UUB-DAQ Status

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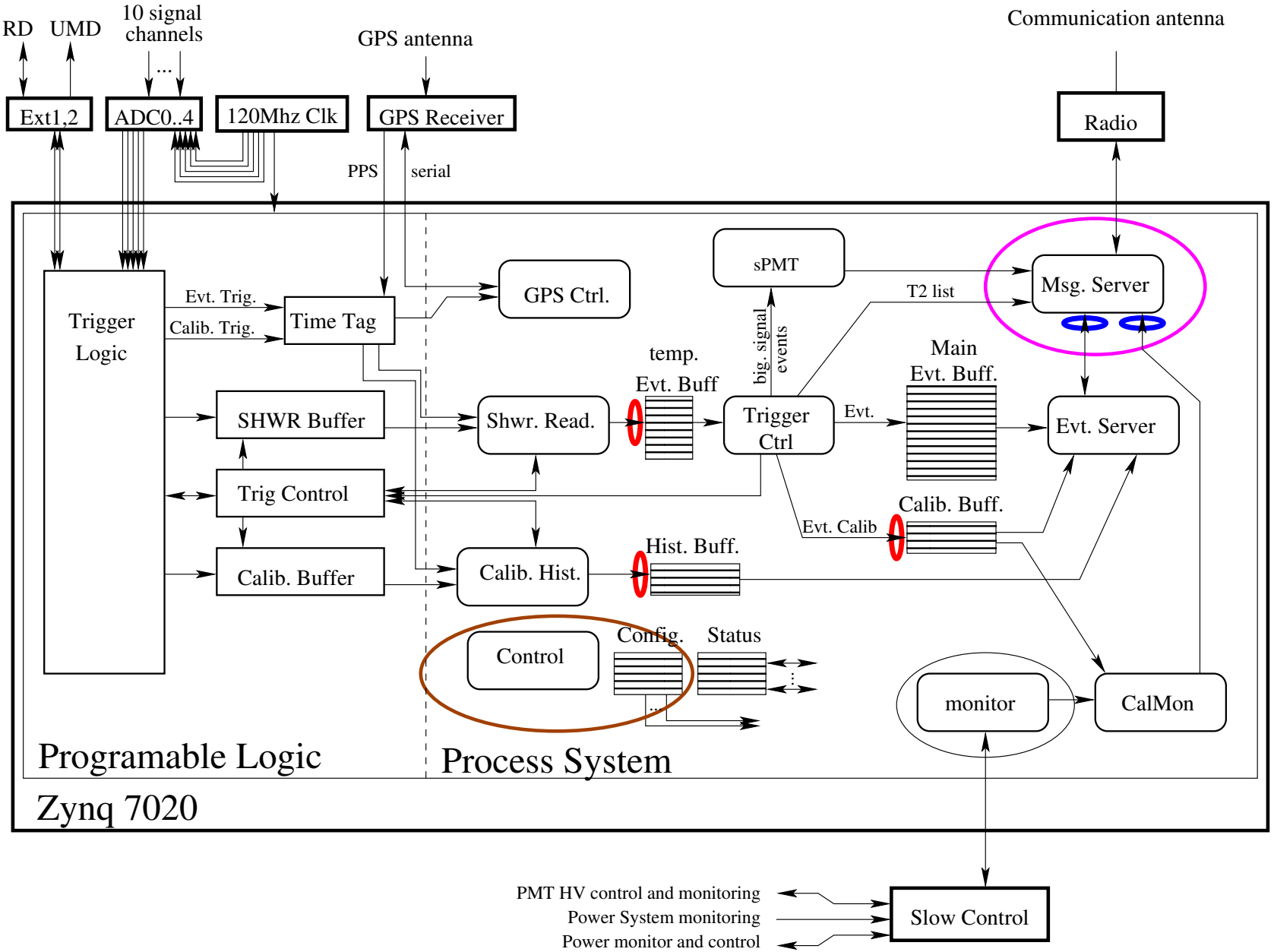
- test: V128R0B0P26; Array: V128R0B0P20
- Slow Control - ref. Voltage
- Internal data management.
- COMMS data management.
- Monitoring and Event data streams.
- Configuration storage.


RD
UMD
10 signal channels
...
GPS antenna
Communication antenna
Ext1,2
ADC0..4
120Mhz Clk
GPS Receiver
Radio
PPS
serial
Trigger Logic
Evt. Trig.
Calib. Trig.
Time Tag
GPS Ctrl.
sPMT
T2 list
Msg. Server
big. signal events
temp. Evt. Buff
Main Evt. Buff.
SHWR Buffer
Shwr. Read.
Trigger Ctrl
Evt.
Evt. Server
Trig Control
Calib. Buff.
Evt. Calib
Calib. Buffer
Calib. Hist.
Hist. Buff.
Control
Config.
Status
monitor
CalMon
Programable Logic
Process System
Zynq 7020
PMT HV control and monitoring
Power System monitoring
Power monitor and control
Slow Control

test: V128R0B0P26; Array: V128R0B0P20

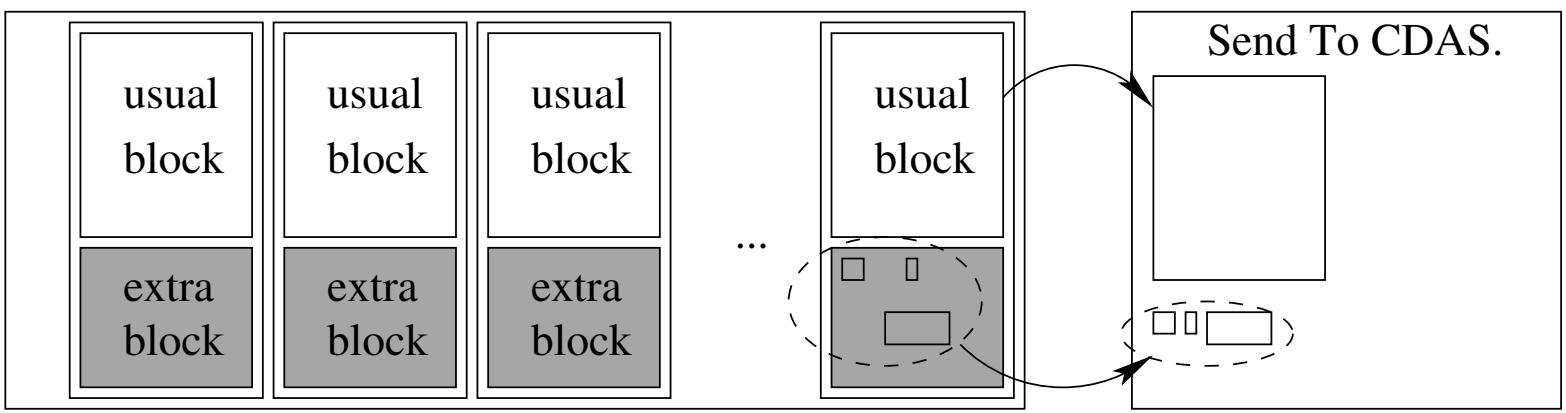
- Muon Histograms:
  - single PMT trigger condition (in the UB consider a coincidence between WCD PMTs).
- T3 events/monitoring calibration:
  - VEM Peak (calculated from filtered and downsampled traces)
  - VEM Area (Filtered/Downsample - configurable - to be verified)
  - baseline calculation:
    - given by FPGA (used in V128R0B0P20; calc., but not used in V128R0B0P26).
    - calculated with raw FADC traces (using first time bin of the trace). This is the one which is transmitted in the calibration block (V128R0B0P26).
    - Filtered FADC traces (for WCD Large PMTs - High gain channel - used to set the compatibility trigger threshold - V128R0B0P26).
- TOTD, MoPS - are disabled in the Array
  - looks too much affected by the Sun rise and set noisy.
  - trigger settings looks wrong (V128R0B0P20).
  - in the V128R0B0P26 - these settings are configurable.

Slow Control - ref. voltage

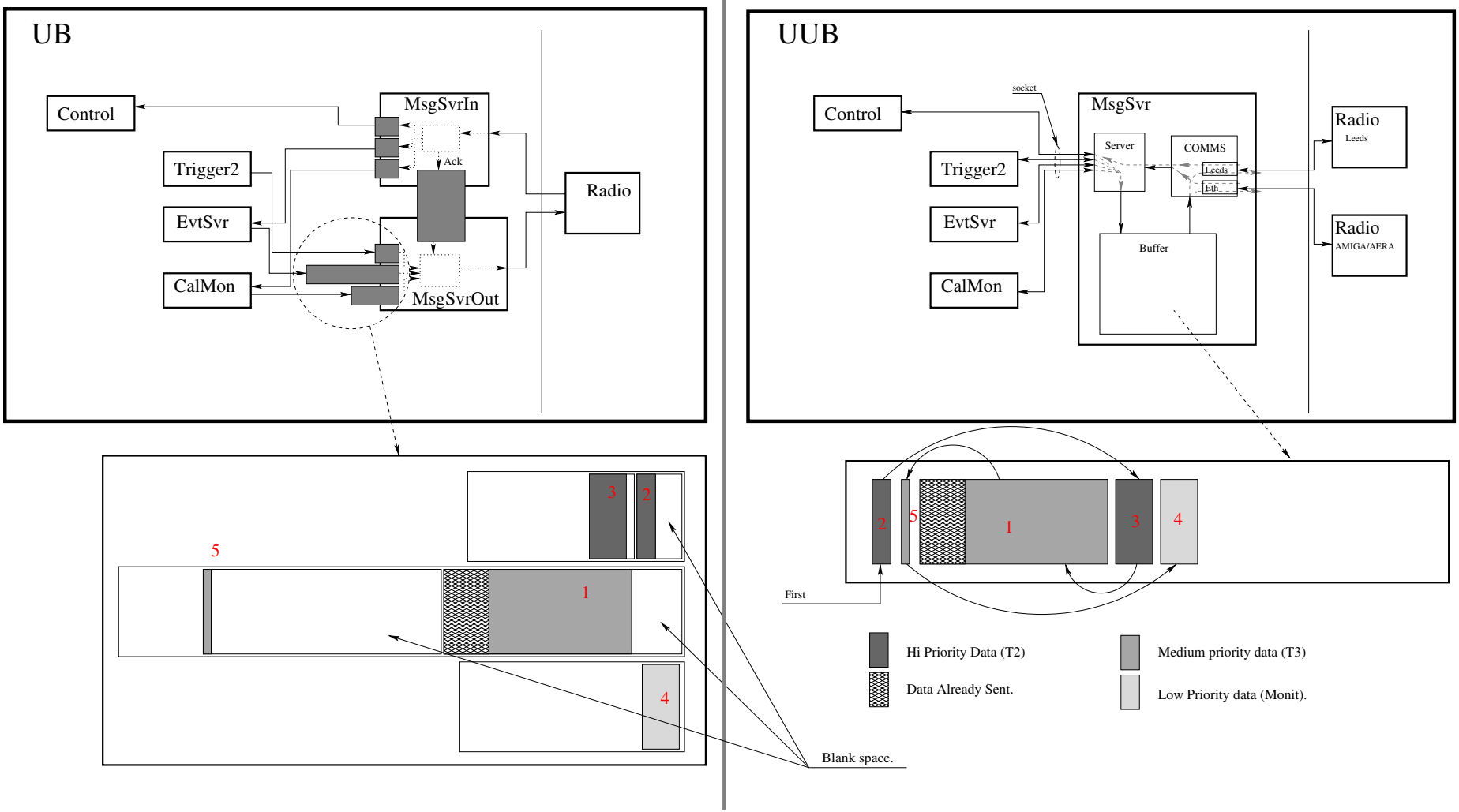
- It can request to change reference voltage, but it is not going to be reported.
- 1.5V internal micro-controller reference (default)
  - %4 according data sheet specifications.
  - Most of variation looks to be component to component.
  - temp are normally in Kelvin. 25°C may read from 13.08°C to 36.92°C
  - 24V battery, may have values from 24.96V to 23.04V.
- 2.048V external ref. voltage
  - The main error source is the ADC quantization and resistor tolerance (1%)

Internal Data Management

- Usual Data block: transmitted to CDAS
- **extra** data block: mostly used to include additional interface to communicate with processes.
  - To make easier some development implementations.
  - Internal format depends on each data stream
  - in Event data: RD data are stored in **extra** block.



COMMS data management



COMMS data management

- move from two processes to single process.
- move from shared memory to client/server communication between processes.
- separate the code in three main blocks: COMMS, Server and Buffer
- the buffer organize data a linked list order by message priority.
    - may need to look how to reorganize free spaces
- an issue: the data reception in CDAS is considered the transmission within a stream. Up to now, it is Ok, but may generate an issue.

Monitoring stream

UB monitoring (in separate messages):

- slow control parameters (Bat. voltage, PMT HV, ...)
- calibration (on-Line VEM, Area, D/A ratio, ...)

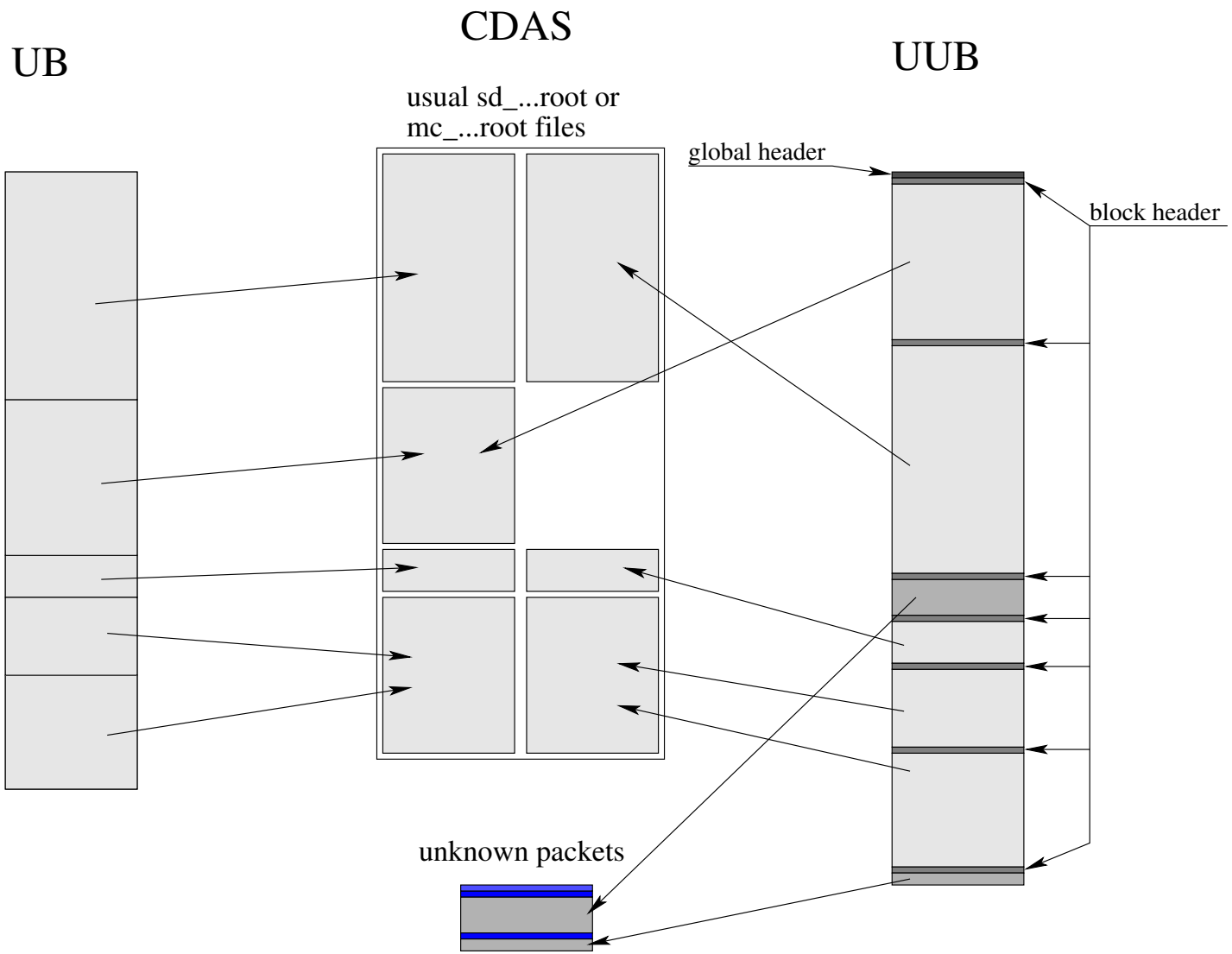
UUB monitoring (single message):

- divided in logical data blocks.
  - slow control parameters
  - calibration block.
  - RD monitoring
- possibility to include additional data blocks.
- Not recognized blocks are stored in separate files in CDAS.
- the data maybe compressed if it become shorter.

Event data streams

- small uncompressed header (Event Id, Error flag)
- compressed with bzip2 algorithms (when there are associated traces).
  - event transmission spend about 6 minutes. In UB was 1 or 2 minutes.
- data are divided in block similar as monitoring.

Monitoring and event data streams



Configuration storage.

- Automatic stored in the flash memory
- During turn on, the UUB verifies if the position looks to be compatible with the information stored in flash memory.
  - In case one UUB is moved from one station to another, it would identify if the position is compatible with tank and discard the stored configuration.
- It was mostly required because the small PMT HV calibration setting (avoid to need to recalibrate again).
- in case of stations shutdown (battery discharged), the electronics are normally re-start without intervention.