



Safe Machine Parameters Status & Update



BT/BP AB/CO/MI 17th September 2008



SPS SYSTEM

Inputs:

Energy
Intensity (10^8)
Intensity (10^{10})

Direct Outputs:

E400_FLAG linked to BA4

E450_FLAG linked to BA4

SPS_PROBE_BEAM_FLAG linked to BA4

SPS_PROBE_BEAM_FLAG linked to BA6

Serial Outputs (through GMT):

SPS_SAFE_BEAM flag

DONE

READY BY 24th September

LHC SYSTEM

Inputs:

Energy

Intensity-1 (fast) Intensity-1 (slow)

Intensity-2 (fast) Intensity-2 (slow)

Machine Mode

Direct Outputs:

BEAM_PRESENCE_FLAG_1 linked to BA6

BEAM_PRESENCE_FLAG_2 linked to BA4

SAFE_BEAM_FLAG_1 linked to BA6

SAFE_BEAM_FLAG_2 linked to BA4

Serial Outputs (through GMT):

ENERGY

INTENSITY 1

INTENSITY 2

All Flags above +

STABLE_BEAMS flag

MOVEABLE_DEVICES_ALLOWED_IN flag



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SAFE_BEAM_FLAG_2 linked to BA4

Serial Outputs (through GMT):

ENERGY

INTENSITY 1

INTENSITY 2

All Flags above +

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SAFE_BEAM_FLAG_2 linked to BA4

Serial Outputs (through GMT):

ENERGY

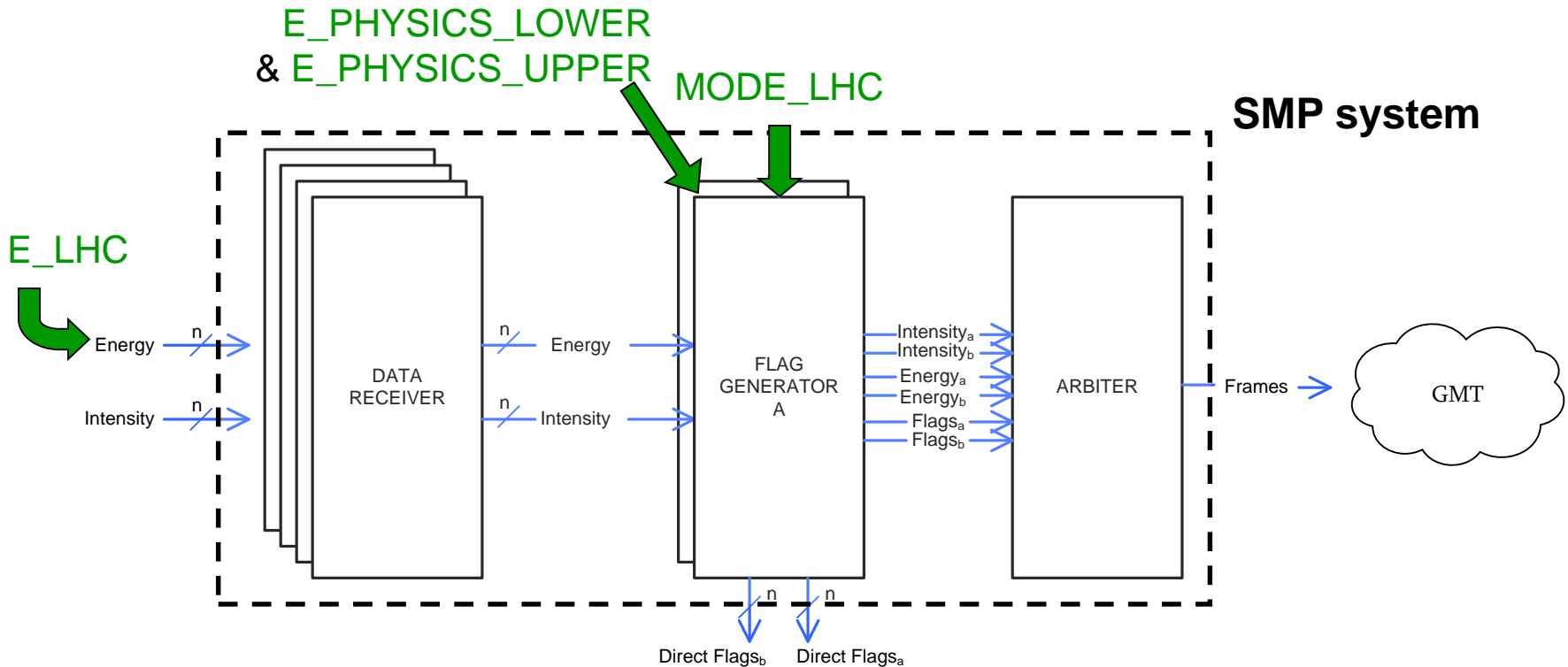
INTENSITY 1 *

INTENSITY 2 *

All Flags above +

STABLE_BEAMS flag

MOVEABLE_DEVICES_ALLOWED_IN flag



“Threshold” Values written through FESA..
 can only be changed by expert... ‘soft’ process...

Not as safe as specification requires
 -good compromise for coming weeks / months

- Agreed 16th September = Change Stable Beams and Moveable Devices

- Should take 4-5 days...

... functional system online afterwards (E / I1 / I2 / all flags as specified) ...

We're studying I1 / I2 – big influence on availability

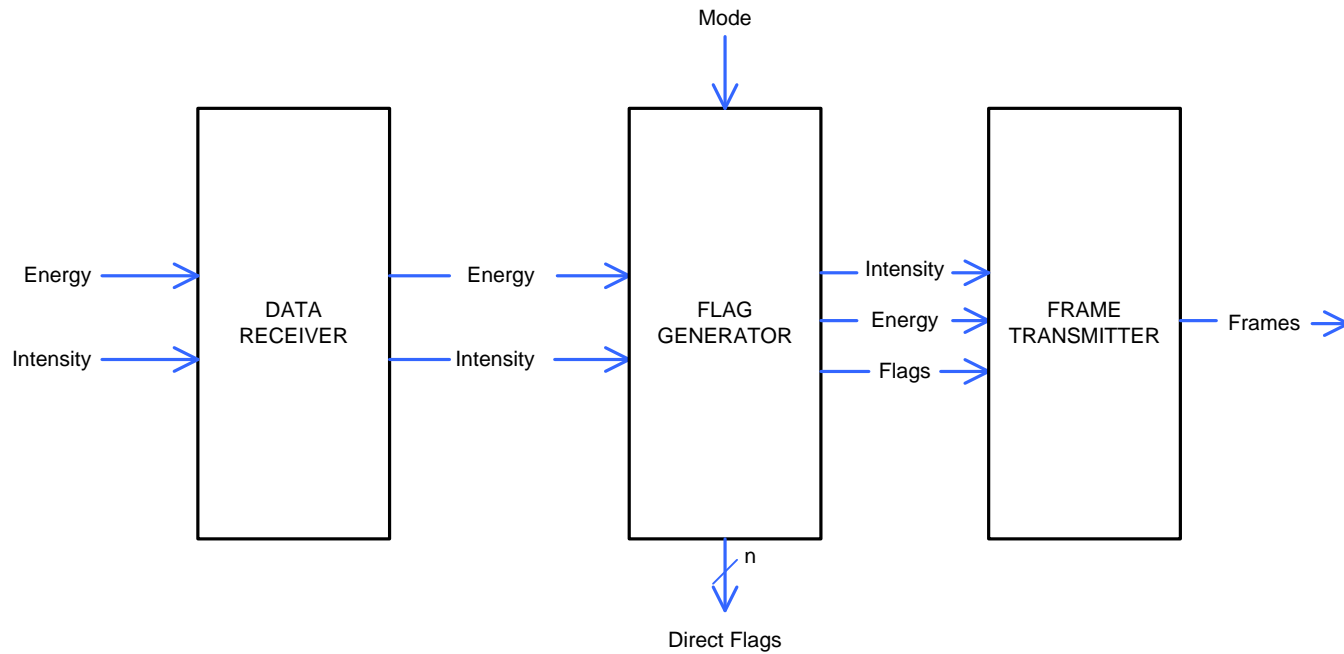
DON'T FORGET:

This is not the final SMP, next year we will supply the specified system:

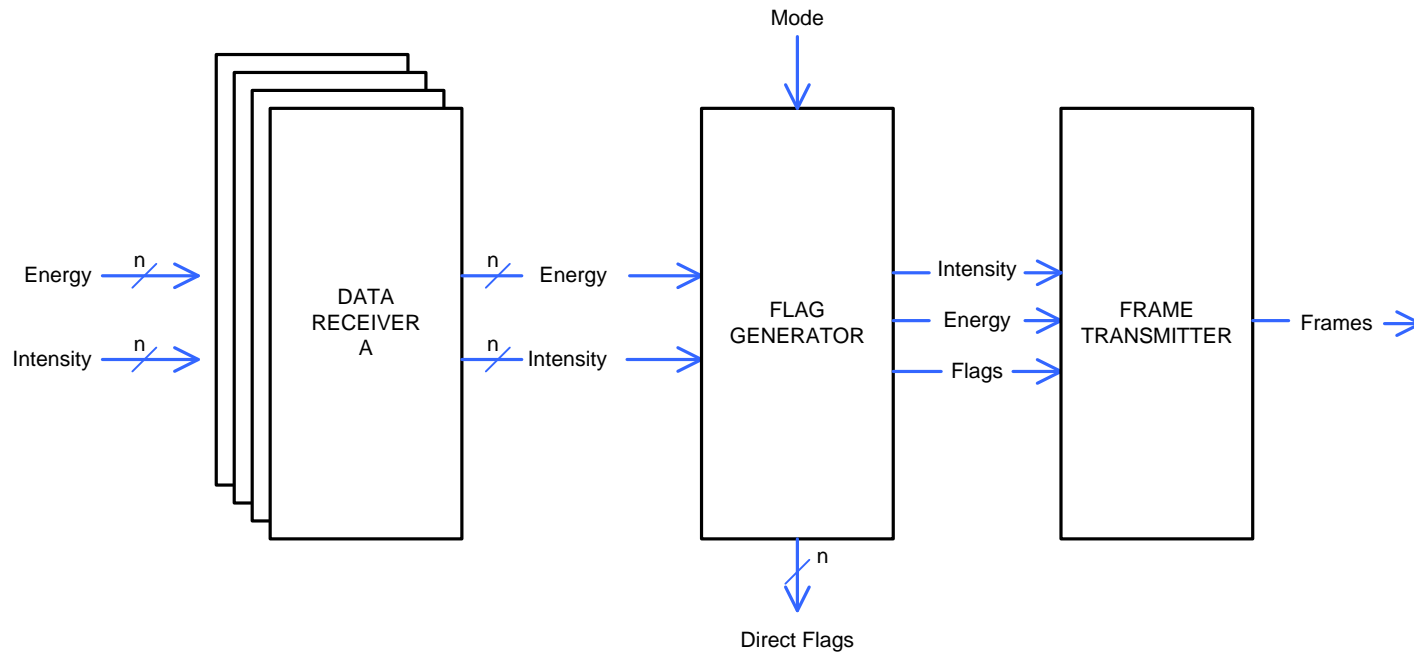
1. Add full redundancy – different sources and processing
2. Add timing cross-check
3. Add interlock to LHC BIS when fault detected



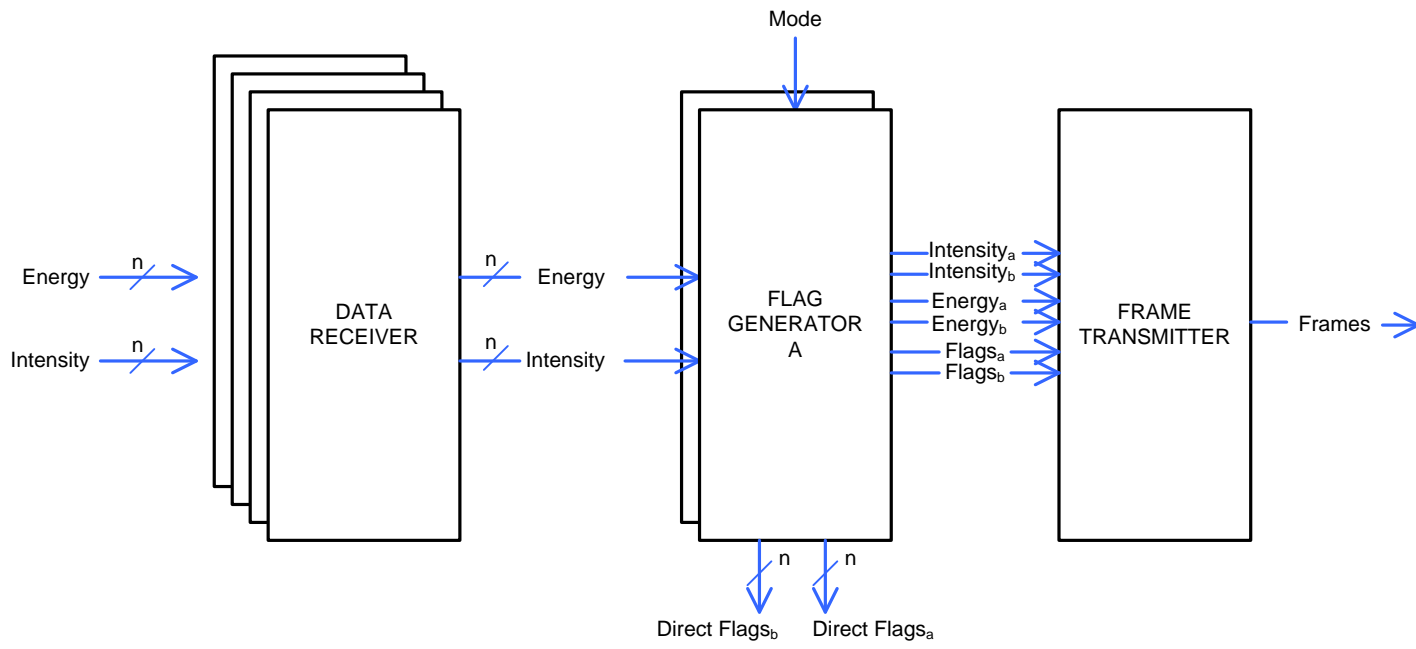
FIN



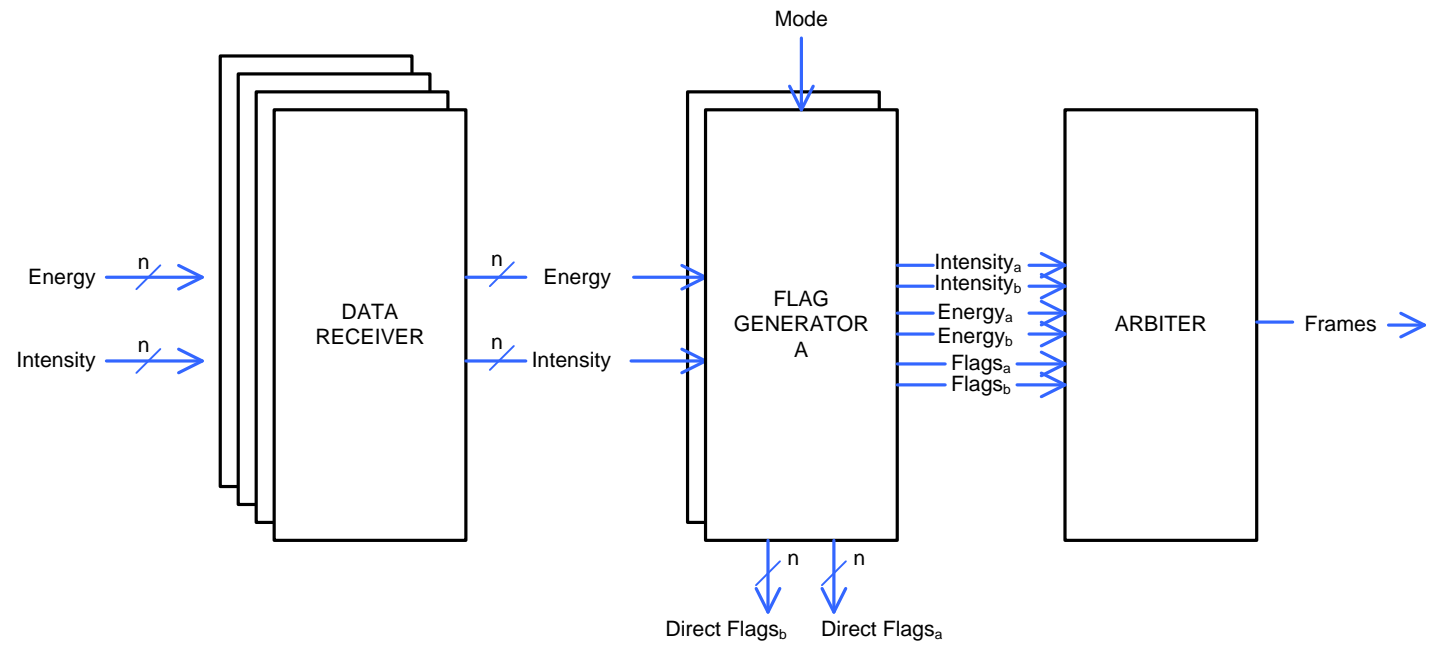
The basic function of the SMP...



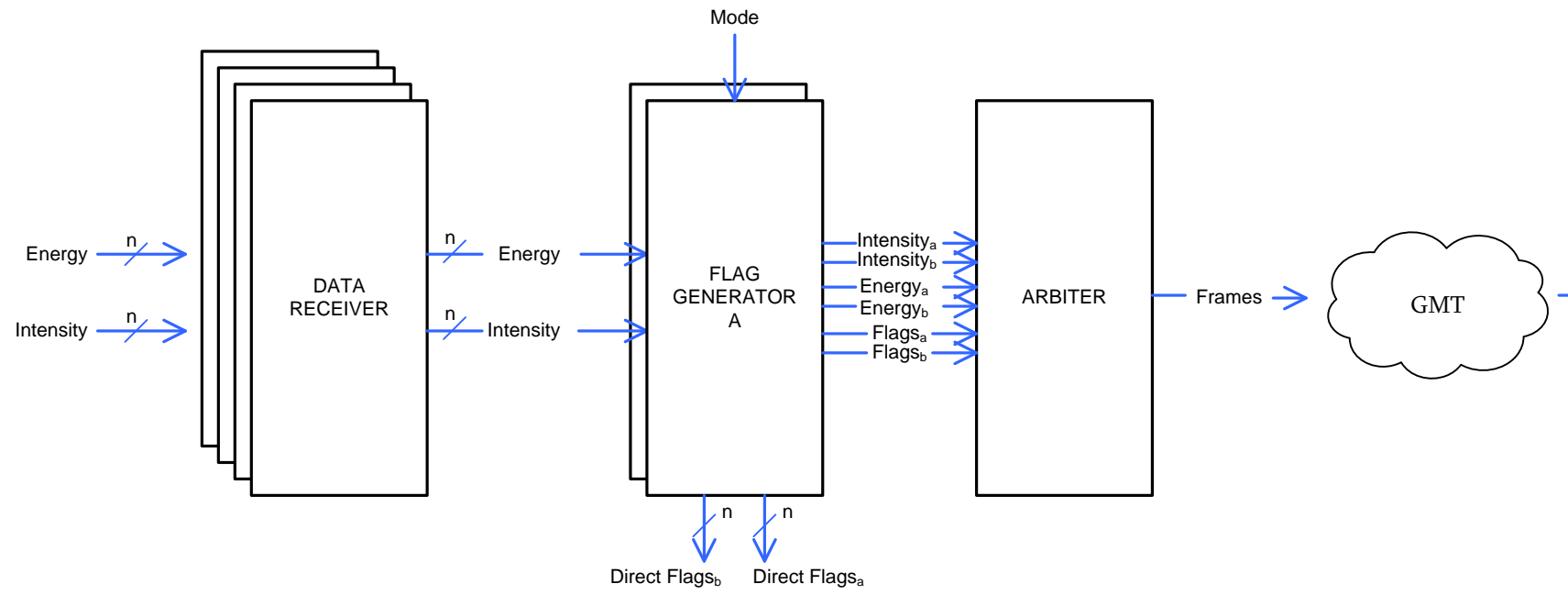
The first step is to accommodate multiple data sources to increase dependability...



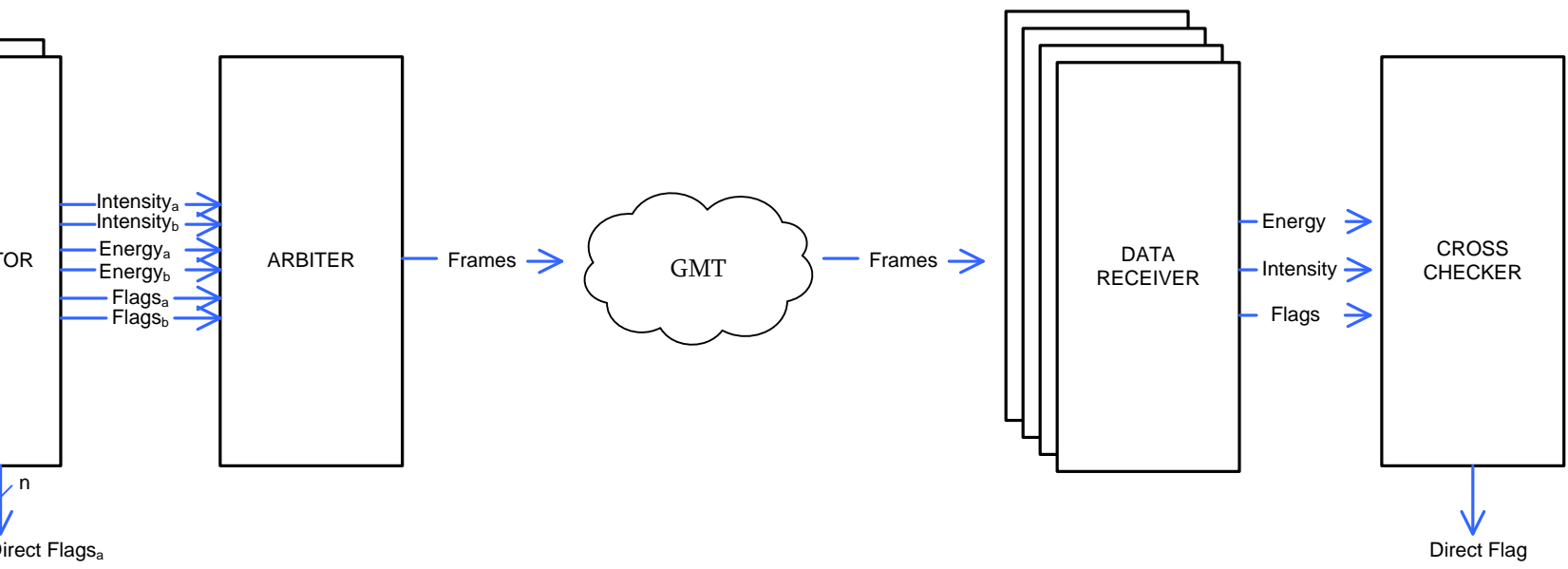
Then duplicate the critical processes



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LHC system:

Produces

- LHC Safe Beam Flags
- *Stable Beam Flag*
- *Movable Dev. Allowed in Flag*

Retransmits:

- LHC Energy
- (Beam Intensities)
- Beam Presence Flags

SPS system:

Produces

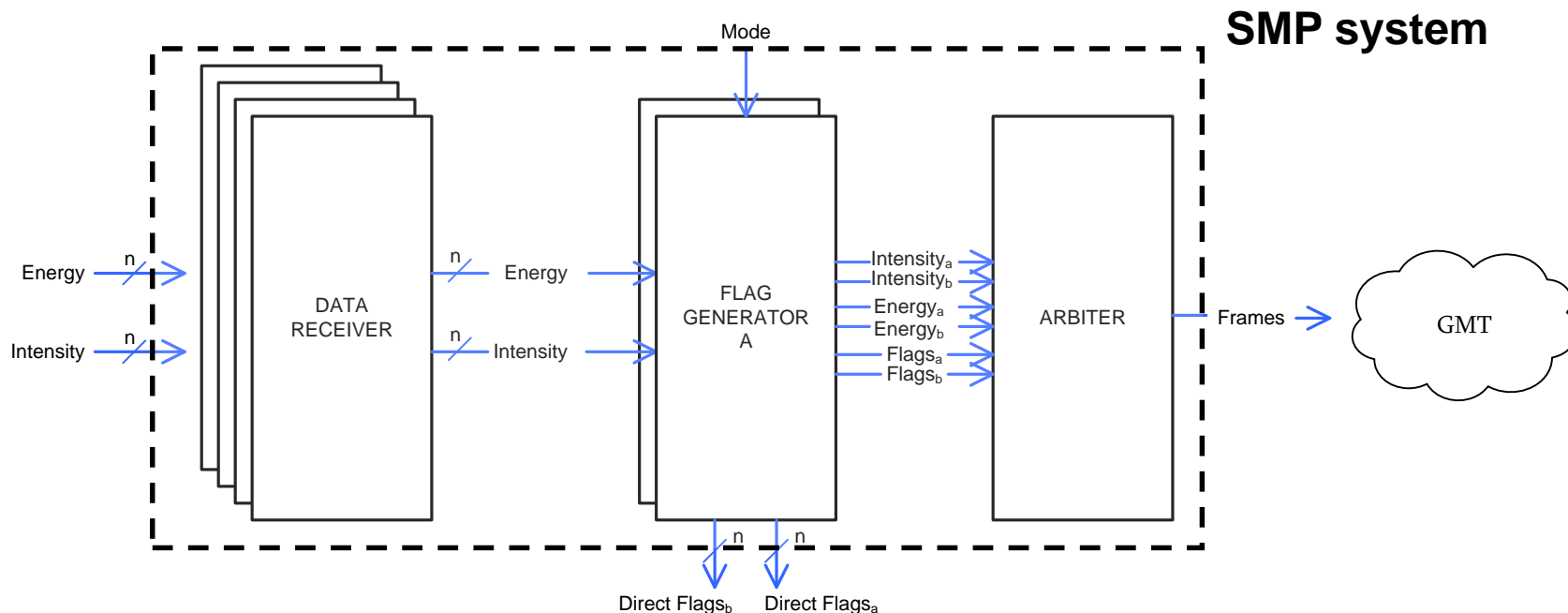
- SPS Beam Flags

Retransmits:

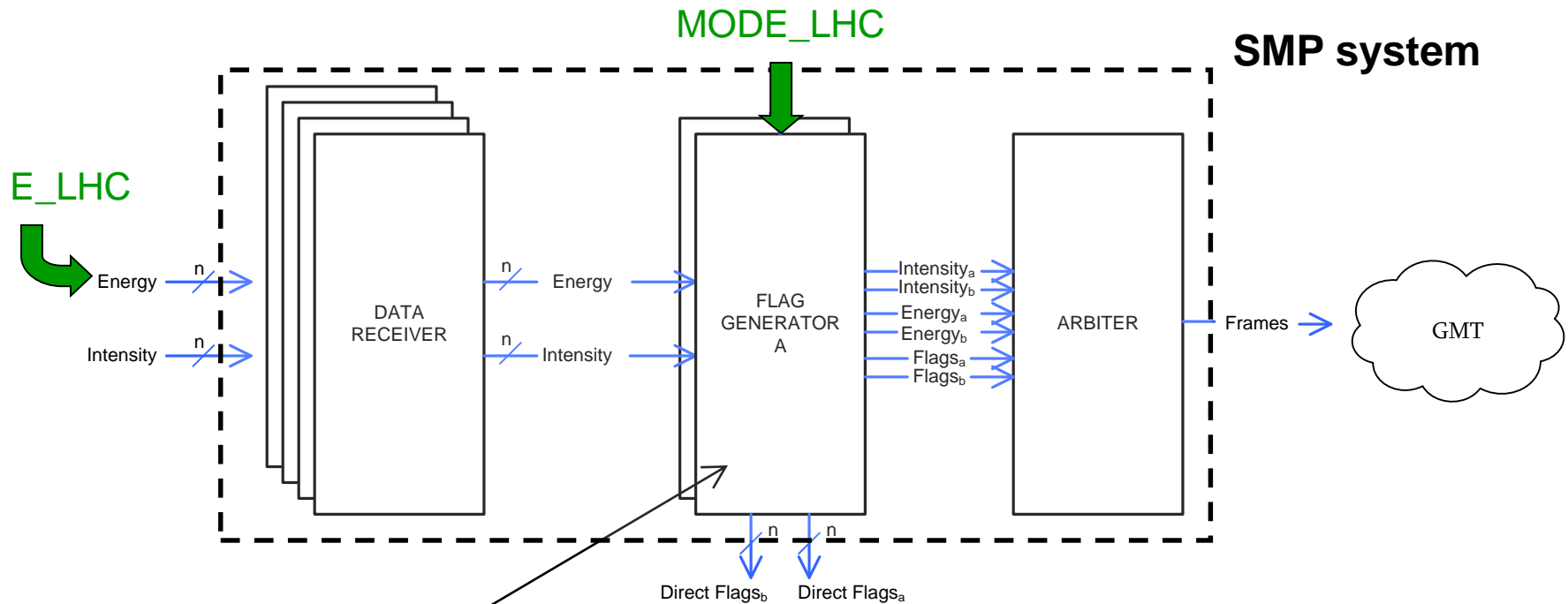
- Beam Intensity

Produces “Direct Flags”:
(not sent to GMT)

- SPS Probe Beam Flag
- CNGS Beam Flag
- LHC Beam Flag



- Hardware Process (VHDL)
- VME system: One for LHC another for SPS
- Multiple data sources to increase dependability
- Duplication of critical process
- Arbitration of the data from the two sources
- GMT output cross-checked with the original data
- FESA class for monitoring and MODE



E_PHYSICS_UPPER & E_PHYSICS_LOWER

Stored in I2C FLASH,
can only be changed by expert...
(dis-assemble SMP system to access)
Redundant... Check sum... very robust!

STABLE_BEAM & *MOVEABLE_DEVICED_ALLOWED_IN* flags need:

- Machine Energy: **E_LHC**
- Machine Mode: **MODE_LHC**
- Upper Limit of “Physics Energy”: **E_PHYSICS_UPPER**
- Lower Limit of “Physics Energy”: **E_PHYSICS_LOWER**

STABLE BEAM FLAG = “TRUE” when
(**E_PHYSICS_LOWER** < **E_LHC** < **E_PHYSICS_UPPER**)
AND
MODE_LHC = “STABLE”

MOVEABLE DEVICES ALLOWED IN FLAG = “TRUE” when
(**E_PHYSICS_LOWER** < **E_LHC** < **E_PHYSICS_UPPER**)
AND
(**MODE_LHC** = “STABLE” OR
MODE_LHC = “UNSTABLE”)

To do this we need:

- add FESA property
 - Re-write VHDL
- Re-program thresholds board
 - Re-write test sequences
 - Full Lab test
- Re-program, re-commission 2 x CISG LHC
- Agreed 16th September = Now is the time to do this
 - Should take 4-5 days...

... full system online afterwards (E / I1 / I2 / all flags as specified) ...