DAQ for the LDC

Report on the LDC DOD plans

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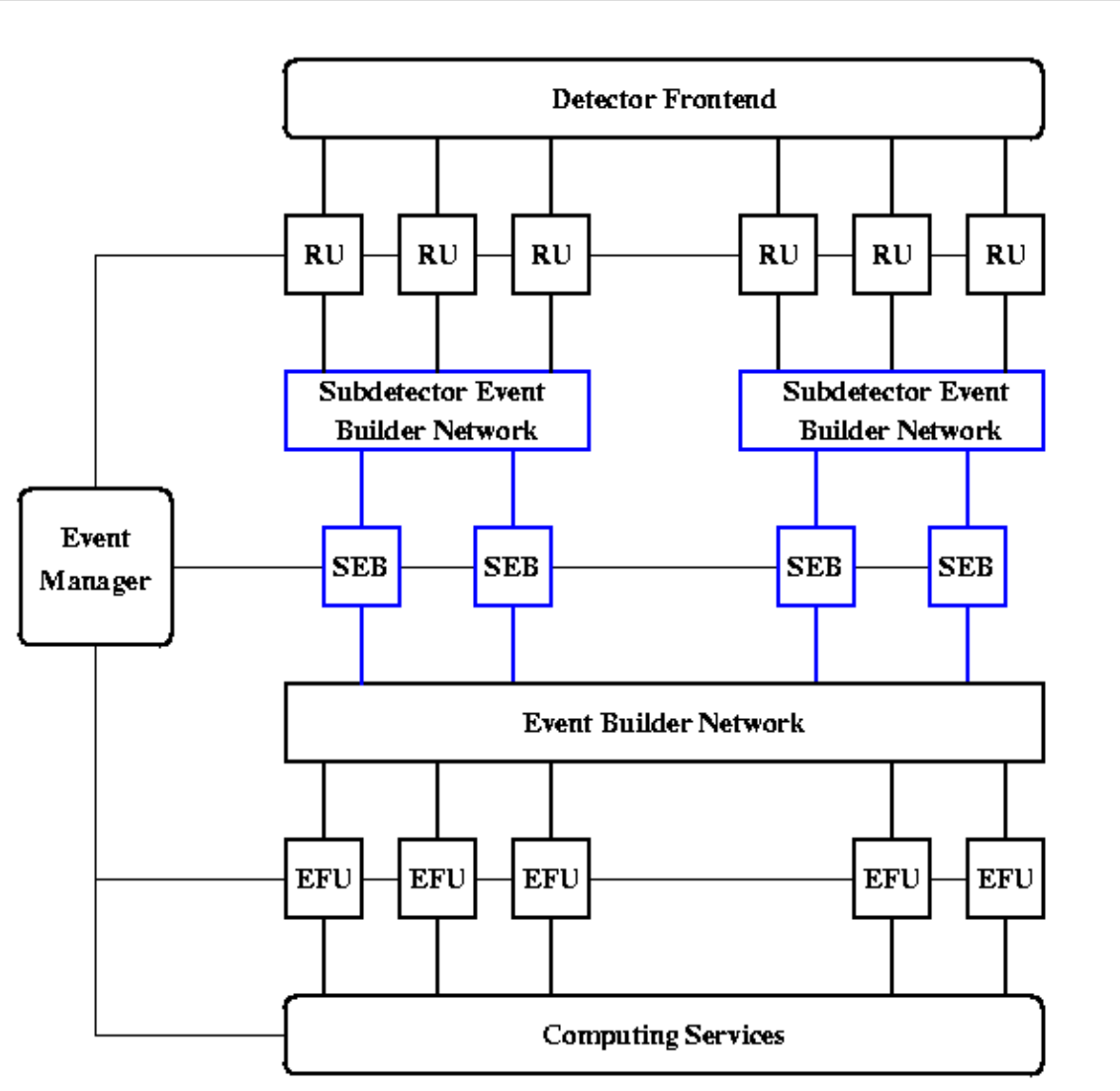
LDC DAQ Chapter Outline

Introduction	DAQ for a precision, high luminosity experiment
Operation at the ILC	~3000 bx in 1ms + 199ms without collisions
Concept	no trigger, 1ms pipeline, software selection
Detector Control	DCS, commissioning, calibration, monitoring, GDN
Requirements	tables on channel numbers & rates
Conceptual Design	building block diagram
R & D	list of what should/could be done

DAQ Concept



1 ms active pipeline
(no trigger interrupt)

zero suppression, hit/cluster finding on front end

Readout between trains
(< 200ms)

complete data of 1 train
in 1 filter unit

software event selection based on full detector information of a complete train

define 'bunches of interest'
to be stored

Channels & Datavolume

Component	Channels [10^3]	Cables	Volume/train [MByte]
VTX	800000	~10	8
SIT	300		1
FTD	40000		2
TPC	5000	~500	110
SET			
ETD			
ECAL	100000	~10000	90
HCAL	5000	~100	3
MUON	75		1
LCAL	25		1
BCAL			
TOTAL	**~950000**	**~12000**	**~250**

(numbers from TDR unless in blue need an update)

Show for all detectors :

- number of channels
- number of readout lines after processing on front end
- expected data volume per train

will add up to ~ 2G/sec

Background vs Physics

Background	VTX layer 1	VTX layer 2	VTX layer 3	TPC	ECAL
Pair from	400 hit/bx	300 hits/bx	200 hits/bx	xx track/bx	yy cells/bx
$\gamma\gamma$ to hadrons					

Shows main background sources
for main detectors

Process	Events/train	VTX	TPC	ECAL

Shows some example physics reactions
for the same detectors for comparison

Main message :
Data volume is driven by background

Technologies and R&D

Nothing mentioned so far on current technologies
- maybe mention LHC experiments as examples ?

Nothing yet on latest developments of new technologies
- new standards on the horizon (ATCA, PCI express, ...)?

R&D
- Should we mention test beam DAQ for EUDET ?
- The DAQ pilot project should be mentioned
  (needs still some more specification though)
- Anything you think needs to be included ?

Cost ?

No 'cost' in the DAQ chapter of the DOD !

But need to know approximate costs for the final document end of 2006 !

How to derive the costs ?

Take CMS (as an example) RU unit cost
scale it by number of channels coming from front end (~12K)

Take CMS event building network and farm
scale by event building rate (~ 2 GB/sec)

Take CMS storage
scale it by data storage rate (in ? TB/year)

Forget about the trigger cost

--> this still needs crosscheck for the LDC design

To Do

Concept has not changed

Detector layout and backgrounds have
re iterate on the data volume etc

Detector control and monitoring concept has to be refined

Event selection strategies have to be studied

Calibration issues have to be addressed

R & D project should not start too late

Need 'some' costing by end 2006 !