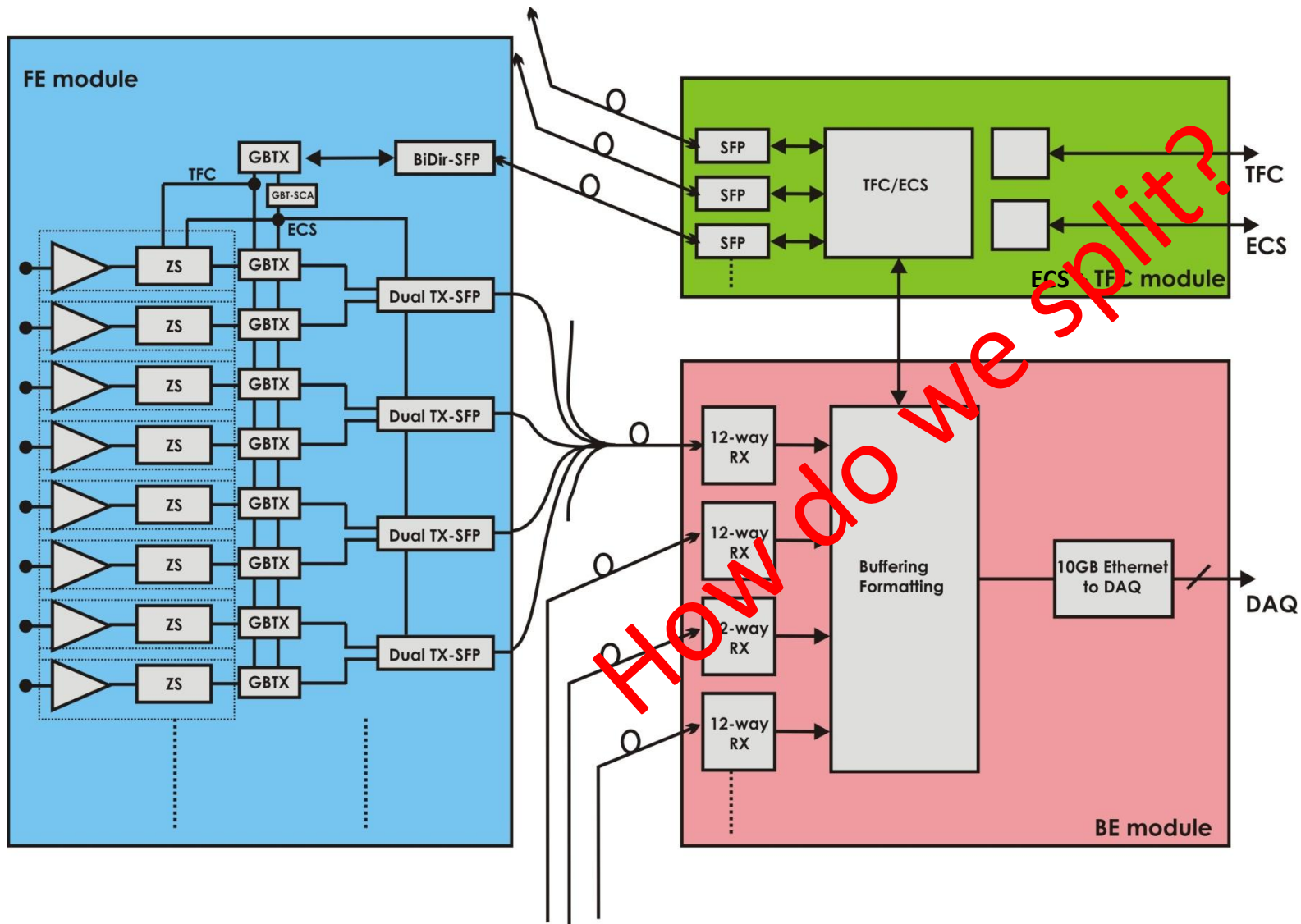


LHCb Architecture Decisions



Thoughts

GBT is designed for DAQ + ECS + TFC in one bi-directional link

BUT concept driven by ATLAS/CMS tracker

-> compactness is driving factor (space constraints)

LHCb more relaxed for space

-> data (DAQ) bandwidth is driving factor

-> big difference in up and down bandwidths

After discussions with Jean-Pierre & Guido:

TELL40 is a large cost in the upgrade (~ 10%): must minimise cost!

=> optimise channel density in boards

=> use SNAP12 + 12-way fibre ribbon

good experience with TELL1/UKL1

already have 8000 links in this format installed

More thoughts

For front-end:

ECS is bidirectional

TFC is unidirectional (maybe bidirectional....?)

DAQ is unidirectional

Bidirectional packaged (SFP+):

Low density, not economic for TELL40

Technical problem:

SNAP12 (MTP/MPO) is 12 x RX or 12 x TX (4 + 4 is available)

=> Cannot arbitrarily choose direction of channel in link

SFP+

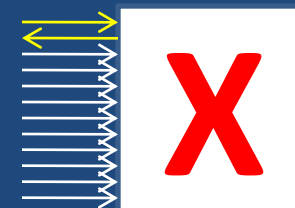


13.4mm

Snap12



18mm



Can we truly combine DAQ+ECS+TFC?

Do we want to?

Implications of combining DAQ + ECS

(both DAQ + ECS info of a front-end module from a TELL40)

- Unidirectionality of SNAP12 implies mixing connector types to get bidirectionality
 - => we lose density
- Ratio of # ECS links to # DAQ links is different amongst sub-detectors
 - => how do we decide the ratio on TELL40?
 - => needs different flavours of mezzanines to optimise.....
- More complex mezzanines + communication with motherboard

Proposal (see slides from Jean-Pierre)

Build TELL40 dedicated to DAQ

Build TELL-ECS dedicated to ECS

=> easy to optimise

=> best density

=> easy to scale

=> consistent with the philosophy of keeping DAQ +
ECS independent

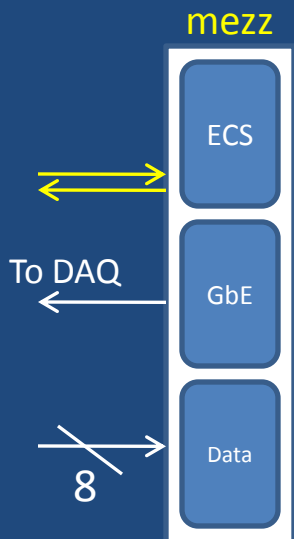
=> easier to merge into existing ECS framework



Example sub-detector: One FE module = 8 DAQ links per 1 ECS link, 100 modules in total

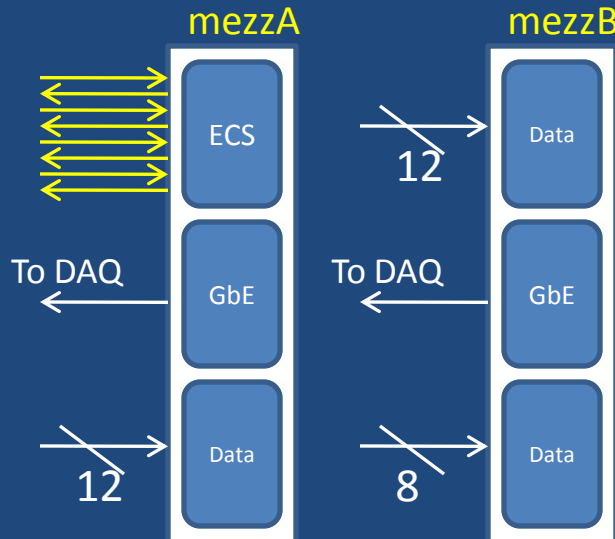
4 mezzanines per board

Combined,
one mezzanine flavour



1 module = 1 mezzanine
4 modules = 1 board
100 modules = 25 boards

Combined,
Multiple mezzanine flavours



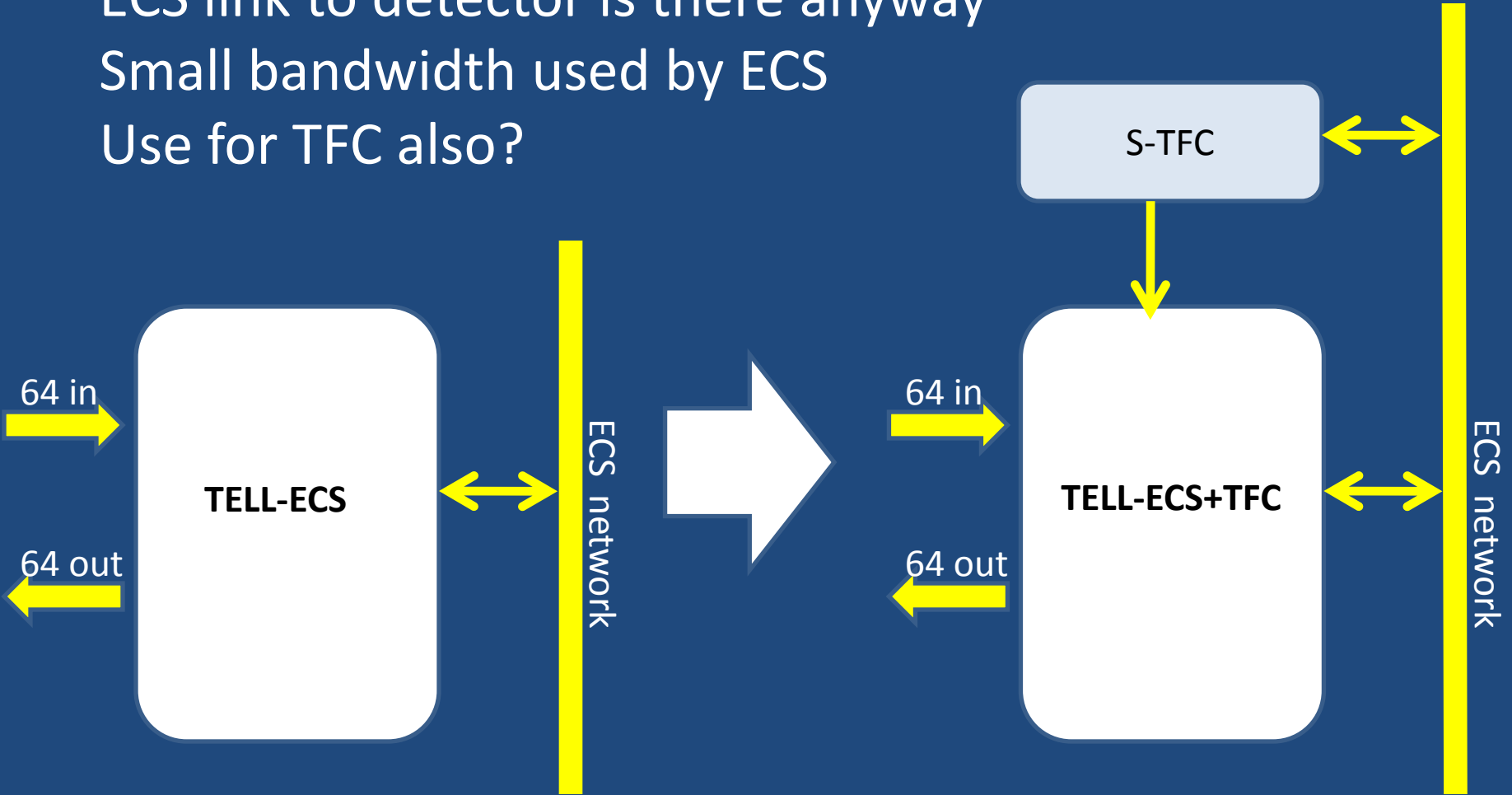
4 modules = 2 mezzanines
8 modules = 1 board
100 modules = 13 boards

TELL40 (96 channels)
TELL-ECS (64 channels)

$800/96 = 9$ TELL-DAQs
 $100/64 = 2$ TELL-ECSs
= 11 boards

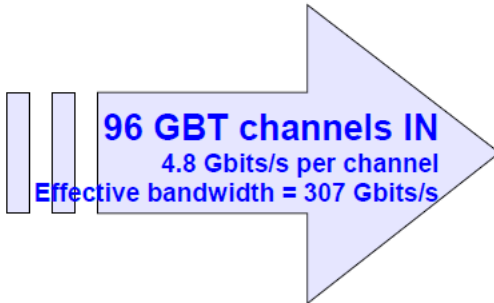
Combine ECS + TFC for front-end?

ECS link to detector is there anyway
 Small bandwidth used by ECS
 Use for TFC also?

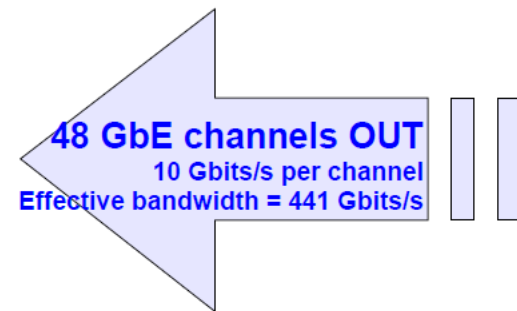


TELL40 from Jean-Pierre

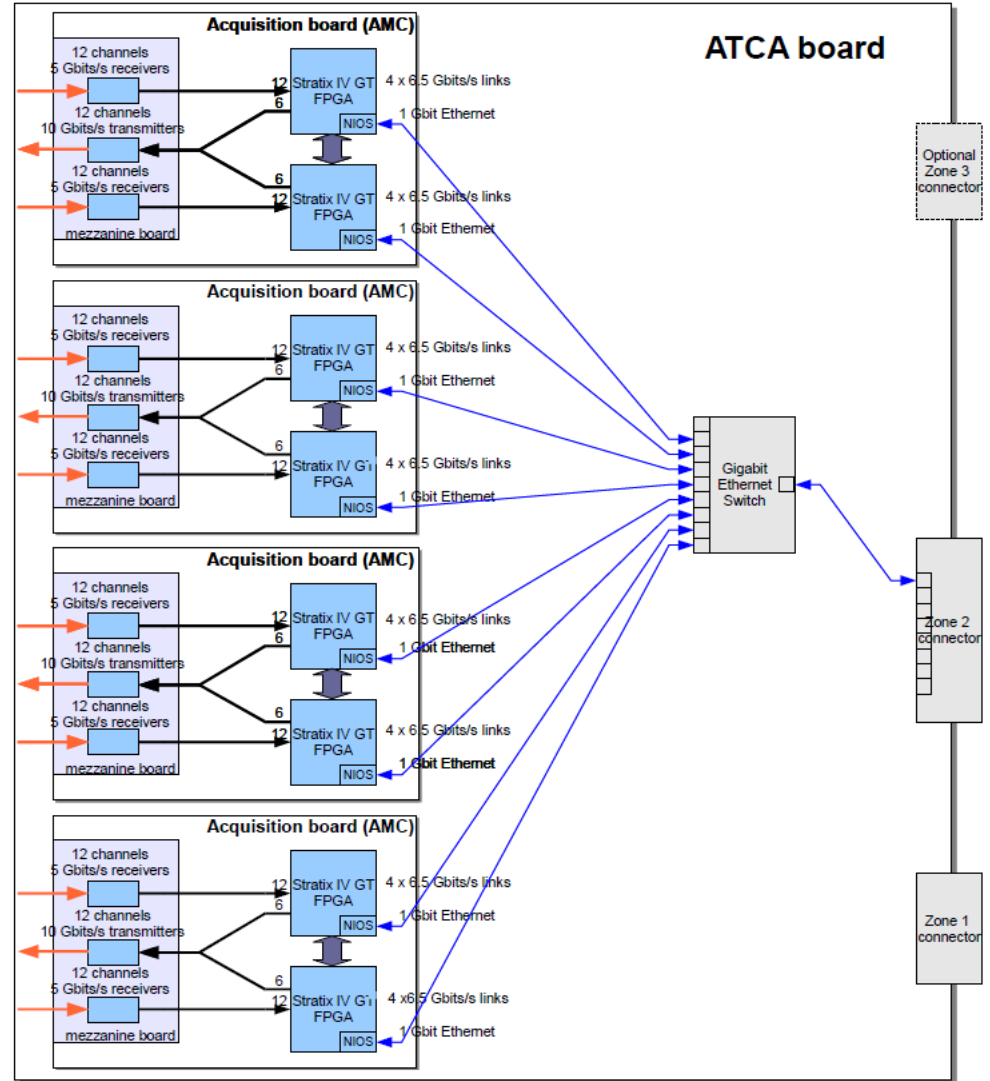
from FE



to switches/farms



No need for local CCPC:
NIOS core with TSE allows to read all the registers of the board
~ 100 times per second



TELL-ECS from Jean-Pierre

