Ideas on ECS for the Calorimeter

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- The present calorimeter ECS is mainly based on SPECS
  - Front-end, LED pulsing, HV, Integrators
- We suppose that we will keep the rest unchanged
  - Power supplies (Maraton), Turbines, HCAL rad. Source (CanBus)

- SPECS will probably not be supported for the upgrade
  - Do not want to be alone to maintain SPECS
  - Follow the overall collaboration → GBT

- This is not a problem for systems which have to be re-designed
  - We would like to keep some of our boards which are based on SPECS

- 3 cases :

  1) Electronics in FE crates and to be re-designed (FEB, control board)

  2) Electronics in FE crates kept and based on a SPECS slave (TVB)

  3) Electronics kept and based on a SPECS mezzanine (e.g. HV)

- We have to find a "GBT solution" for all of these cases

Case 1 : New electronics in crate

- Backplane is kept as is but many lines are not necessary anymore

  - Use them for ECS point to point connections

- A new control board must be designed → GBT-ECS fibre connection

  - GBT receiver on the control board

  - Propagate e-links on the backplane (SVLS @80MHz → to be tested!)

  - Receive the signal with a GBT-SCA chip on the boards (FEB)

   – Generates I2C for slow control on the FE boards

FEB   Control Board

E-links (point 2 point)

GBT-SCA

GBT
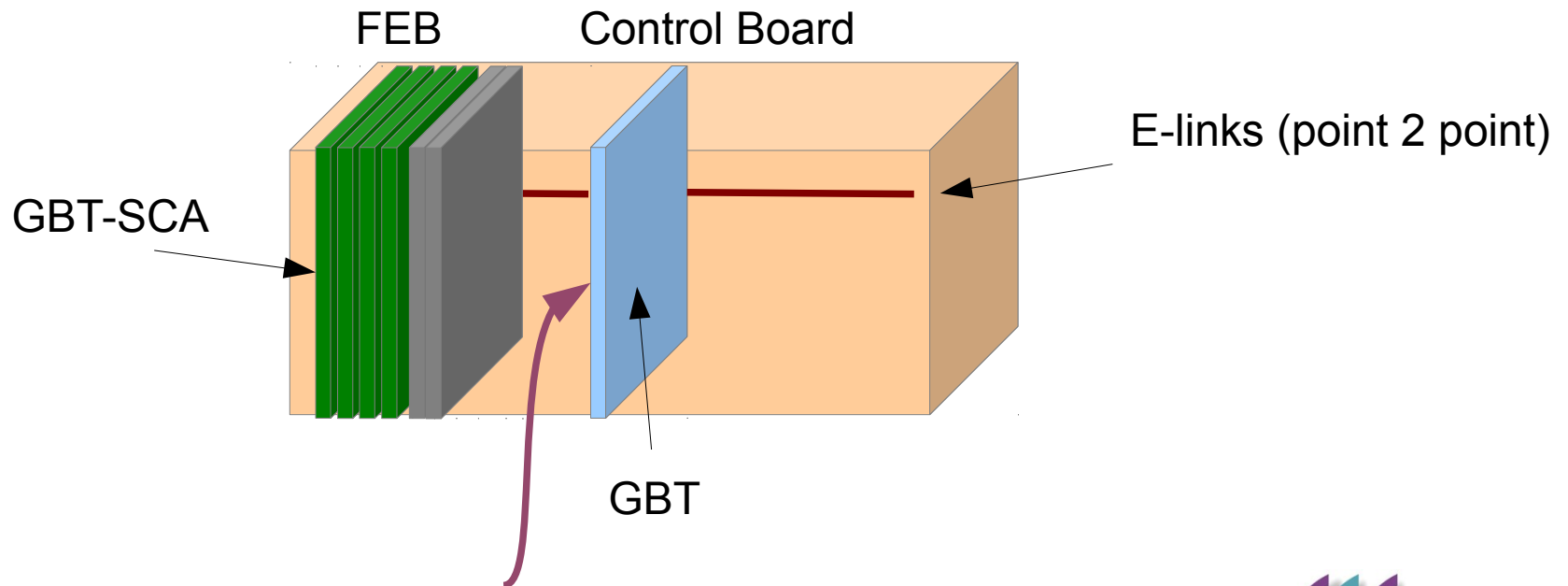
- Some boards should be kept
  - ECS input is currently SPECS bus
  - Replace the signal from SPECS frame to I2C frame
    - This is not obvious : SPECS is here a mono-directional SPECS !
    - May have to add a FPGA on Control board to make it transparent for the GBT
      - Firmware has to be written
  - Reprogram the SPECS slave to make it a I2C→I2C transmitter (Firmware)
  - The board directly receives I2C from the control board
    - GBT-SCA on the control board
    - Could this solution also be used for case 1 ?

FEB   Control Board

GBT   GBT-SCA
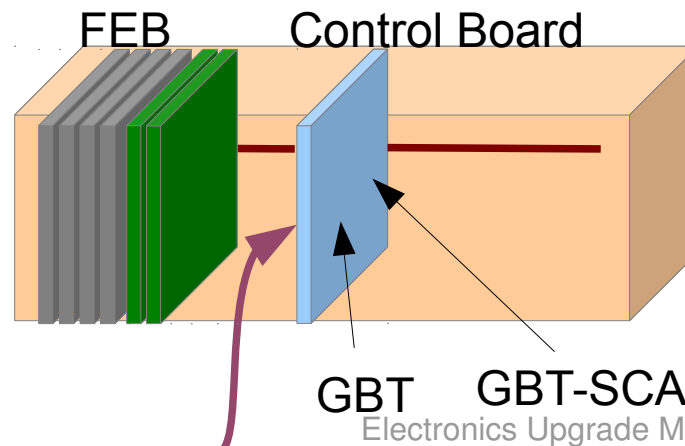
- The SPECS mezzanine have to be replaced by a "GBT equivalent"
  - This would consist in replacing the SPECS mezza. by a GBT one
    - Yuri Guz from the calorimeter group volunteered to realize this
      - Difficulties : GBT frequency, power supply, signal levels,...

SPECS signal → GBT optical signal
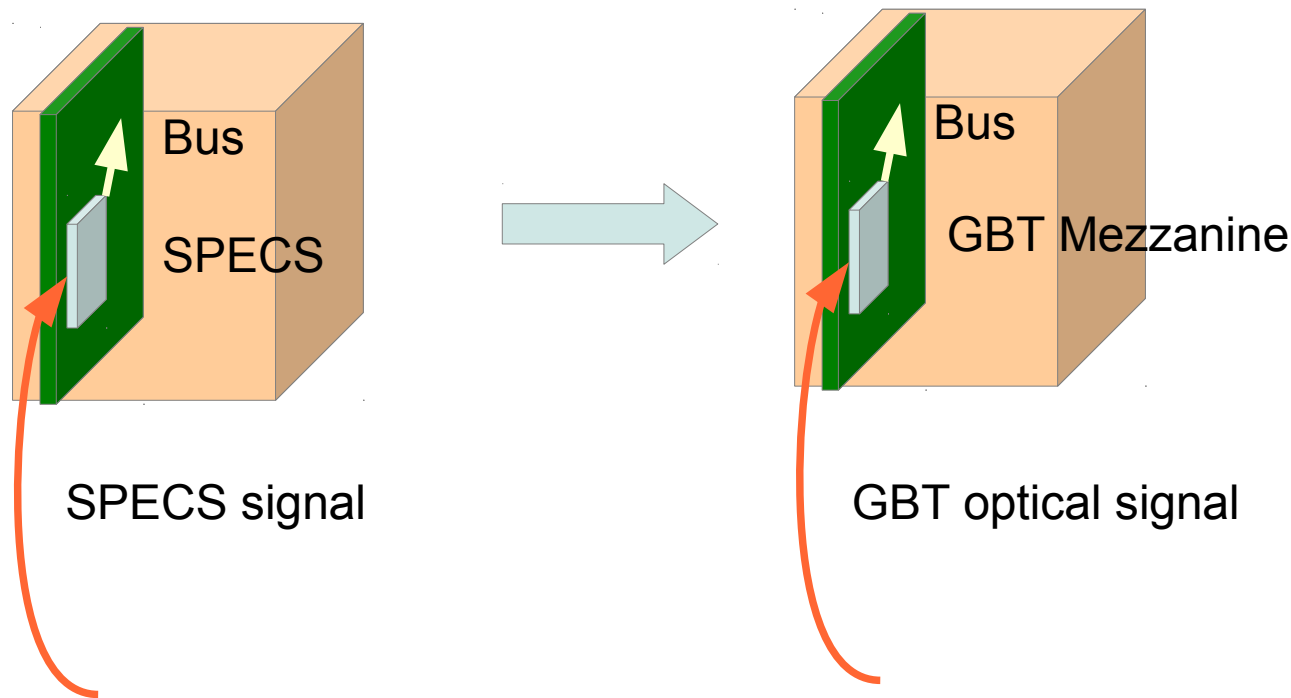
Conclusion

- Those are just ideas
  - Deeper thinking with experts of the different boards is needed
  - Preliminary tests are mandatory (usage of the backplane for e-link, I2C bus,... ?)
  - This is heavily connected with the control board design
    – Problem : work on the CB has not started (we have no volunteer yet !)
- Could imagine several alternatives and variations
  - Case 1 (FEB) could be made similar to case 2 (TVB)
    – Having a I2C → I2C transmission on the FEB
    – Gathering all the GBT-SCA on the Control board
      • 2 GBT-SCA on control board → 32 I2C bus !
- A single I2C bus is not enough for a board
    – Should implement sub-adress in the GBT frame to implement local bus
      • FPGA for ECS requested on the FEB(TVB)
        – was expected or already exists (TVB)