NectarCAM TC Status

NectarCAM F2F Meeting Bordeaux
October 11th 2022

J.A. Barrio

DTS Status

K.H. Sulanke

- ## Hardware Status

  – DTS for QM and T66 produced and delivered

  – DTB for MST2-8

  - ❖ Spartan6 FPGA obsolete: plan A (find them in the grey market) or plan B (upgrade to Spartan 7, requiring change in PCB and firmware)
  - ❖ Production by DESY or company based on a call for tender

  – CTDB for MST2-8: production by DESY or company based on a call for tender

  – L2CB & L2-Crate for MST2-8: production by DESY

- ## Firmware & software status

  – Firmware changes depending on option for DTB. No change in software

- ## Funding and personnel

  – Funded by Irfu

  – K.H. Sulanke retiring in 2023, continuing 2 more year 75%, hopefully in CTA.

  – Expert successor already appointed

TIB Hardware

JA Barrio, A. Pérez, LA Tejedor

- ## TIBv5.1 Status

  – Reduction of optical channels from 10 to 6

  – Great reduction of crosstalk between optical channels, important for stereo trigger, but also for calibration trigger or any other optical trigger signal

  – Internal clock available and selectable by slow control, allowing local operation if camera cannot connect to the IT center for WRS and UCTS use.

  – Obsolescence avoided by replacing some regulators in the power supplies

  – Bug found in v5.0 → delayed production of v5.1 due to micro-chip shortage

- ## Production Status

  – 5 already validated for LST North

  – 2 for NectarCAM QM and T66 awaiting in the lab for QC (funded by Irfu)

  – 4 for MST2-5 arriving next week to the lab (funded by Spanish sources)

  – 5 for MST6-9 + spare partly produced: PCBs and most components received. Funding expected in 2023 for the rest of components and mounting

  – Personnel available during 2023-2024 for production and QC

TIB firmware & software

JA Barrio, A. Pérez, LA Tejedor

- **Firmware Status**
  - Several improvements applied and all known issues fixed
    - ❖ More robust operation
    - ❖ Issues with TIBv4 at T66 should be checked again with TIBv5.1
    - ❖ Firmware ready for absolute time-stamping at TIB
  - Adding calibration features for LST Hardware Stereo Trigger

- **Software status**
  - OPC-UA-Server
    - ❖ New datapoints included for debugging, Busy monitoring, etc
  - TIB-EVB communication
    - ❖ Issue solved in LST TIB-EVB communication
    - ❖ Software ready for absolute time-stamping delivery from TIB to EVB, but not deployed yet, waiting for EVB-TIB agreement

UCTS Hardware

C. Champion, S. Colonges, M. Punch, R. Oger

- ## UCTS Status
  - TiCkS board acting as White Rabbit node
  - Remote Programming Board (RPB) for online updating TiCkS firmware
  - Box for mechanical enclosure

- ## Production Status
  - 5 UCTS modules delivered for LST-North, with RPis provided by UCM
  - QM and T66 equipped with TiCkS-only UCTS modules
  - 3 UCTS modules complete and tested, without RPi (out of stock)
  - TiCkS:
    - ❖ 3 complete and tested.
    - ❖ 6 stuffed but incomplete: DC-DC converter, LED, LVDS driver, inductor)
    - ❖ 4 PCB to be stuffed, Spartan6 FPGA missing: est. delivery date 2027!!!
  - RPB:
    - ❖ 5 to be finished: oscillator and DC-DC converter missing
    - ❖ 5 PCB to be done and stuffed.
  - Personnel and funding available for full production, only lacking components

UCTS firmware & software

C. Champion,, M. Punch

- ## UCTS firmware

  – No changes in firmware expected

- ## OPC-UA Server

  P. Sizun, A. Pérez, LA Tejedor

  – Converging to a common LST/NectarCAM version, based on the latest IRFU version

  – Update might be required to solve LST communication issue

- ## CDTS-Server software

  D. Hoffmann, J. Houles, M. Punch

  – Software receiving x24 UCTS timestamp-packets via UDP and delivering x1 UCTS timestamps to EVB via TCP/IP

  – On the process to become an element of EVB, once the corresponding Change Request has been presented by NectarCAM and accepted by ACADA

- ## TATS

  M. Punch, C. Champion

  – When ACADA ICD is settled, TATS system can be provided to help SWAT tests

CDMR

- Coordination:
  - No specific TC document in CDMR high-priority action-list, so we relaxed :-(
  - Most of RIXs requesting additional information/clarifications of documents
  - 2 general documents pending update

- DTS:
  - 14 documents pending update

- TIB:
  - No document pending update

- UCTS:
  - 1 document pending update (UCTS User Manual)

- Actions:
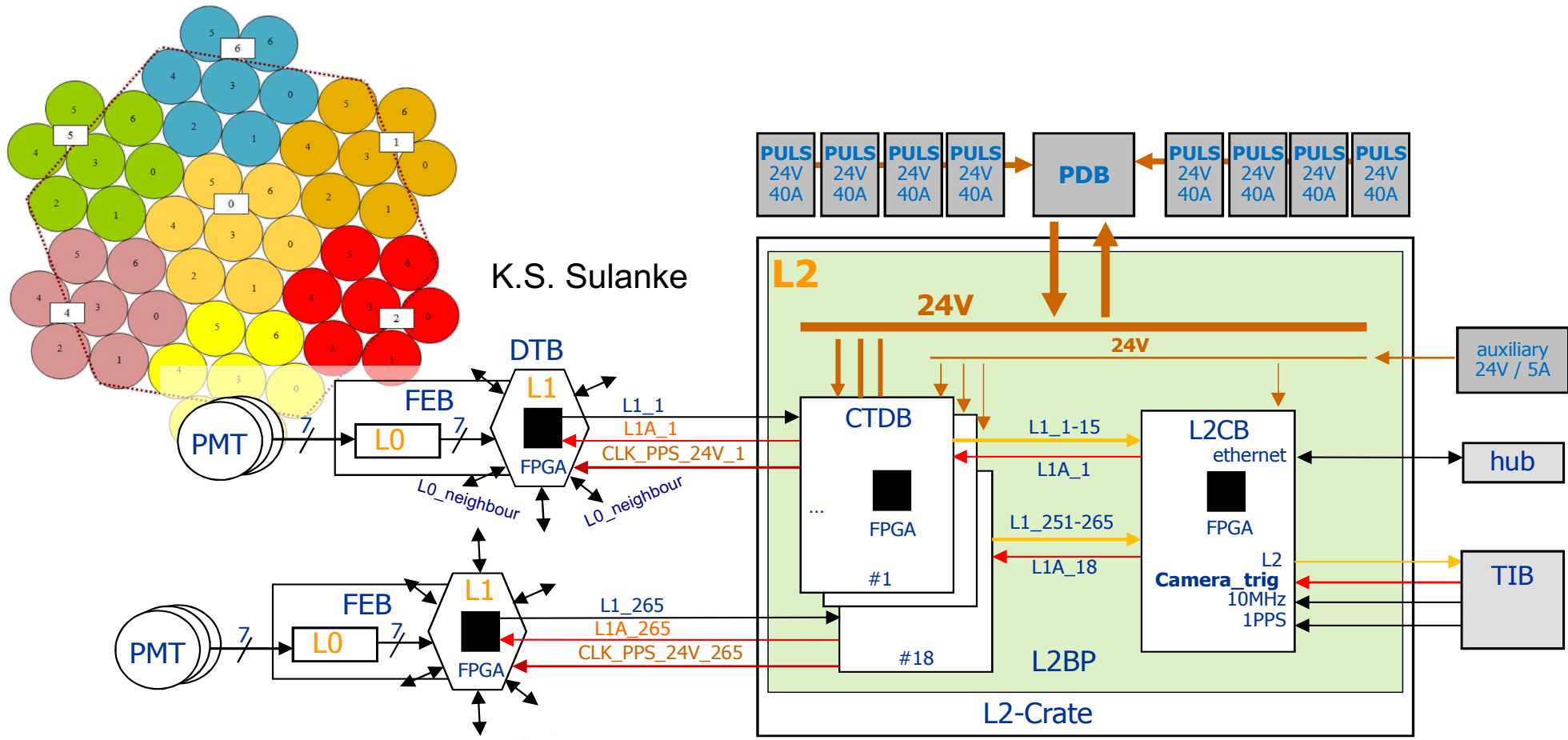 - Address RM comments on updated RIXs: difference wrt Philppe's
  - Deadline: end of 2022

Backup

DTS principle

- Digital Trigger System:
  – Trigger Decision: L0 ASICs @ FEE, L1 @ DTB, L2 @ L2-Crate
  – Trigger & Clock Distribution: CTDBs @ L2-Crate, DTBs
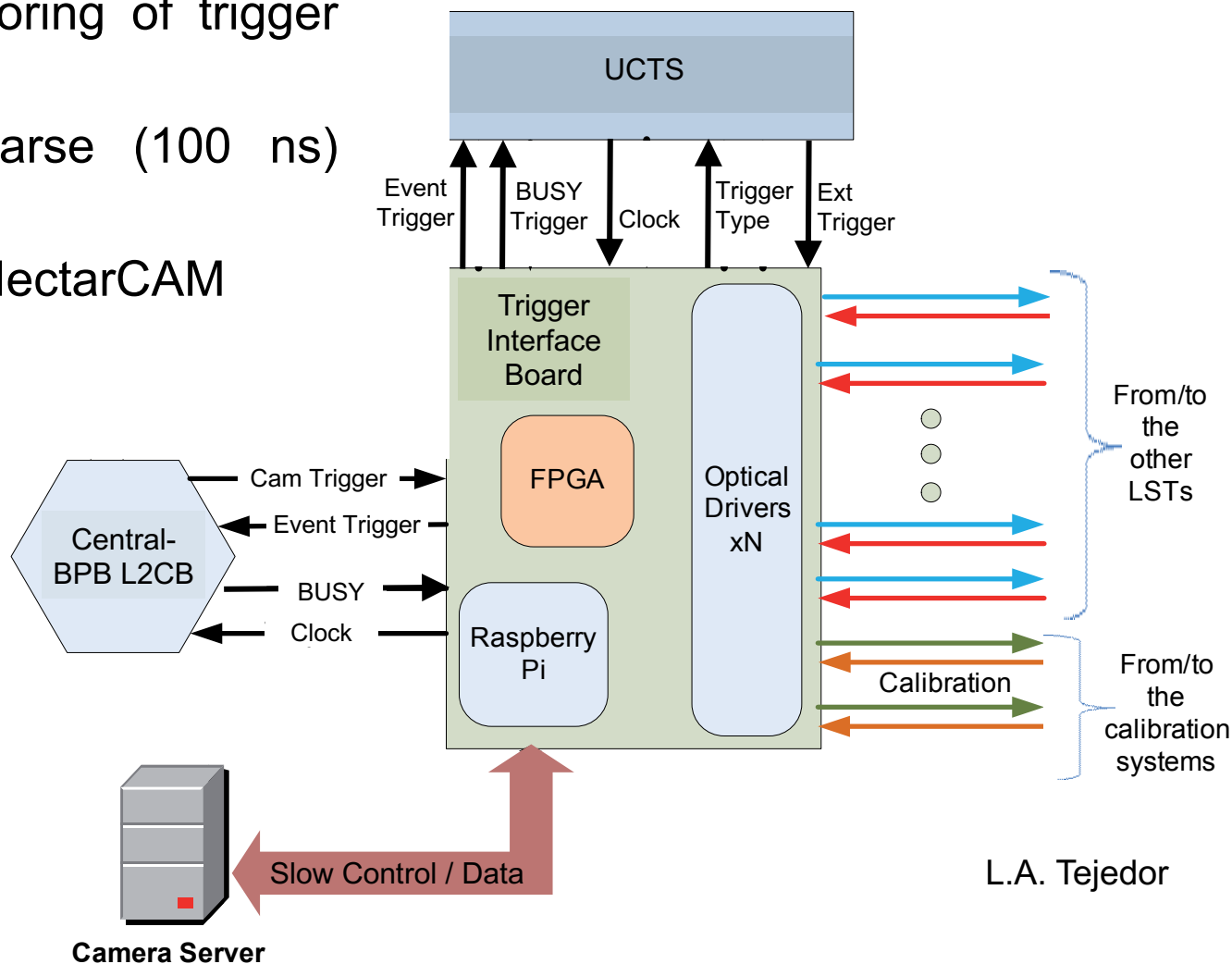 – Power distribution/control to FEB/FPM: 24 V via CTDBs @ L2-Crate

K.S. Sulanke

TIB principle

- **Trigger Interface Board:**
  - Management & monitoring of trigger and clock signals
  - Trigger type and coarse (100 ns) timestamp of events
  - Common to LST and NectarCAM

L.A. Tejedor

UCTS principle

- Unified Clock distrib. & Trigger time-Stamping board:
  - Camera White Rabbit node for Clock Distrib. & Trigger time-Stamp (CDTS)
  - Ticks-UCTS designed by APC, common to LST and NectarCAM
  - Delivery of clock signals for camera synch & generation of 1-ns timestamps