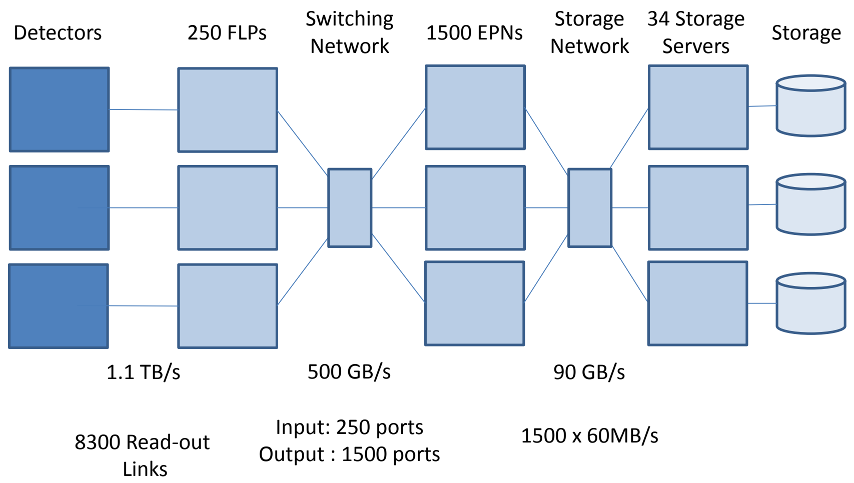

Figure 5.3: Possible hardware implementation of the logical data flow described in Fig. 5.1.

– A fraction of the data at the TF edge can not be used due to the TPC drift. The fraction lost is:

$$0.1/t$$

where t is the duration of the Time Frame in milliseconds. For example, a TF spanning 100 ms would cause a data loss of 0.1%. Having longer TF is better in this respect.

– The TFs are distributed over the entire EPN farm. It would be preferable to keep the interval between two consecutive TFs received by a given EPN on a few minutes level, in order to minimize discontinuity in the calibrations at the synchronous stage. A TF of 0.1 s in a farm of 1500 EPNs would lead to a cycle time less than 3 minutes.

– The calibration data produced within each single TF will have some fixed size overhead, since a lot of data will be accumulated in fixed size containers (histograms). Therefore, shorter TF would mean more frequent input to CDB and also larger data rate.

– The TF should be a multiple of the shortest calibration update period, currently estimated at 5 ms for TPC Space Charge Distorsion (SCD) maps.

– Longer TFs reduce the overhead query of some of the calibration parameters, as some calibration data from each side of the TF are needed to interpolate values with greater precision. (e.g. take an extra 5ms SCD bin on each side of the TF). However, the overall query rate is still small compared to the TF data (around 20 MB of calibration data per second of physics data, i.e. less than 0.1%).

– Shorter TFs reduce the size of data to be handled on every EPN, and ease staggered data transfer from the FLPs. On the EPNs, we anticipate the need of buffers for 3 full time frames (one receiving, one processing, and one sending).

Any TF between 20 ms and 100 ms is considered to be adequate for calibration/reconstruction. Having a finer TF granularity makes it easier to distribute and buffer the data; the selected design value used for