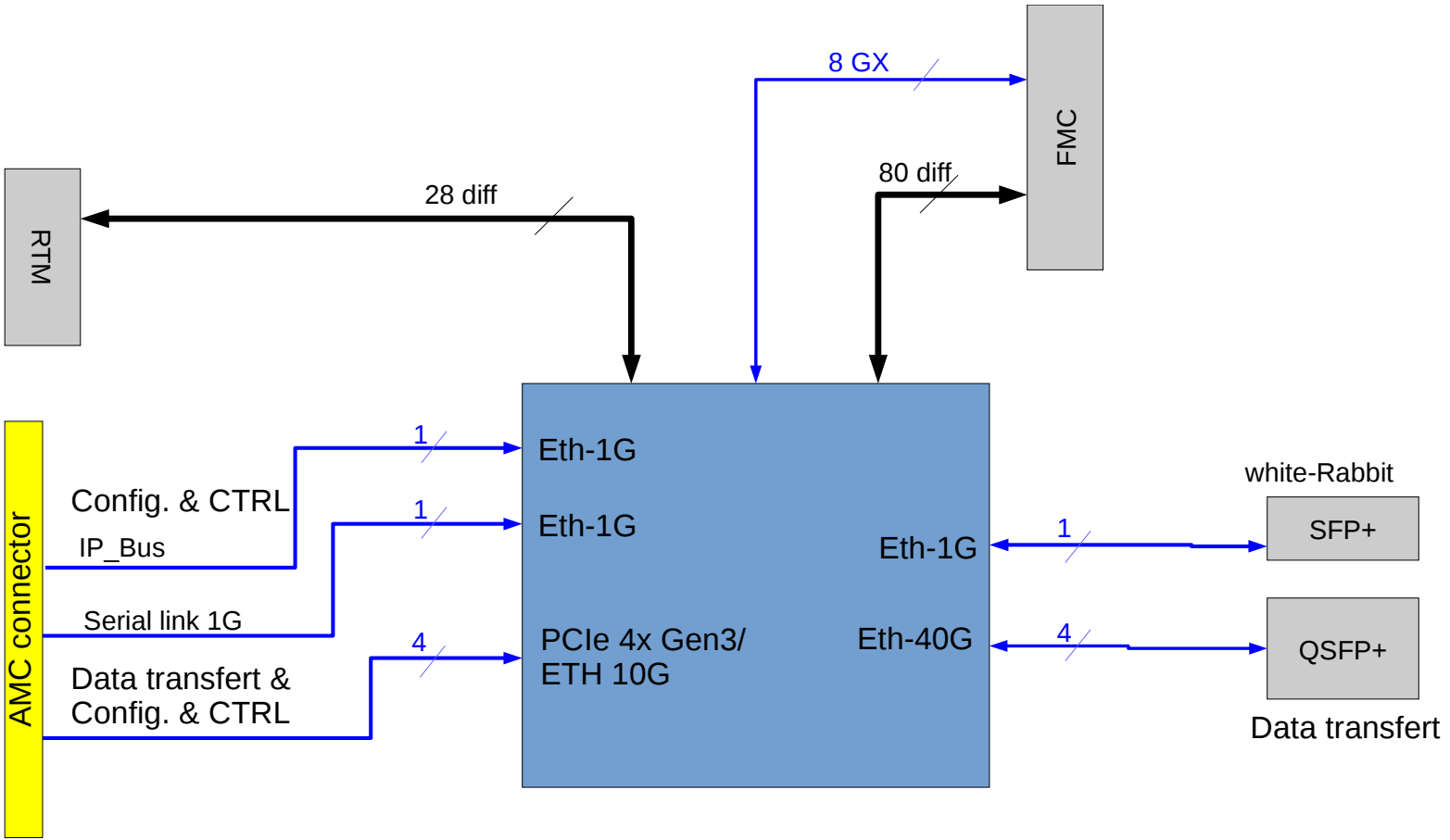
Carte IDROGEN, arbre d' horloges



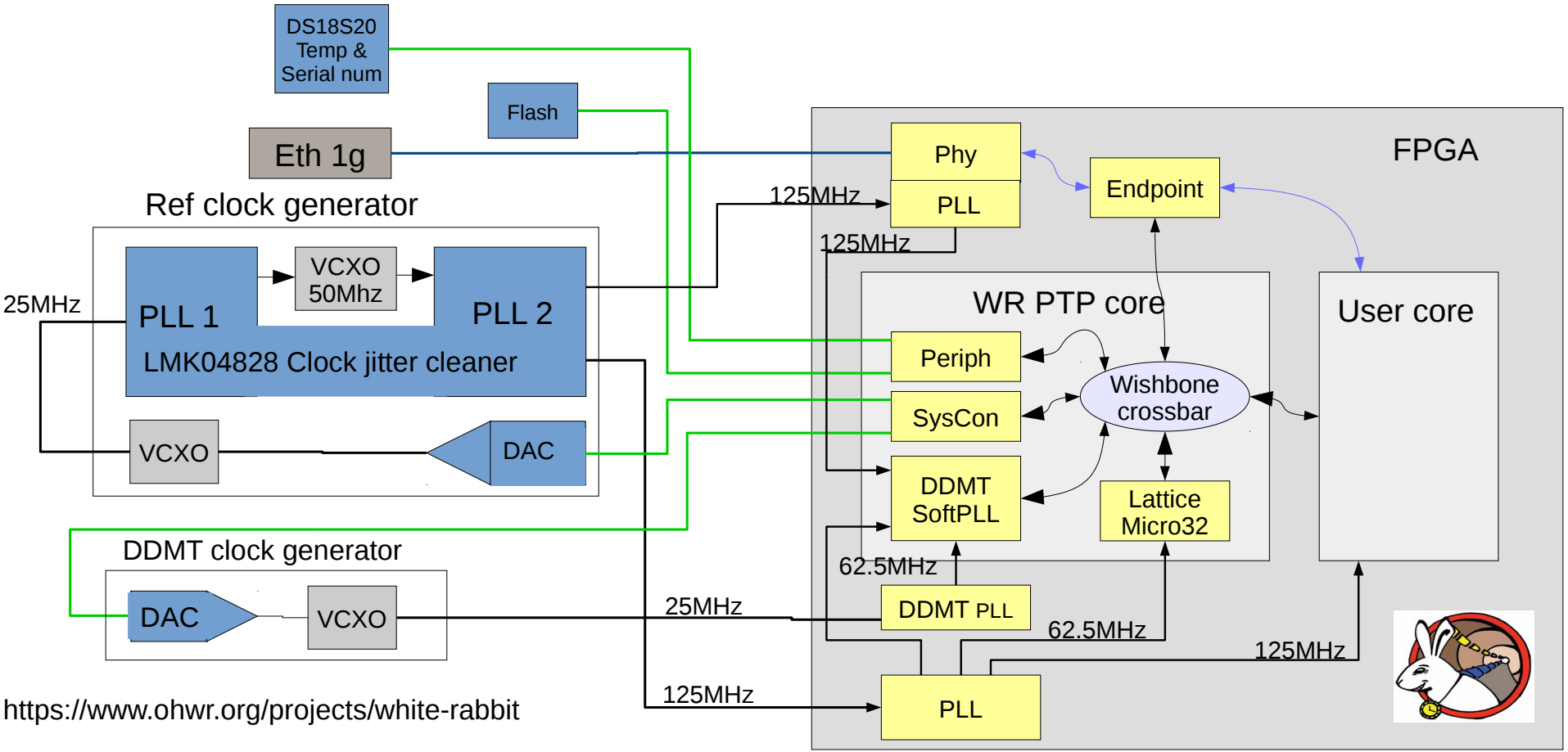
Carte IDROGEN, configuration FPGA



Carte IDROGEN, bus

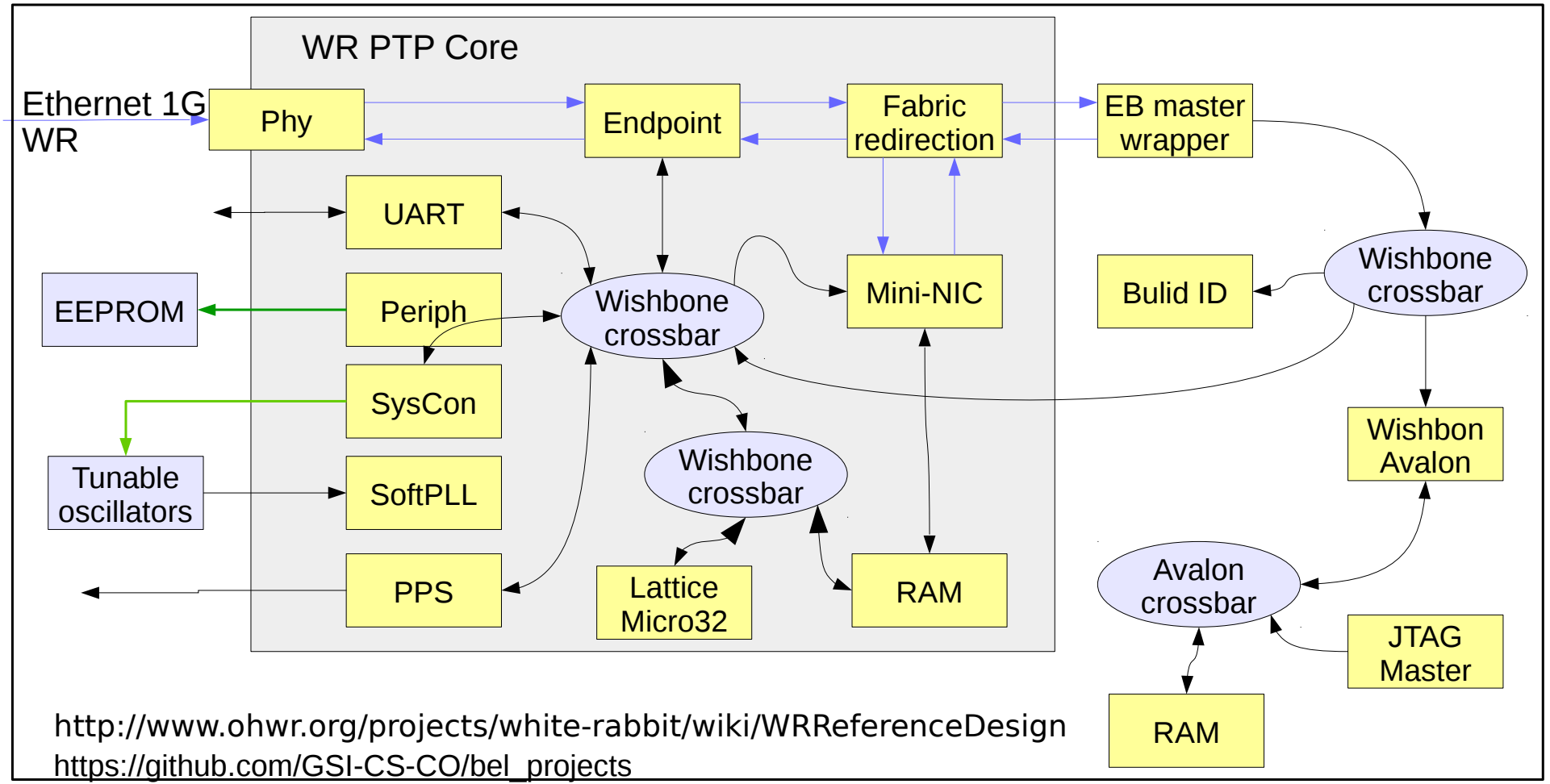


Carte IDROGEN, arbre horloge WR

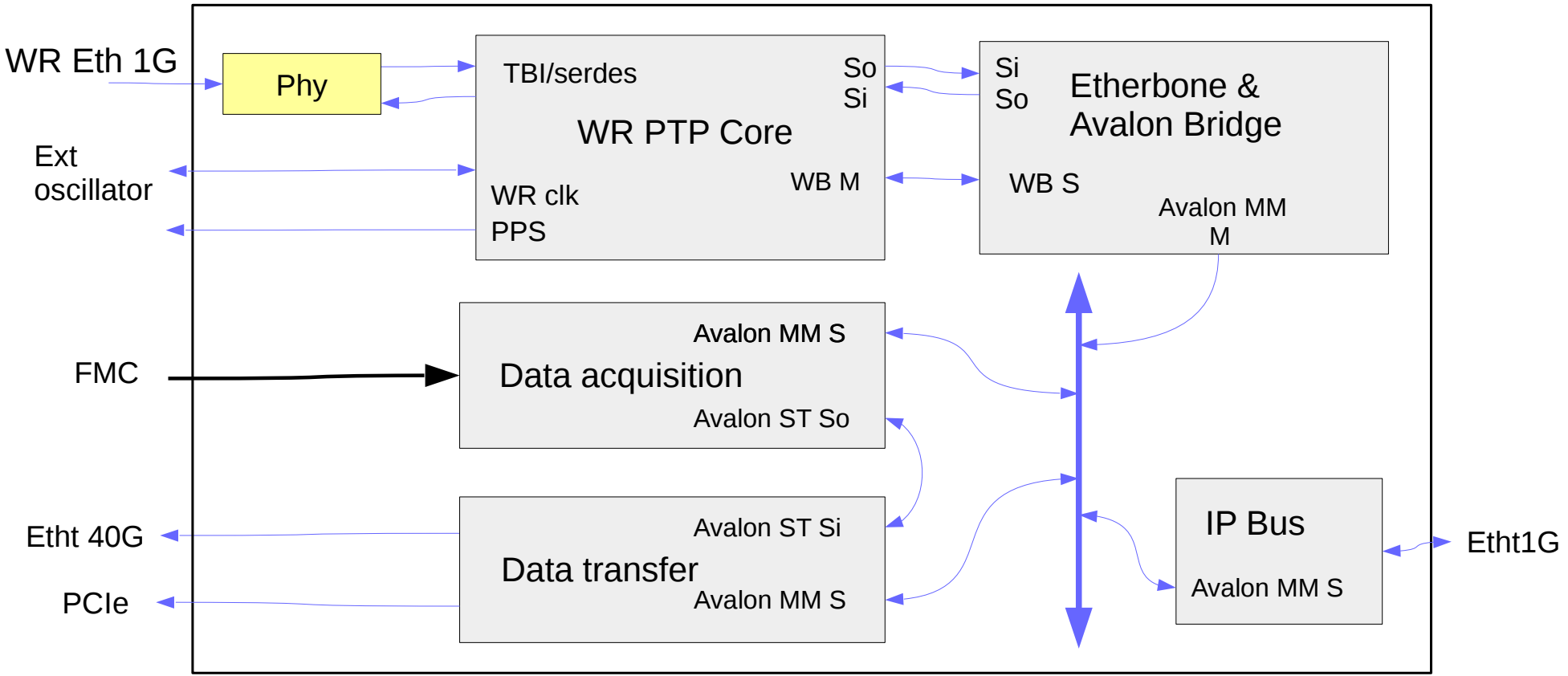


https://www.ohwr.org/projects/white-rabbit

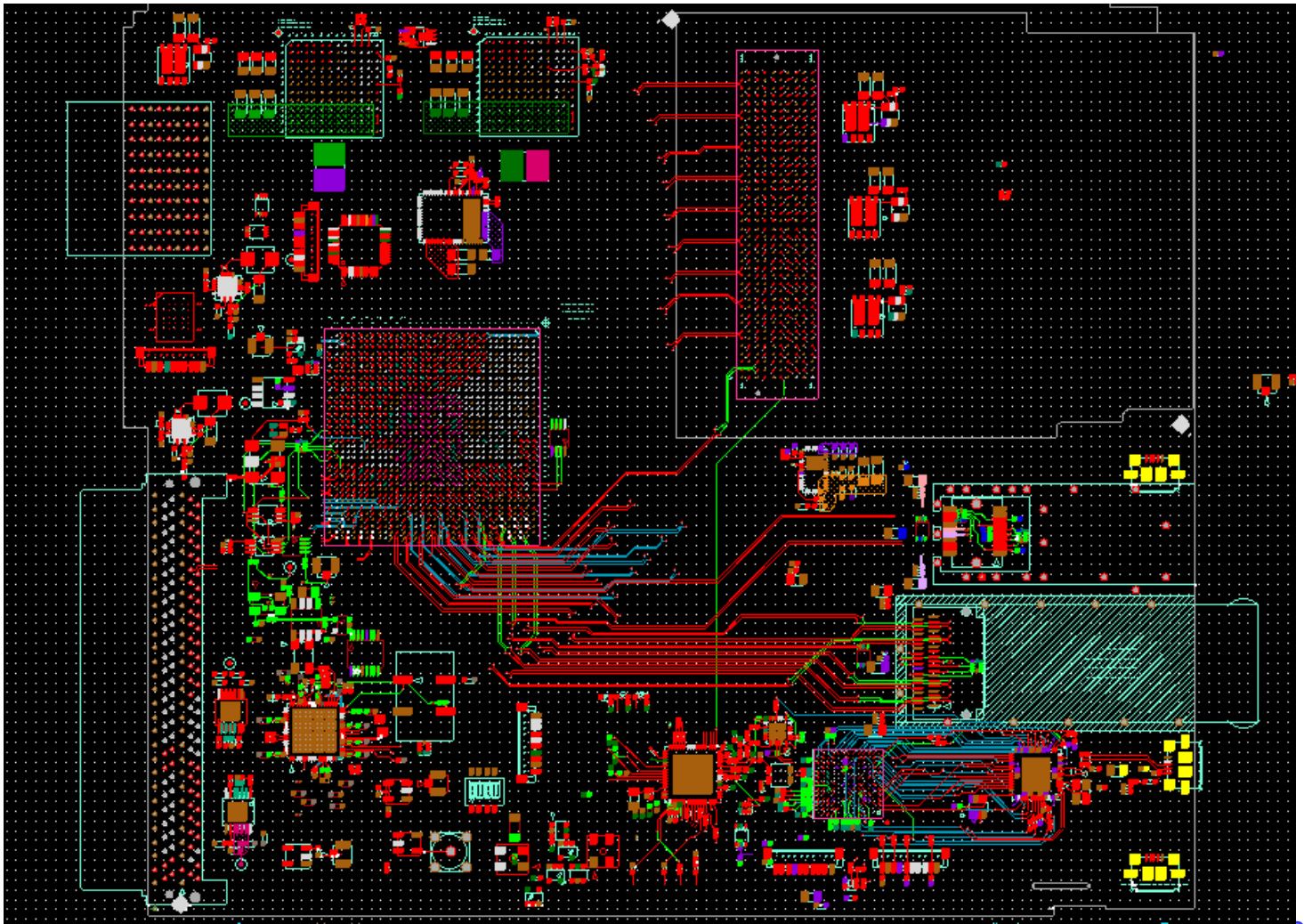
Firmware White Rabbit



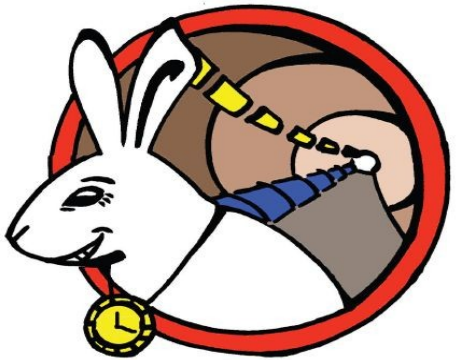
Firmware IDROGEN



Carte IDROGEN



WHITE RABBIT



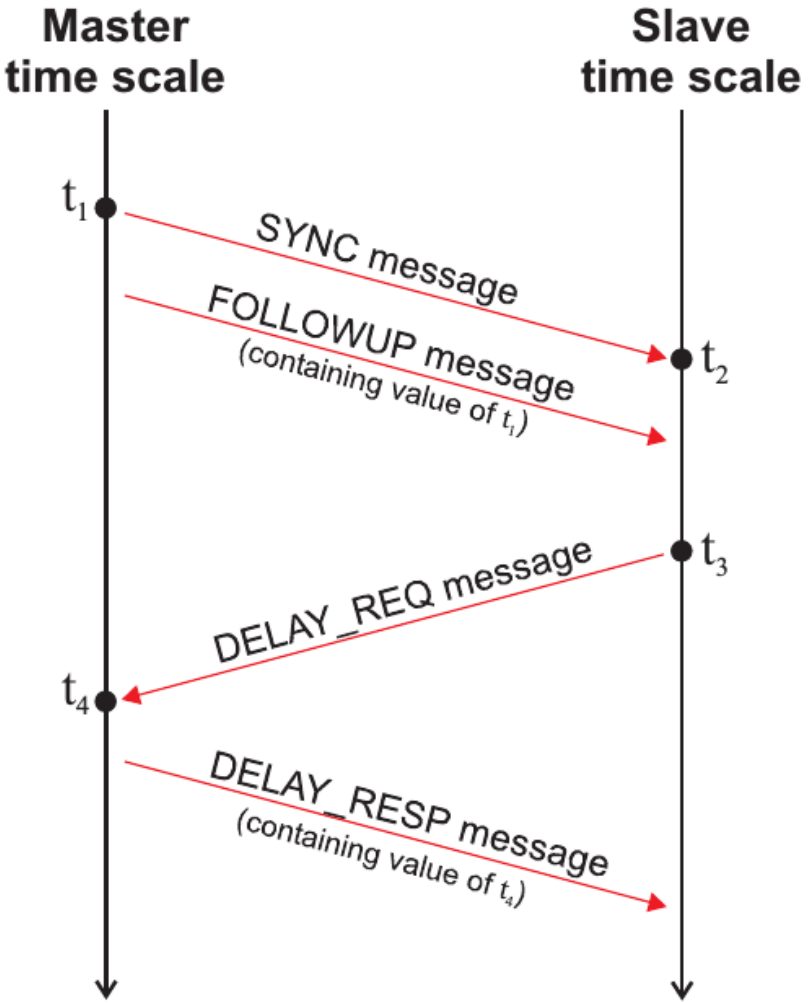
An **extension** to **Ethernet** which provides:

- Synchronous mode (Sync-E)
- Deterministic routing latency

- Sub-nanosecond synchronization in WR is achieved by using the following three technologies together:
  - Precision Time Protocol (IEEE1588).
  - Synchronous Ethernet.
  - DMTD phase tracking.

Open hardware (CERN)

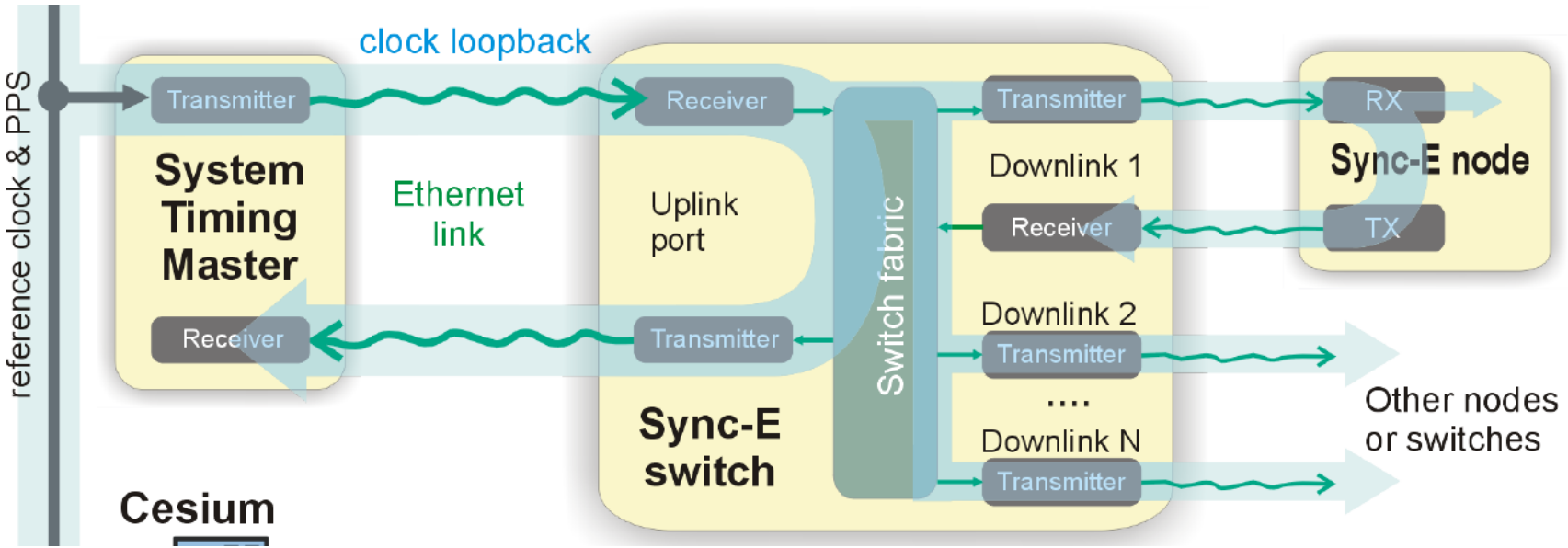
Precision Time Protocol (IEEE1588)



- Synchronizes local clock with the master clock by measuring and compensating the delay introduced by the link.
- Link delay is measured by exchanging packets with precise hardware transmit/receipt timestamps.

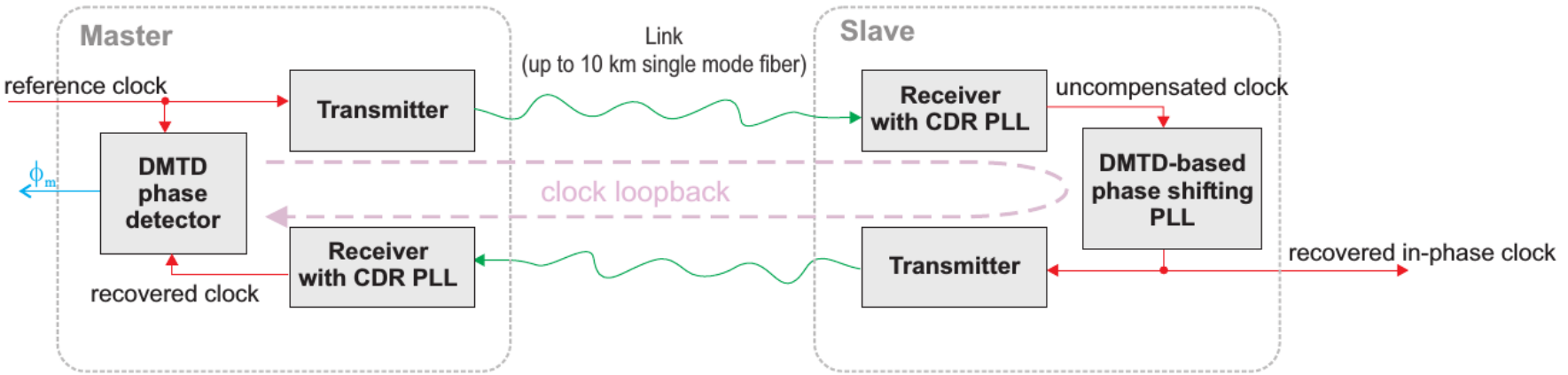
Synchronous Ethernet

- All network nodes use the same physical layer clock, generated by the System Timing Master.
- PTP is used only for compensating clock offset.
- Having the same clock frequency everywhere enables phase detector technology as the means of measuring time.



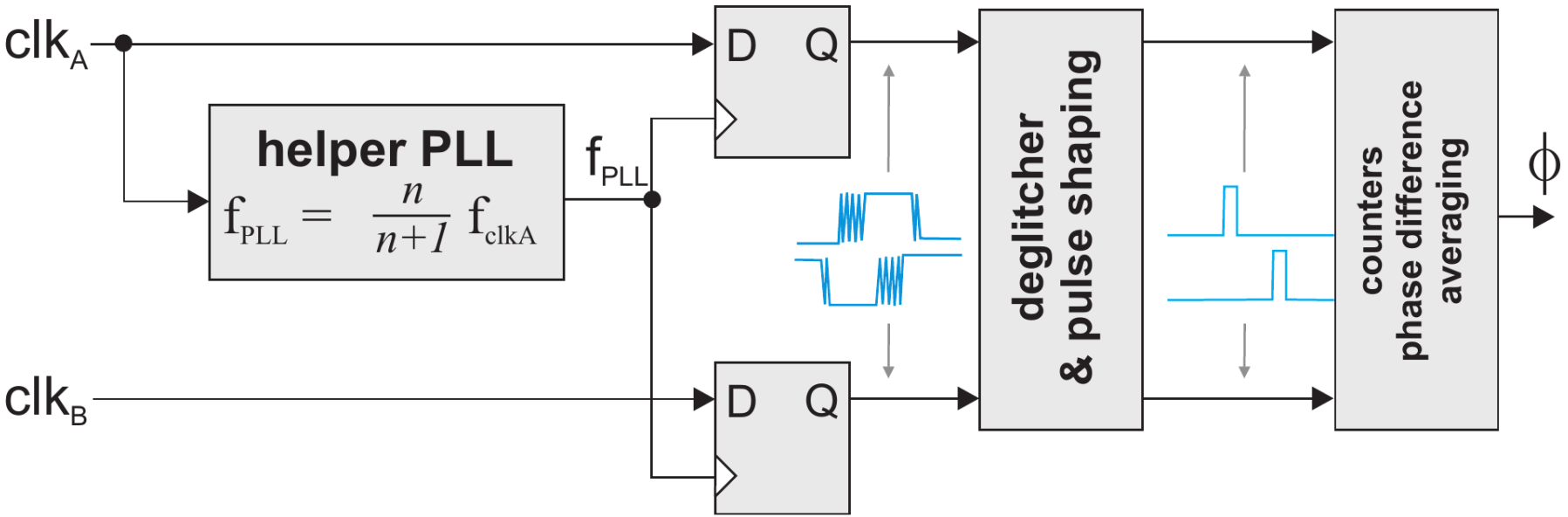
Phase tracking

Measure the phase shift between transmit and receive clock on the master side, taking the advantage of Synchronous Ethernet.



Monitor phase of bounced-back clock continuously.
Phase-locked loop in the slave follows the phase changes measured by the master.

Digital Dual Mixer Time Domaine phase detector



Documentation

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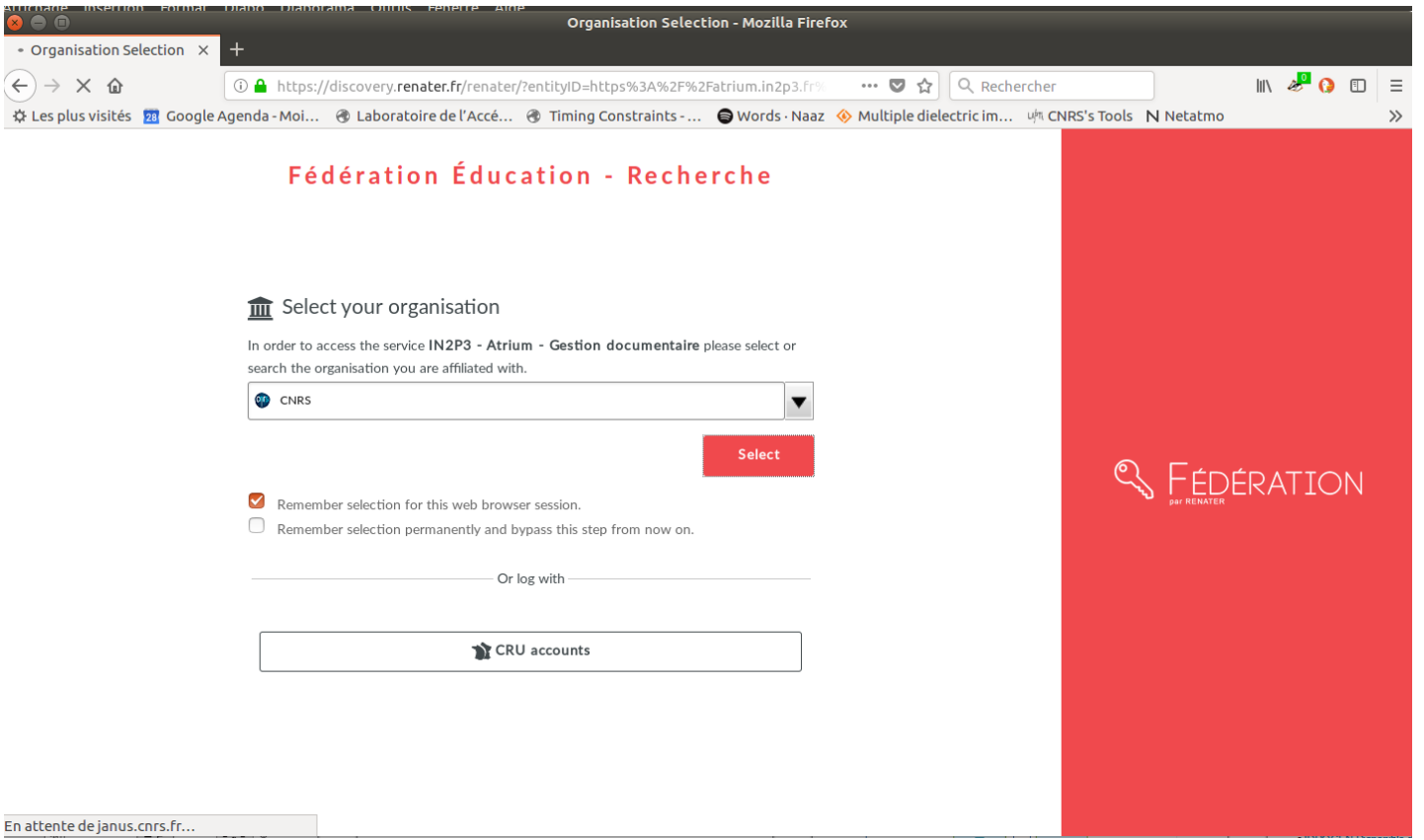
- En principe sur ATRIUM
- Mais actuellement problèmes d'accès avec RENATER

……

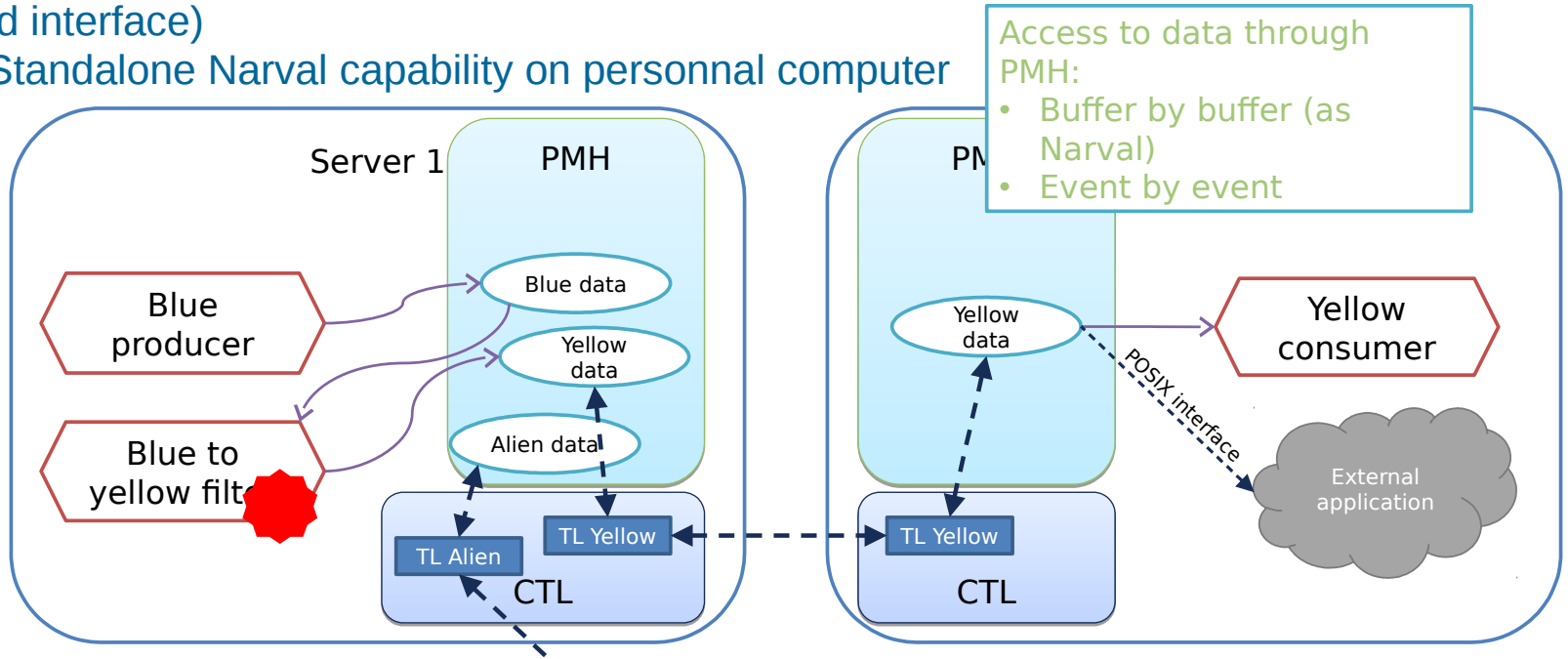


Software DCOD framwork

- DCOD Framwork
  - PMH – Posix Memory Handler
  - CTL Common Transport Layer
  - Narval acquisition : distributed acquisition system
  - ENX : slow control et configuration (unified interface)

Standalone Narval capability on personnal computer

- DCOD tools :
  - DCOD lancher : a process to control them all
  - DCOD monitor (Distributed framework)
- Implemented on further detectors : AGATA, VAMOS, ….



Conclusion

- Carte en cours de routage, test en fin d'année.
- Firmware développé sur la carte d'évaluation (ATILA sce REFLEX).
- Le portage de DCOD sur IDROGEN sera testé sur la carte d'évaluation par le CSNSM.
- IDROGEN Disponible début 2019.
- Mezzanine FMC basée sur open hardware IDROGEN sera développée pour projet AGATA.

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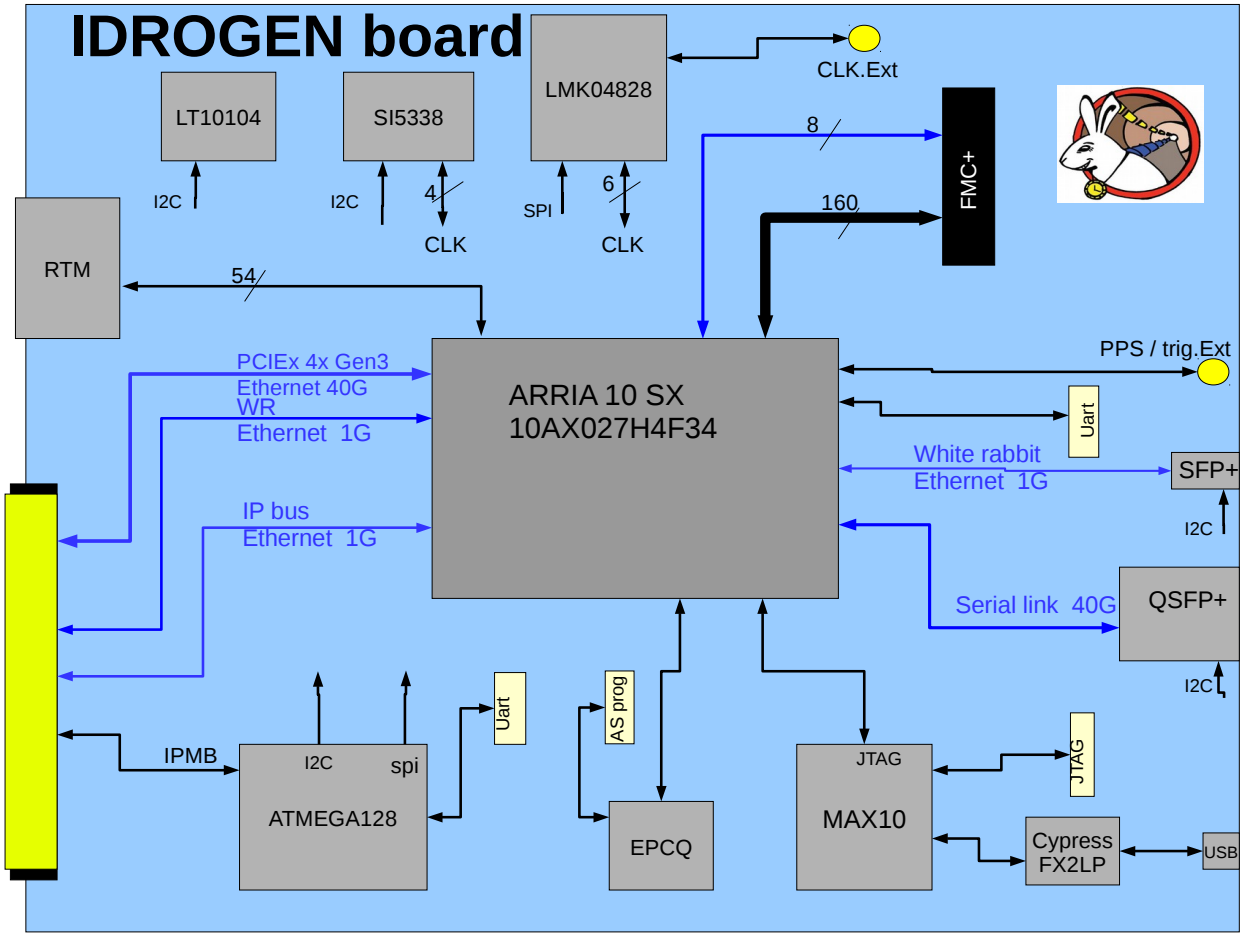
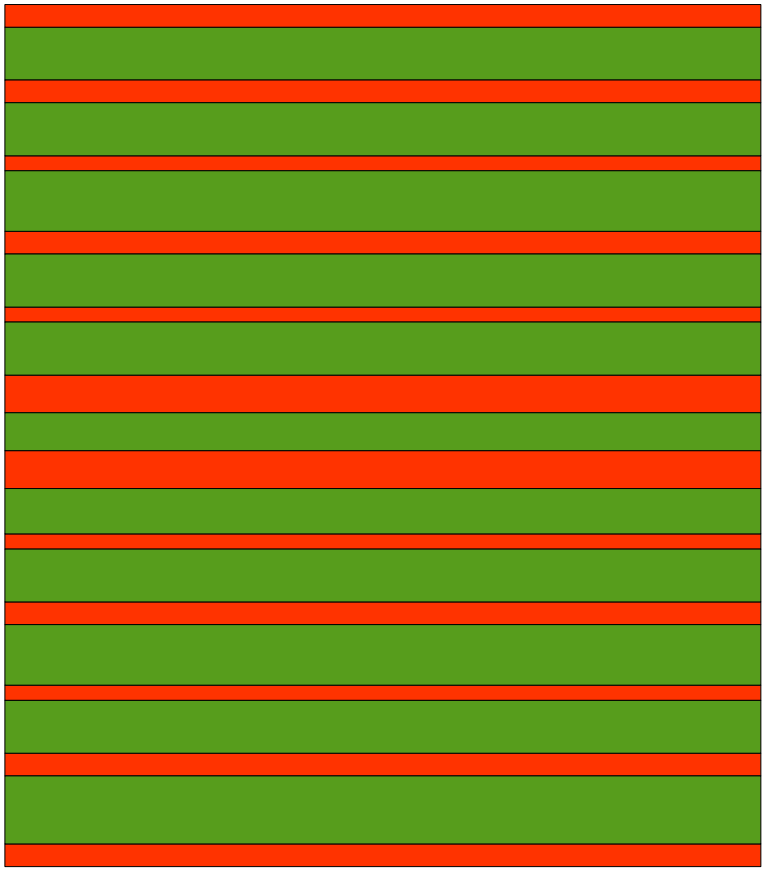


Empilement

1	55	Signaux	100 Ohm
2	35	GND	
3	17	Signaux	100 Ohm
4	35	PWR	3.3v
5	17	Signaux	50 Ohm
6	70	GND	
7	70	PWR	0,9v/12v /1,8v
8	17	Signaux	50 Ohm+ PWR
9	35	GND	
10	17.	Signaux	100 Ohm
11	35	GND	
12	55	Signaux	100 Ohm
		0,460mm	



75	1
100	2
100	3
90	4
75	5
64	6
75	7
90	8
100	9
100	10
75	11
954	

1,4mm