The ALICE TPC ReadOut Bus – *status report*

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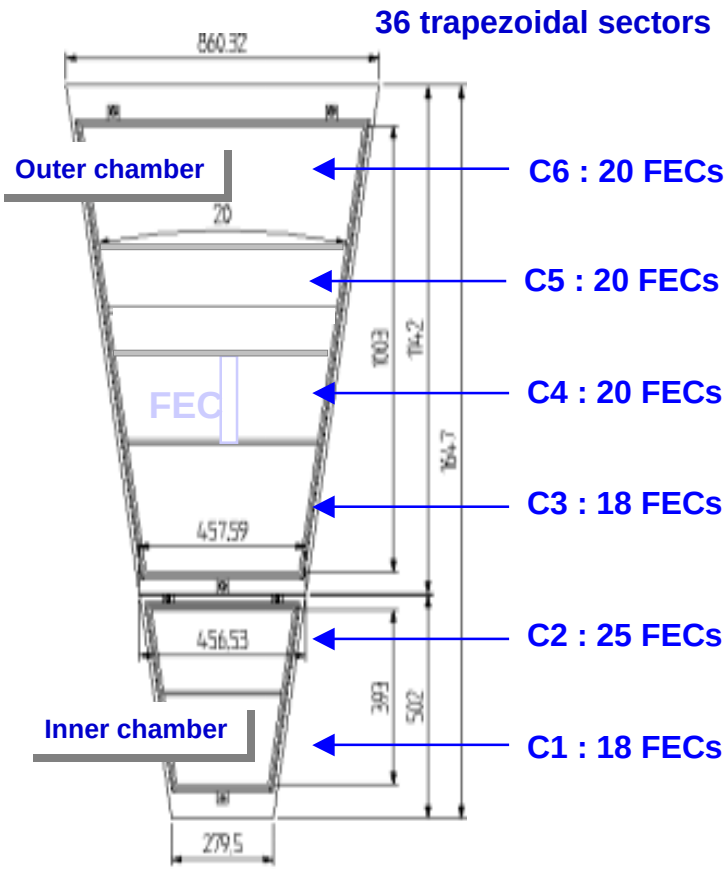
this presentation is available on the website http://cern.ch/ep-ed-alice-tpc/

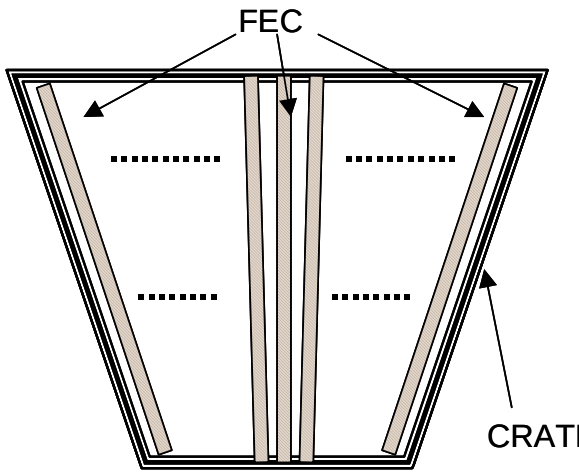
OUTLINE

- System Overview
- Technology and Measurements
- Conclusions

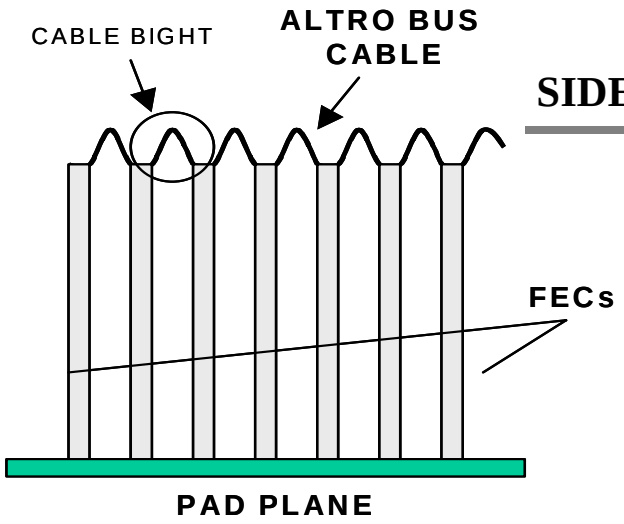
Arrangement of the Front End Cards and Bus Cable

TPC SECTOR FRONT VIEW



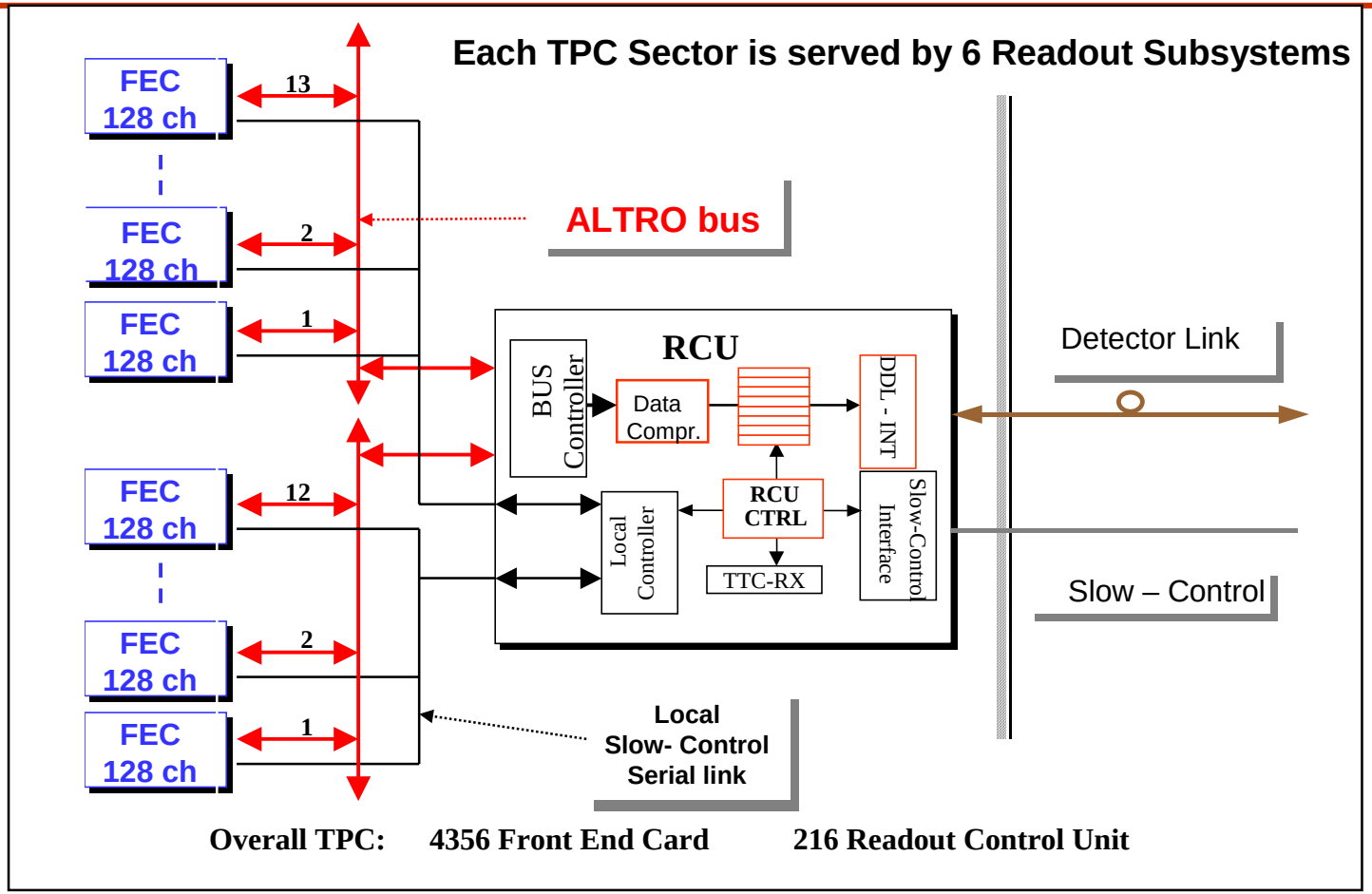


SIDE VIEW



The bus is routed in 2 cables (30 AWG, 0.635 mm pitch, halogen-free ribbon cables)

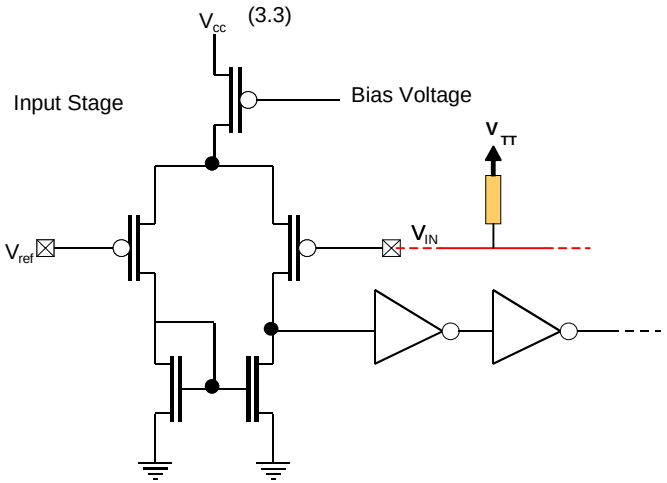
Front-end electronics system architecture

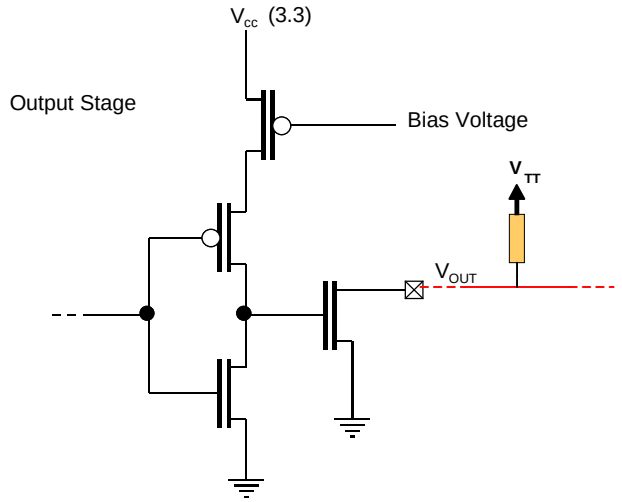


ALTRO bus requirements:

- 7 control lines
- 4 dedicated lines (distribution of L1 and L2 trigger + read-out and ADC clock)
- 40 bi-directional lines (data, addresses and instruction code)
- Signal frequency: up to 40 MHz

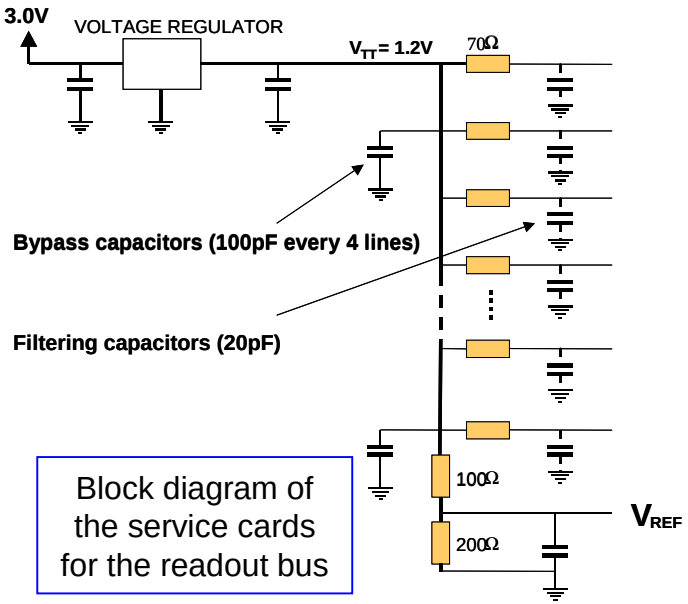
The GTL technology





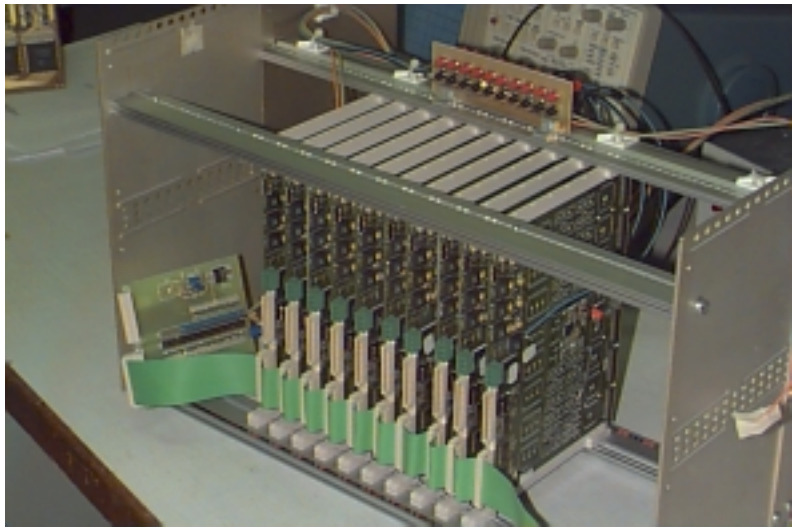
GTL is a low swing input/output technology
Commercial drivers require 3.3 V supply

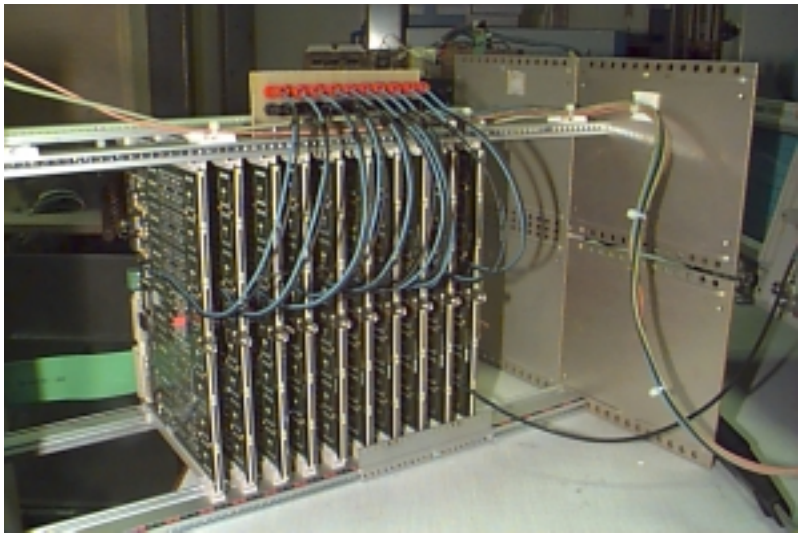
We have characterized some of them at 2.5 V to use a single digital power-supply in the FEC (ALTRO requires 2.5V)



Block diagram of the service cards for the readout bus

ALTRO bus Test set-up

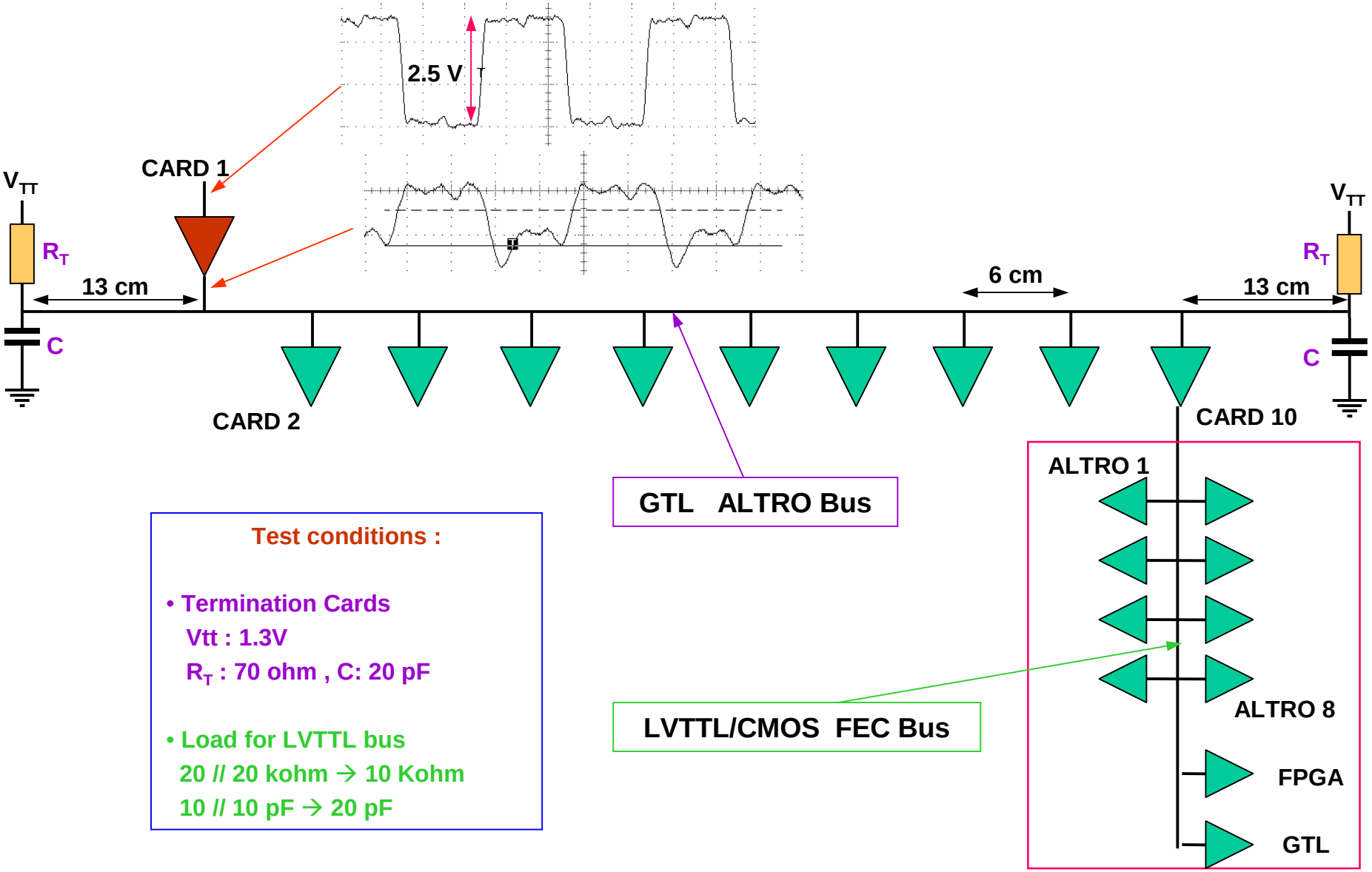




Test configuration:

- **10 FECs light-prototype equipped with GTL transceivers (Philips 16612DGG) supplied at 2.0 to 3.3 V**
- **Test signal: 20 MHz to 100 MHz square-wave**
- **Cable length : ~ 80 cm**

Signal Distribution Scheme



Test conditions :

- **Termination Cards**
  - **Vtt : 1.3V**
  - **R_T : 70 ohm , C: 20 pF**
- **Load for LVTTL bus**
  - **20 // 20 kohm → 10 Kohm**
  - **10 // 10 pF → 20 pF**

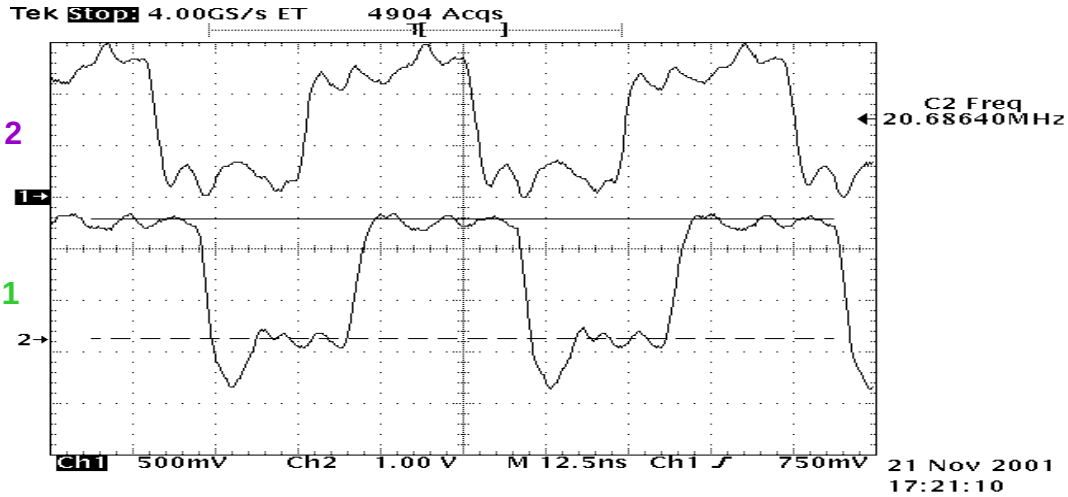
Measurements

Measurements performed with 20MHz (40 Mbit/s) input signal :

- GTL signals on CARD 2
- GTL signals on CARD 10
- LVTTL on ALTRO 1 (card 10)
- LVTTL on ALTRO 8 (card 10)

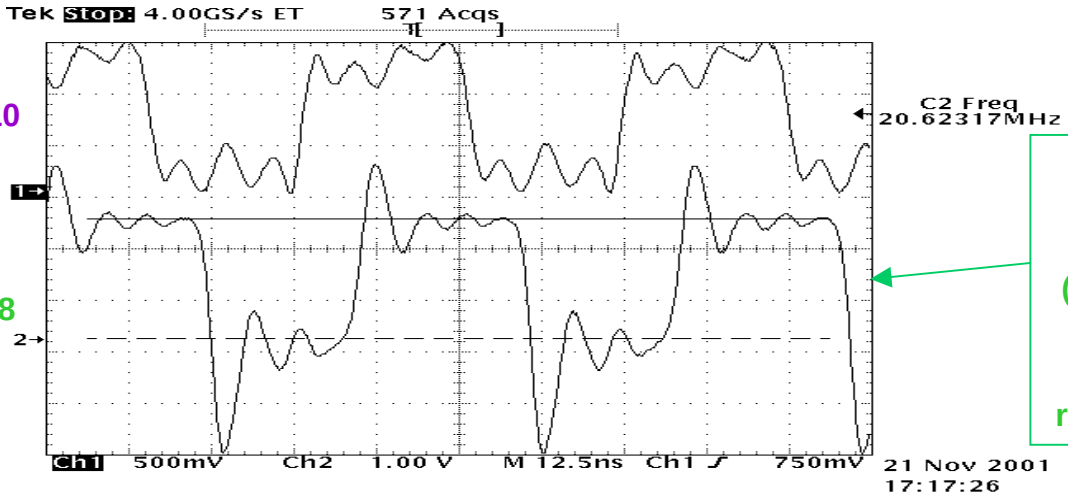
GTL on CARD 2

LVTTL on ALTRO 1



GTL on CARD 10

LVTTL on ALTRO 8



Signal amplitude: 2.35 V
Overshoot: 0.85 V
Undershoot: 1.95 V
(The measurement shows that the FEC internal bus has to be optimized to reduce under/over -shoots)

Conclusions

- GTL transceivers can be operated at 2.5 V
- Tests have shown that the Front End bus can be operated up to 100 MHz
- The use of 2 ribbon cables represents a good compromise between mechanical and electrical requirements

The ALICE TPC ReadOut bus documentation is available at :
http://cern.ch/ep-ed-alice-tpc/