

DAQ and Trigger Systems for CLAS12

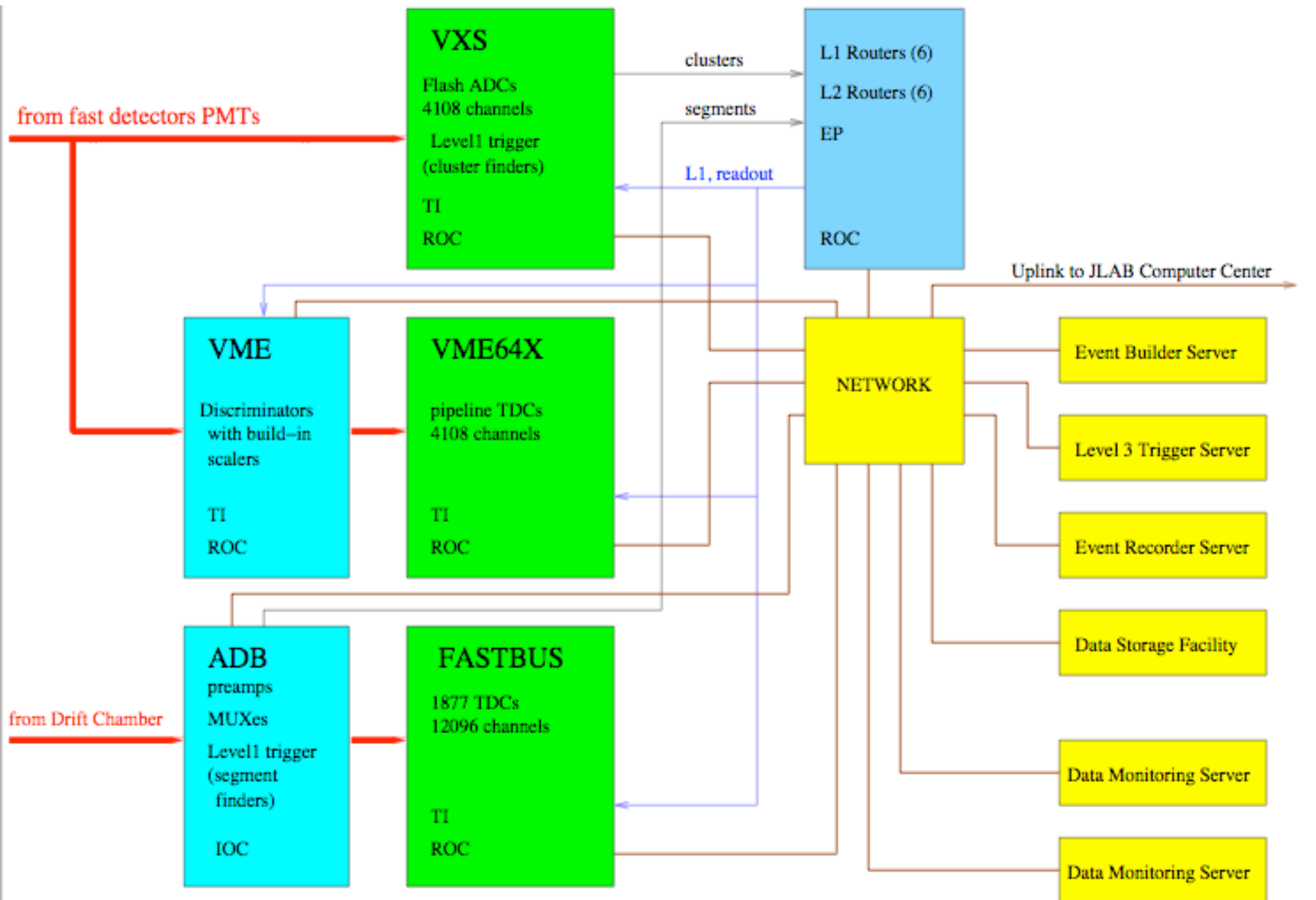
TDR supporting slides
June 2007

CLAS DAQ Analysis

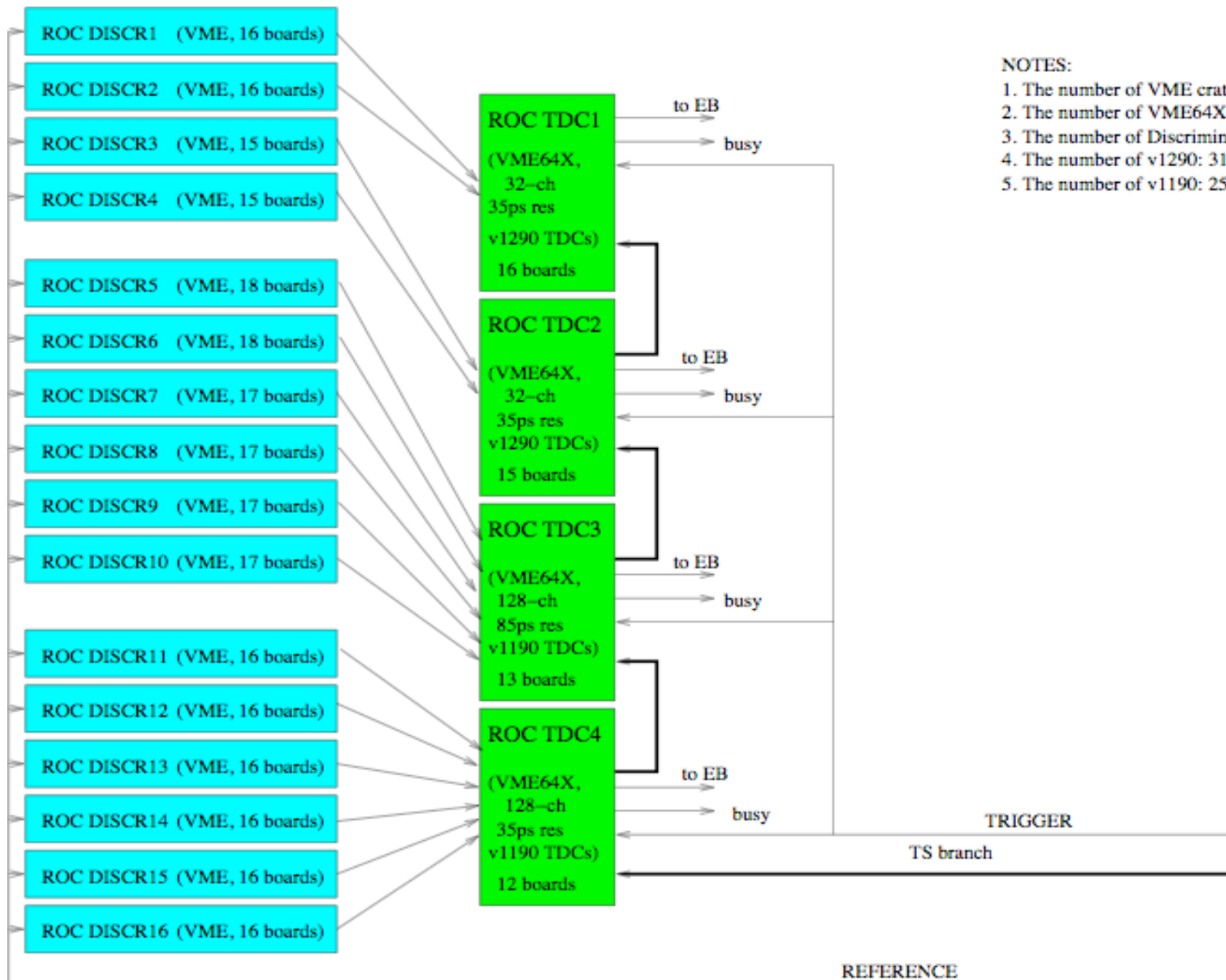
- CLAS DAQ performance (10kHz event rate, 35MB/s data rate, <15% dead time) is close to CLAS12 requirements (10kHz, 100MB/s, <15%)
- FASTBUS ADCs will be replaced with Flash ADCs
- Pipeline TDCs will be reused, new channels will be equipped with the same kind of modules
- CAMAC discriminators will be replaced with JLAB-made modules
- FASTBUS 1877 TDCs will be reused for drift chambers, VME backup solution will be provided
- ADB electronics will be partially reused, partially redesigned
- Completely new trigger system will be built

CLAS12 Data Acquisition System

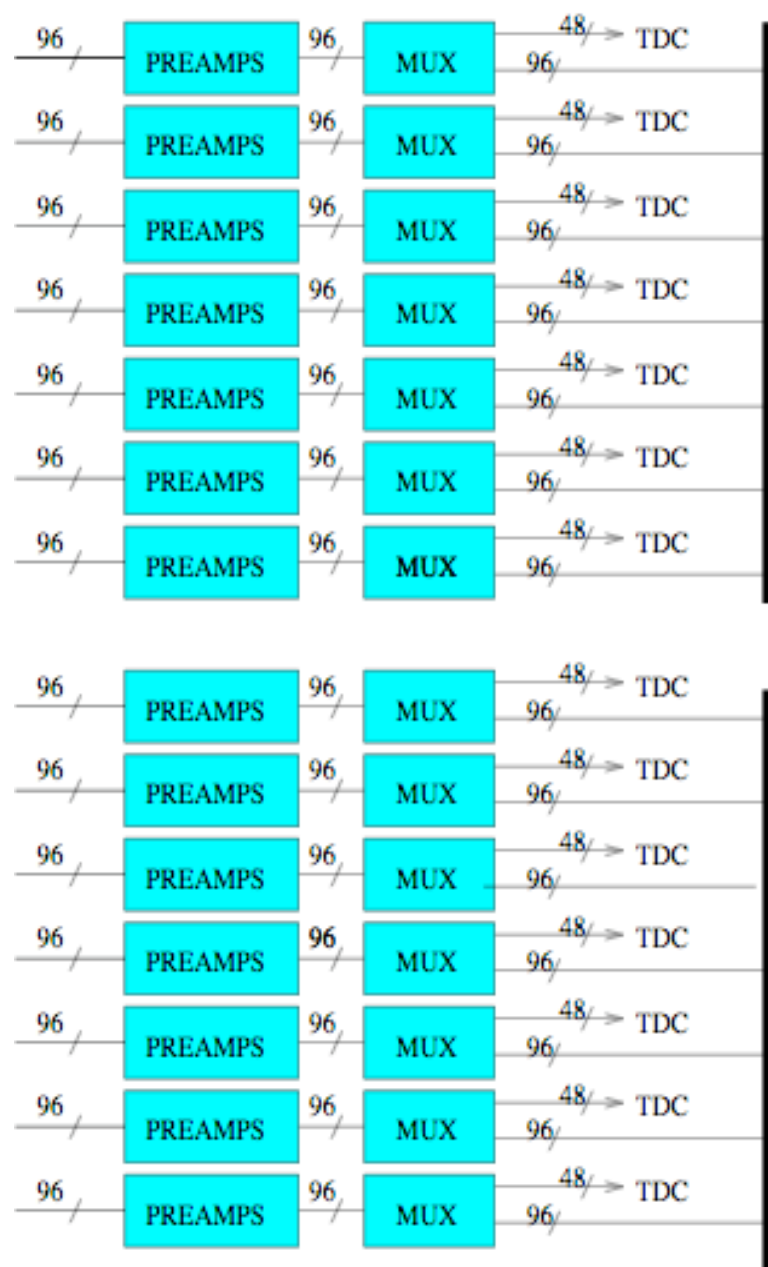
- 4108 channels of Flash ADCs and TDCs/discriminators collecting data from two calorimeters, two cerenkov counters and three time-of-flight detectors
- 12096 channels of TDCs collecting data from Drift Chambers
- 41 VME/VME64X/VXS/FASTBUS crates equipped with Readout Controllers and Trigger Interface Units
- CODA DAQ software



CLAS12 DAQ System





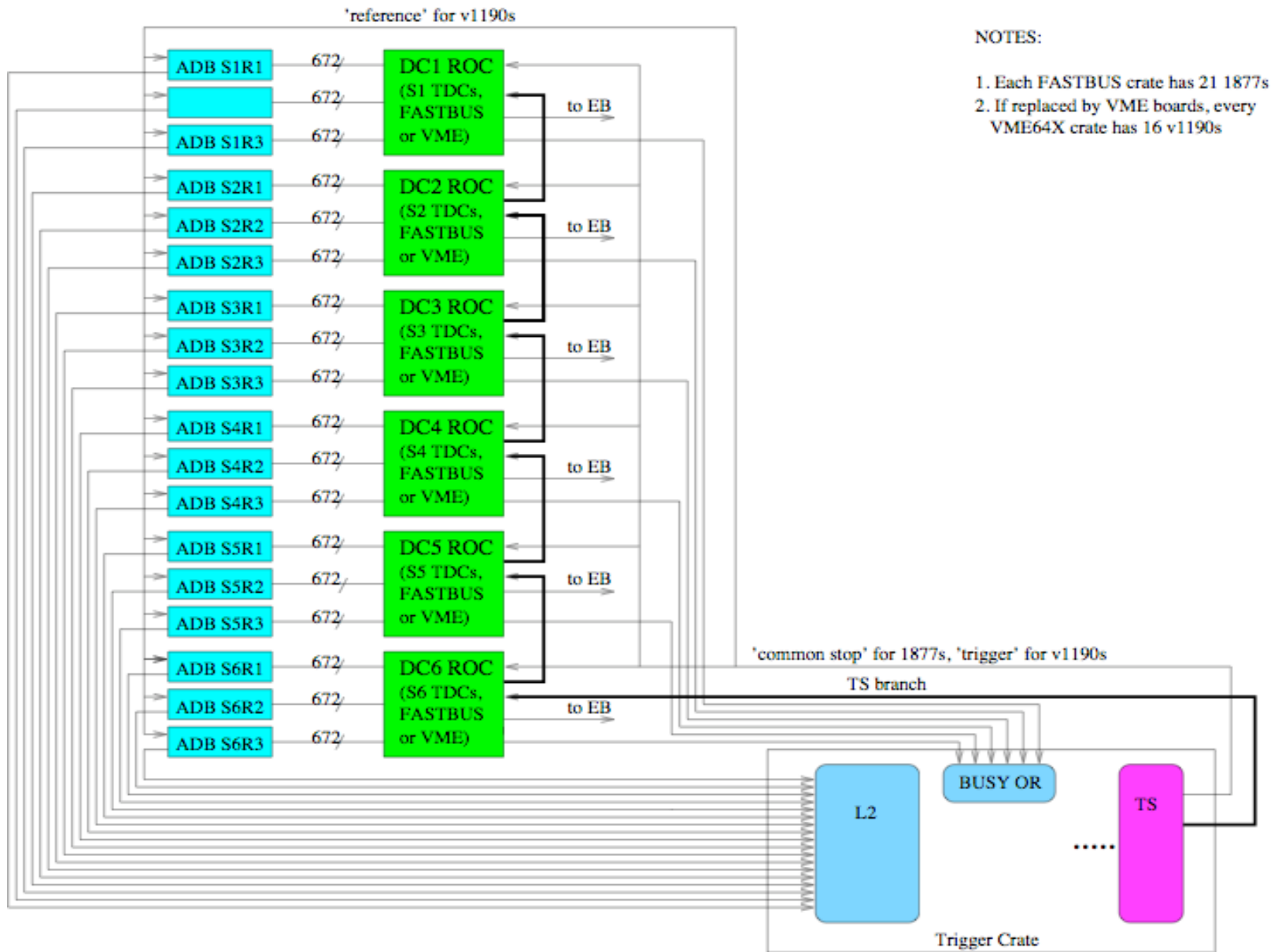


FEATURES:

- ONE CRATE PER REGION
- REUSE PREAMPS FROM CLAS
- NEW 'MUX' BOARDS
- NEW BACKPLANE
- NEW SEGMENT FINDER

TO ROAD FINDER (every 105ns)

list of REGION-based segments (24 bit per segment):
 first wire number in U (7 bit)
 last wire number in U (7 bit)
 U-V for the first wire in V (5 bit)
 U-V for the last wire in V (5 bit)

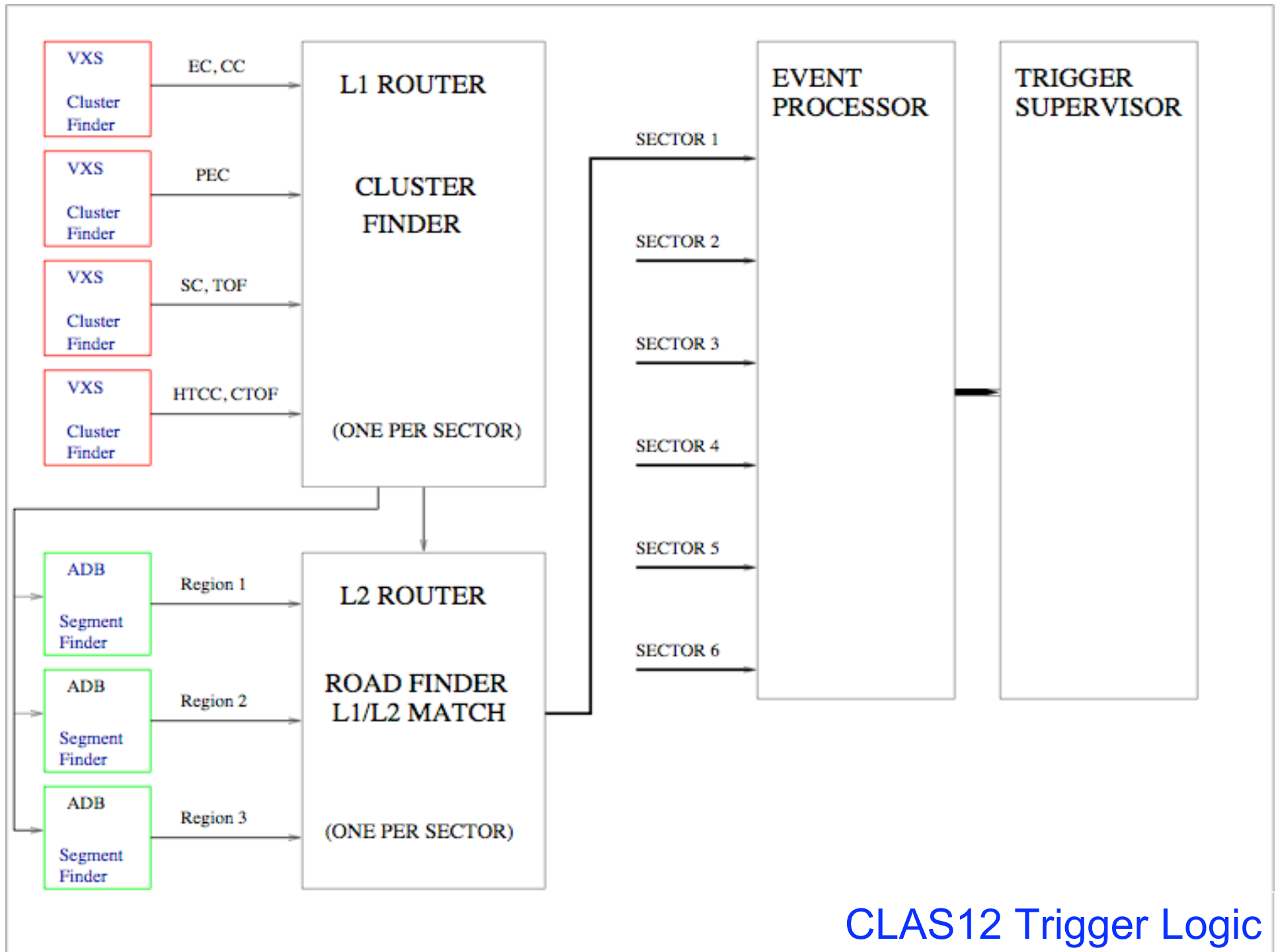


NOTES:

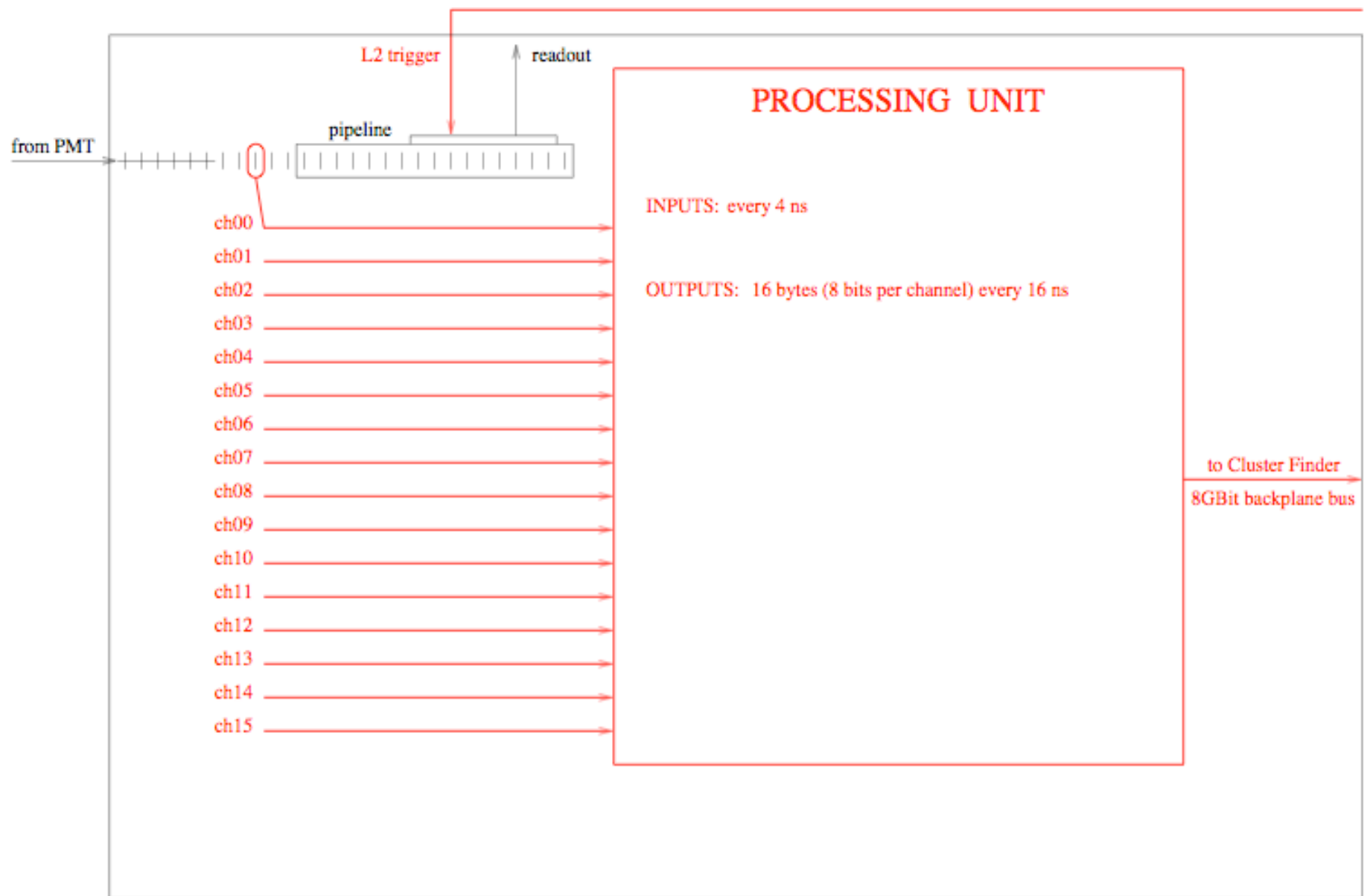
1. Each FASTBUS crate has 21 1877s
2. If replaced by VME boards, every VME64X crate has 16 v1190s

CLAS12 Trigger System

- Trigger system study is completed based on high energy CLAS data
- CLAS12 trigger system conceptual design is completed; it includes fast detector-based Level1 trigger and Drift Chamber-based Level2 trigger subsystems (see following slides)
- Future development includes CLAS12 simulation-based trigger study and electronics design

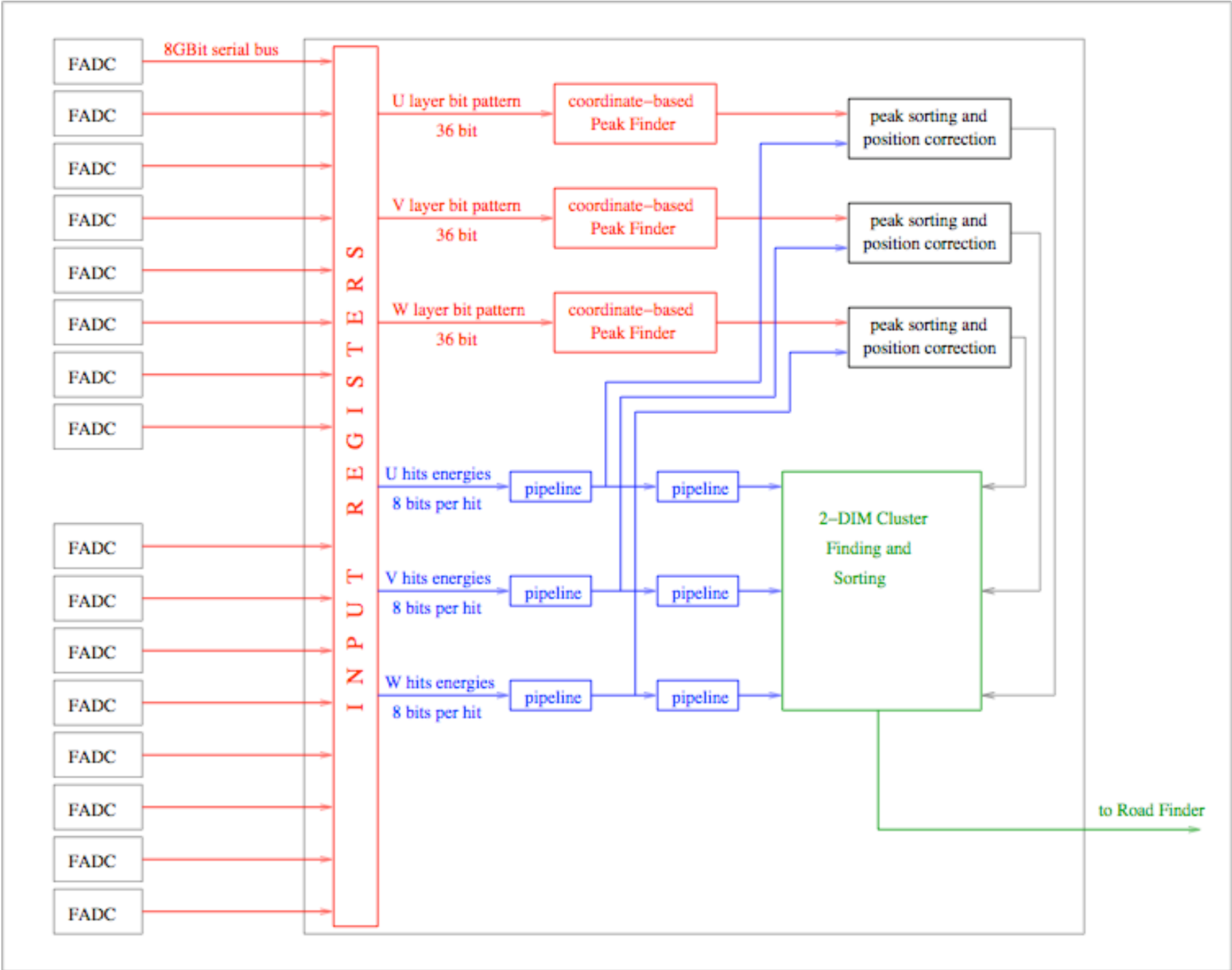


CLAS12 Trigger Logic

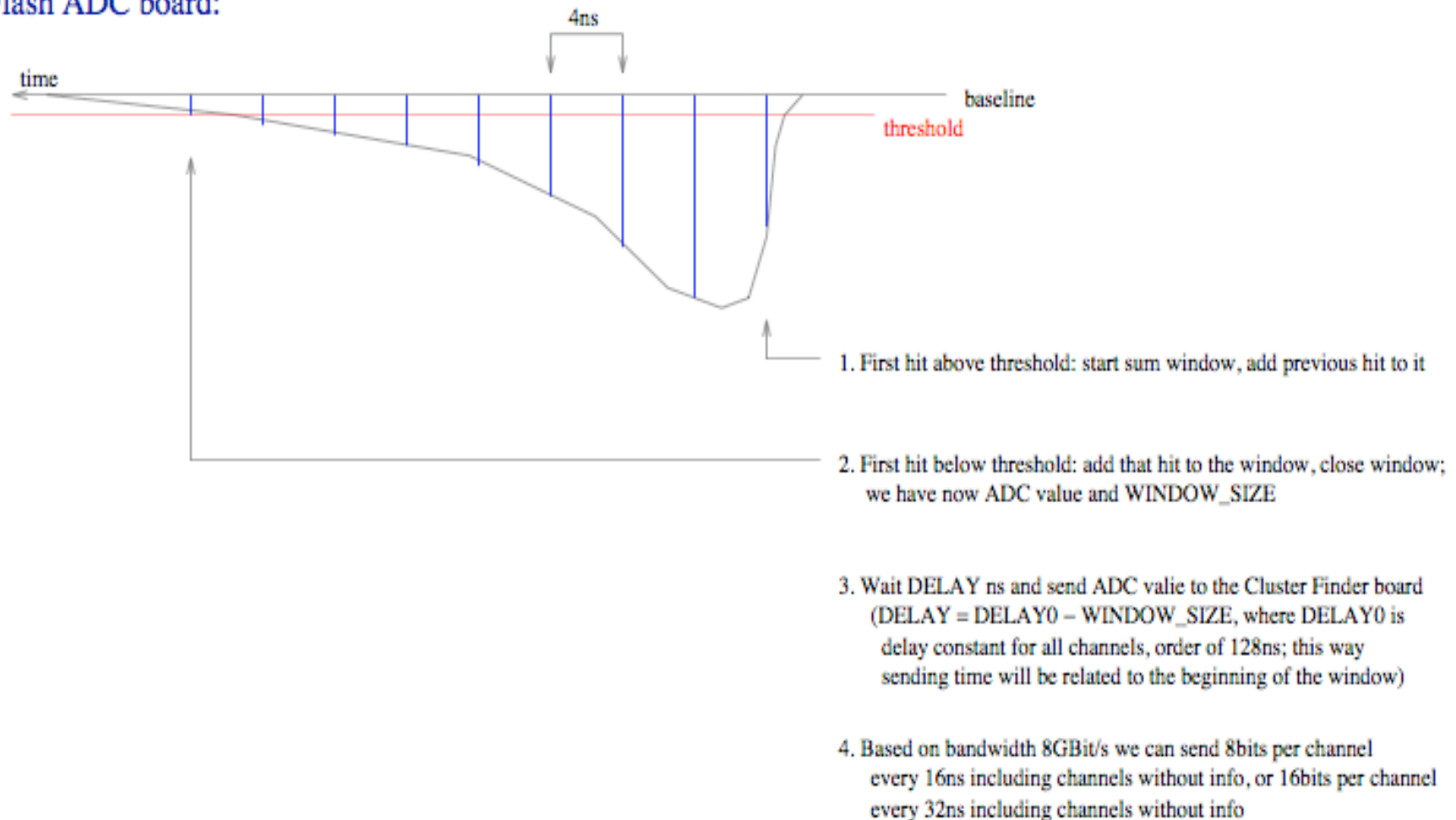


NOTES:

- only channel 00 is shown in details, all other channels have the same structure

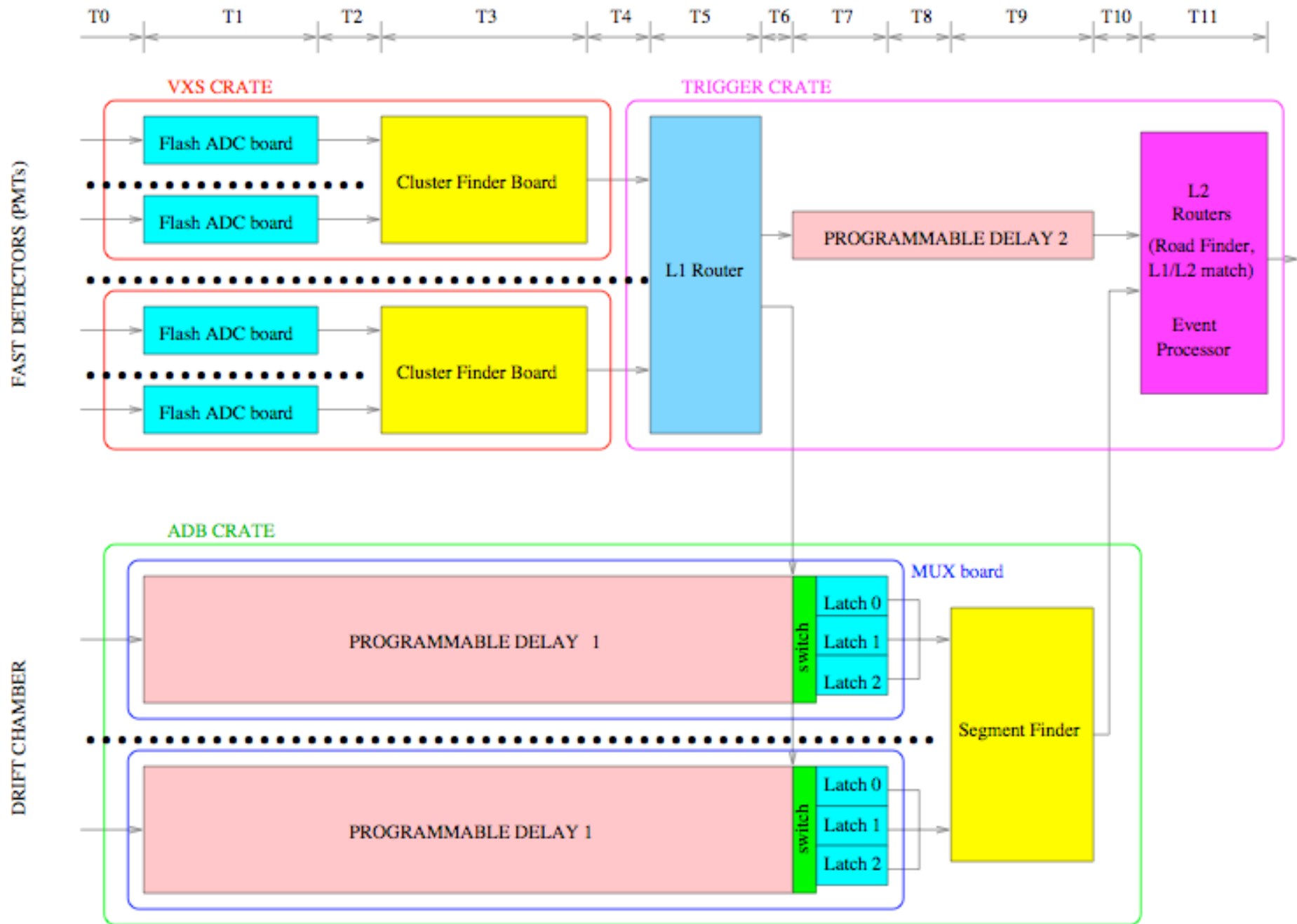


Flash ADC board:



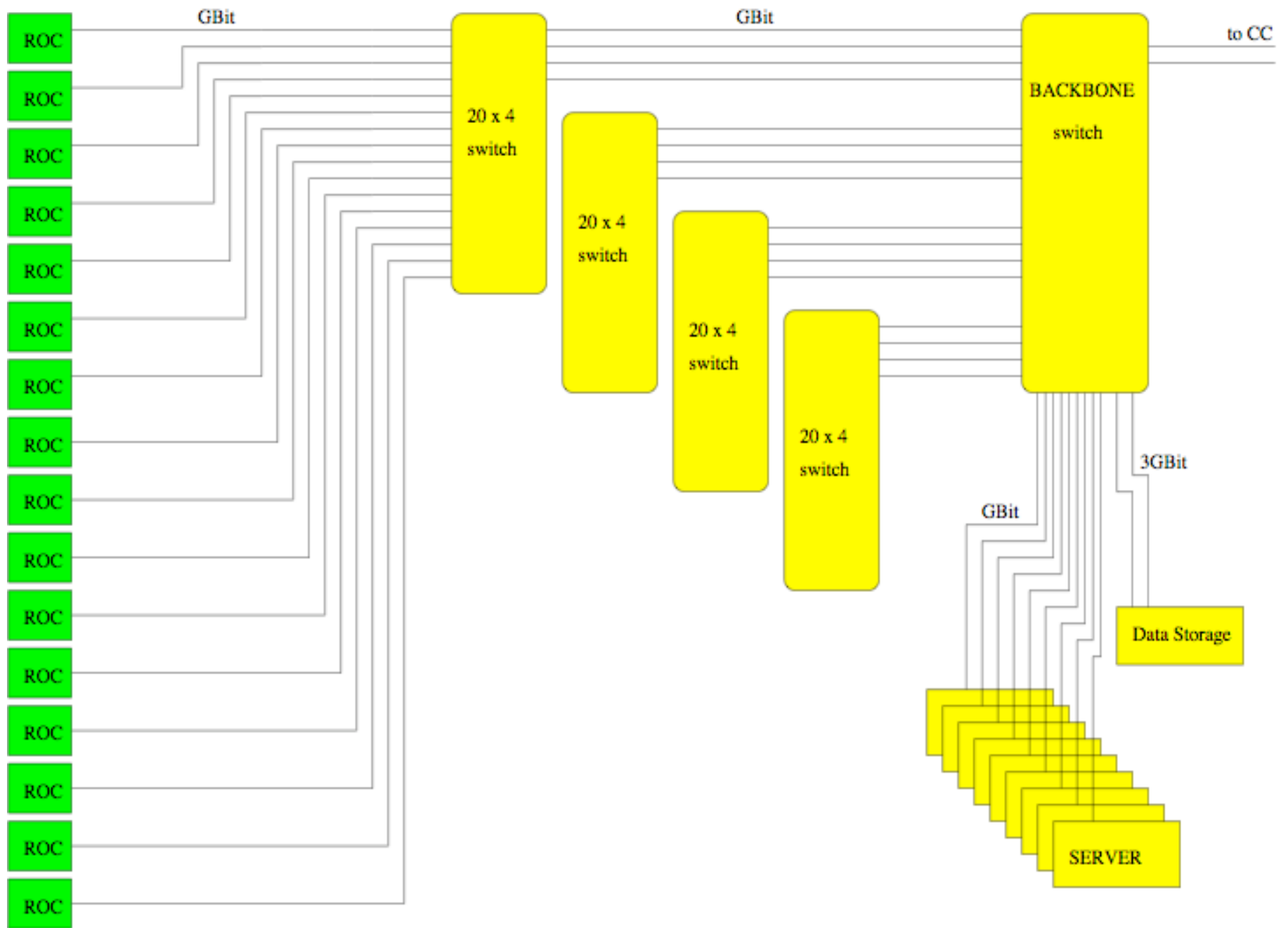
Cluster Finder board:

1. Does not have information about original sum window width
2. Expands every window up to the value big enough to enforce coincidence between different channels



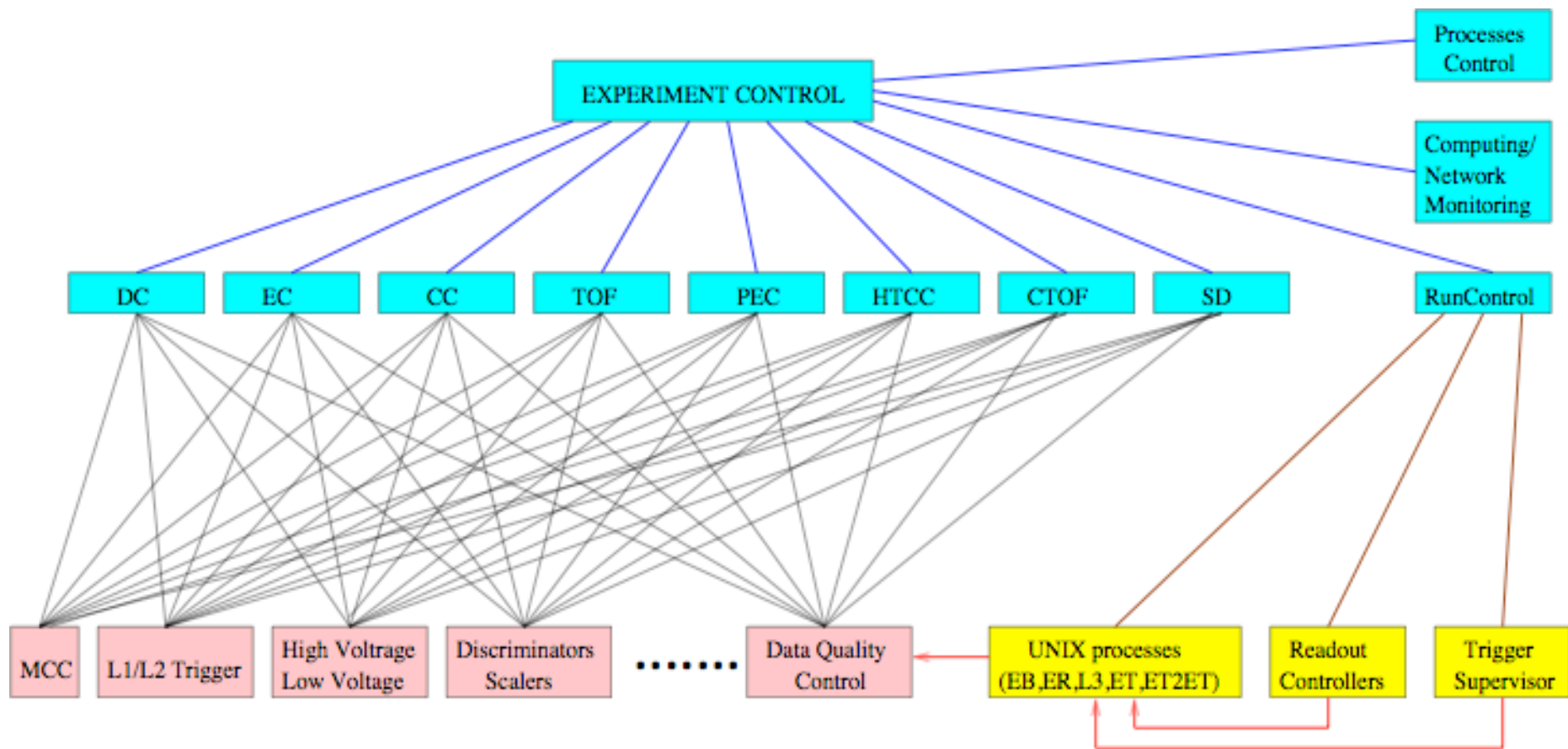
CLAS12 computing and network

- CLAS online cluster is fast enough already to satisfy CLAS12 requirements, except data storage and data link to the JLAB computer center
- Most of computing and network equipment will be upgraded in following years because of aging and maintenance reasons



CLAS12 Experiment Control System

- New Experiment Control System (ECS) will be adopted for CLAS12
- ECS will include monitoring, control and calibration subsystems
- CLAS12 DAQ and Trigger systems will be incorporated into ECS



- Experiment Control State Machines and Connections
- Hardware Control Components and Connections (currently EPICS IOCs/ EPICS channel access)
- Data Acquisition Components and Connections
- High Speed Data Flow