

# UT5 development discussion with company

- I had a meeting with company, Abe-san and Oyobe-san, to discuss possible UT5 development plan in this week
- Question and answers are summarized

# Fix existing issues on UT4

- GTH transceiver is not working with 127MHz reference clock.  
Laser from the transceiver is not brightening sometimes with some FW.  
→Voltage of PLL is suspicious.  
    Check accuracy of the voltage carefully for UT5.
- VME communication is failed when UT4 is installed to VME crate.  
→Need investigation with type of VME error and response to VME bus.  
→Bad mechanical connection is one possibility, but the connector of VME<->UT4 itself is widely used commercial one and should be stable.
- Maximum optical speed is not achieved due to bit error or unstable link.  
Operated with ~half of maximum rate (12Gbps/10Gbps for GTY/GTH).  
→Only self-feedback test on single channel is done by company, when UT4 is constructed. Better to do more realistic test with two UT5s and full channels for UT5.  
→Optimization of parameters of transceiver IP might help.

# New UT5 feature

-Versal or Vertex Ultrascale+ FPGA, with large resource (~5-10 times larger than UT4) and high optical speed (25-60Gbps) ?

→Present Versal do not have large resource.

At next year, a new Versal FPGA with ~4 times larger resources than UT4 VU190 will be published. It may be a good candidate.

→Present Ultrascale+ has ~4 times larger resource than UT4 VU190. Optical speed is 32Gbps (no PAM4). It might be one candidate.

→With conventional protocol, 32Gbps is maximum.

With PAM4, 58Gbps is possible but latency may be increased. They will check the latency and let us know.

	Vertex Ultrascale VU190 (UT4)	Vertex Ultrascale+ XCVU19P	Vertex Ultrascale+ XCVU29P	Versal next year
Logic cell (K)	2350	8938	3780	~9000
Slice	1800	3840	12288	?
Optical speed	25Gbps	32Gbps	58Gbps	?

# New UT5 feature

- VME 6U is OK in terms of power consumption and board size ?
  - It is difficult to answer, but design of the board is getting difficult.
  - If possible, VME 9U or other standard is better, in terms of UT5 board design. (But we need money to buy new crates ofcourse.)  
If we develop a new board with ATLAS, common standard is needed.
- Add more monitor and button in front of the panels ?
  - Maybe it is difficult with VME6U, due to limited space.