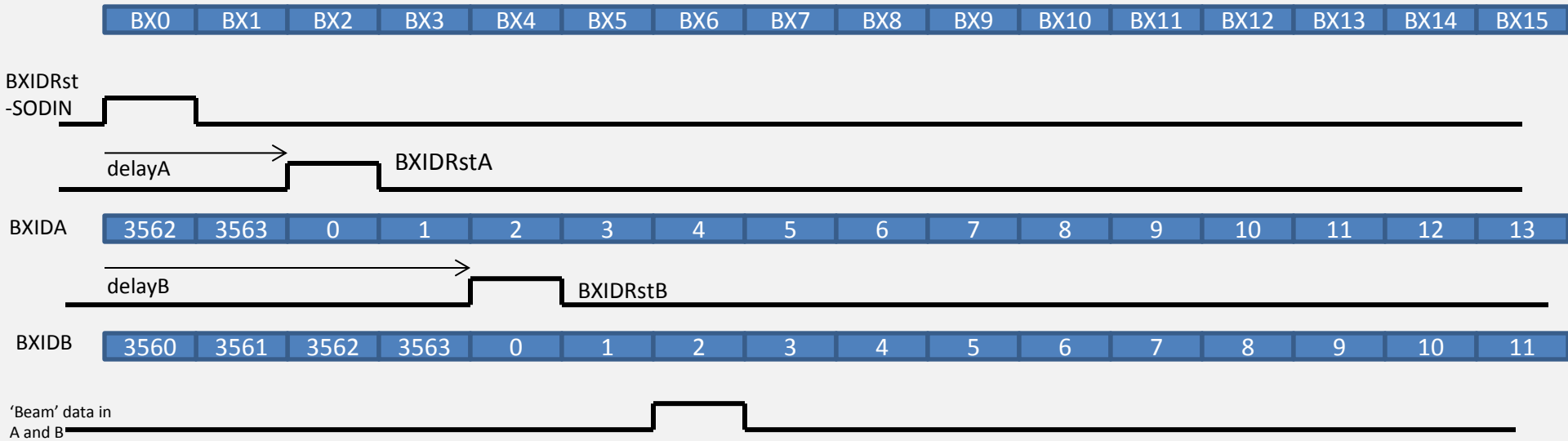
Time alignment

All sub-detectors are optimising readout as compromise between robustness and cost. OK, but.....

We must consider special scenarios where more information is required (eg more bits of BXID).
For example,

- time alignment within each sub-detector
- time alignment of LHCb

(Remember we don't have the L0 trigger !!!!)



Beams collide in only one BX (or a few well-spaced BXs)

Detector A sends a packet with data and BXID = 4

Detector A sends a packet with data and BXID = 2

} Difference used to align BXIDResets

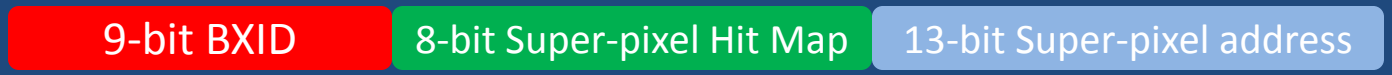
H3653	H0	H1
H2	H3	H4
Data4		H5
H6	H7	

H3653	H0	H1
H2	Data2	
H3	H4	H5
H6	H7	

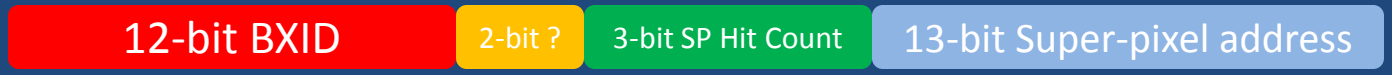
Time alignment: useful tools

Example of a SPECIAL MODE: VELO data packets (30-bits):

Normal running



Time alignment running



Another example (in FE specs!): TFC-alignment mode:

Replace data with TFC command received for each BX

TFC alignment

Then compare to see if offsets are correct/consistent

Time alignment possibilities

Test pulse injection (TFC triggered & phase adjustable)

But is still sensitive to cable delays

Cosmics

Gives absolute timing, but rare……

Laser (or similar, TFC triggered & phase adjustable)

Very useful, but not all detectors are sensitive

Beam

Ultimate tool, but quite expensive!

We still have time to put helpful features in the front-end designs, so.....

Next meeting in Feb 2014:

sub-detector ideas for time-alignment & commissioning, and how to implement them