Considerations with respect to a multi-ROB

In PC

Problems with connecting links, unless optical fibre / flat cable is used. Only 1 or 2 PCI slots available. Limited board space. Mechanically awkward. Connection between PCs only via network (in crates also backplane bus can be used).

Typical power for complete PC : 200 - 250 W. 6 ROBins of 10 W each may be possible -> about 300 PCs. Typical dimension PC : 20 cm wide, 40 cm high -> when one rack can hold 8 PCs 38 racks are needed.

In crate

Assumption : use of commercial CPU cards with commercial network interfacing in single PMC slot, second PMC slot used for connecting to ROBin(s).

PMC slot maybe can hold 1 integrated ROBin + S-link card -> 1 ROBin per slot. When current design S-link interface card is used : need 2 slots in crate.

Better approach : ROBIns + S-link interfaces on separate card with ROL connections on front-side (connection to PMC slot via P2 in VME ?)

With current S-link interface card form factor -> 3 ROBIns in 6U crate slot. When 2 S-link interfaces could be put on single card -> 6 ROBIns in single slot
**6U VME** (or CompactPCI): power: about 40 W per slot (800 W / 20), with 10 W per ROBin: 3 ROBins per slot (6 may be feasible in view of space needed and with < 7 W per ROBin), 10 slots per crate, 10 other slots for CPU cards -> about 60 crates + 600 CPU cards. With 4 crates per rack: 15 racks, with 6 ROBins per slot: 8 racks.

Assume that the cost of 1 crate is about the same as that of 3 PC’s, 1 CPU card = 4 PC’s -> total: 60 * 3 + 600 * 4 = 2580 PC cost equivalents, with 6 ROBins per slot: 1290 PC cost equivalents,

**9U VME**: typical power: about 60 W per slot (1200 / 20), assume 6 ROBins per slot => 30 crates + 300 CPU cards, 10 racks, 30 * 4 + 300 * 4 = 1320 PC cost equivalents

Conclusion: System is too large for PC based solution. Backplane bus is argument in favour of crate based system.

Crate based solution needs about 300 - 600 slots for ROBins (total power of 18 kW for 10 W ROBins, 30 or 60 W per slot). Maybe it makes sense (in view of cost) to invest in a custom design of a CPU card (or a general-purpose CPU part of ROBin card) in a few years from now.
Traffic to EB via backplane

Combined LVL2 / EB i/f

LVL2 + EB

Separate i/f to LVL2 and EB for each ROBIn card

card with ROBIns connected to two CPU cards (PMC slots)

Different grouping of ROBIns for LVL2 and EB

card with ROBIns connected to two ROBIn cards

DAQ

backplane forms bottleneck

trade-off between cost of CPUs / crate slot space / network i/f and of switching

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