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ROD Topology and Input Links

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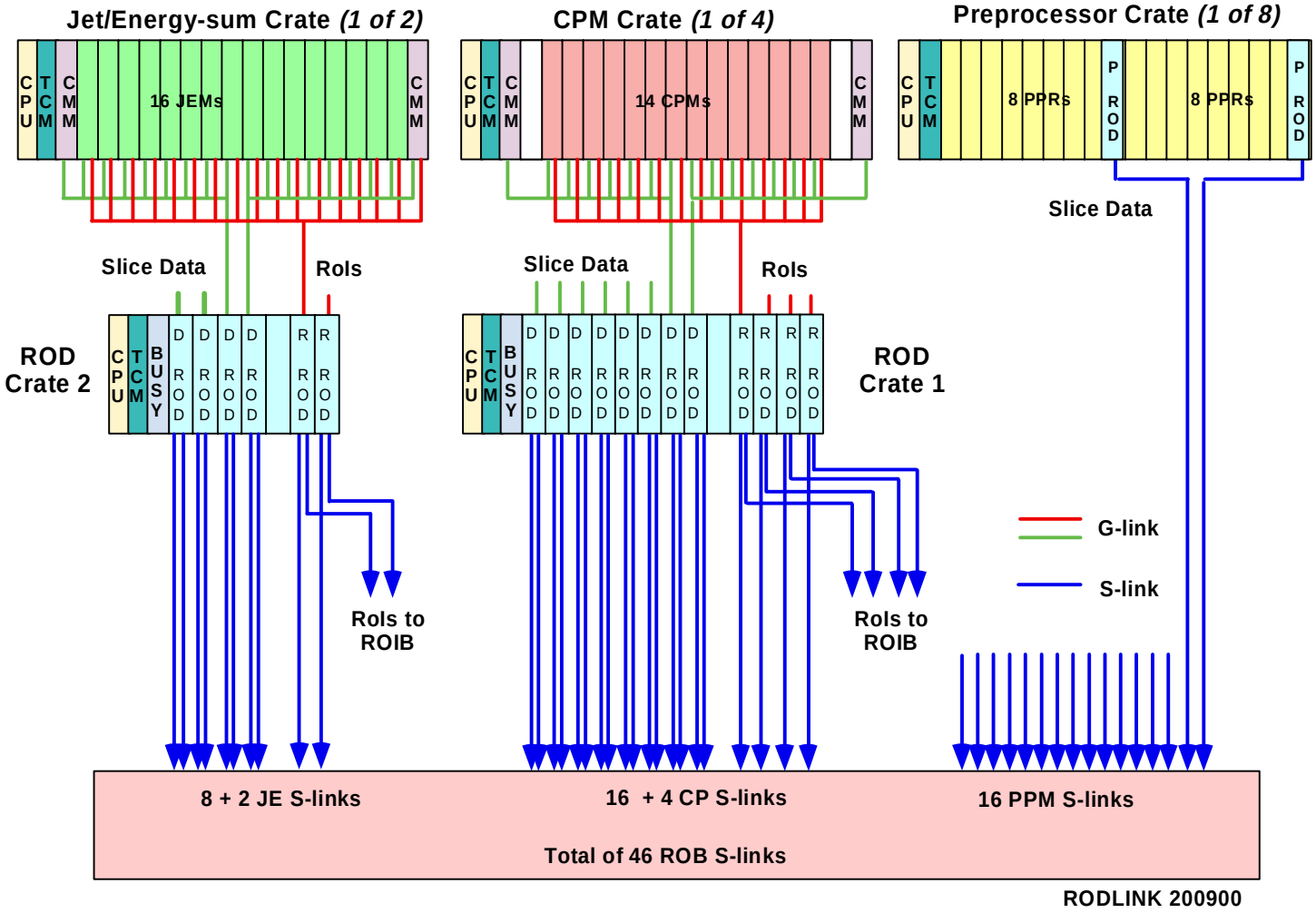
Basis of Current Numbers - shown at ROD workshop 2000



Current Numbers of Links

Current spreadsheets use RODs as follows:

- **CP Data: 2 DRODs per crate, each driving 2 S-Links = 8**
- **CP RoIs: 1 RROD per crate, each driving 2 S-Links = 4**
- **J/E Data: 2 DRODs per crate, each driving 2 S-Links = 4**
- **J/E RoIs: 1 RROD per crate, each driving 2 S-Links = 2**
- **+ 2 used for test rigs = 2**
- **TOTAL 20**

- **CM M readout shown in diagram as included with other data**
- **Spreadsheet RODS use 16 G-Links costing £784/module.**

CP Data Rates

- **A CPM reads out 160 towers per slice at 100kHz.**
- **Each tower has 8 data plus 1.5 status bits.**
- **Propose to zero-suppress in ROD. Simple scheme assuming data is not written if zero.**
  - Need to pack 9+ data bits plus address bits into 32-bit longwords.
  - 1 tower per longword is wasteful, 3 towers won't fit.
  - Therefore put 2 towers per longword into each event.
  - Addressing needs tower no (7) + CPM no (4) + Crate (2) = 13 bits
  - Not enough room in 32-bit field for address + 2 towers.
  - Therefore put CPM no & Crate no in separate longword with slice number and status bits.
  - Also read (& zero suppress) hits per cp chip.

CP Data Rates (2)

- **Data per slice per event per CPM before suppression :**
  - 80 longwords for 160 towers
  - 16 longwords for hits
  - 1 longword for address/status
  - Total 97 longwords
- **Data rate for half crate is 97 * 4 * 7 = 2716 bytes/event.**
- **At 100 kHz, using 2 links, each one carries 135 Mbytes/sec out of 160 Mbyte/sec capacity.**
- **Using compression will reduce load; reading multiple slices will increase the load. I have assumed we don't want more data than this.**

J/E Data Rates

- **A JEM reads out 88 towers per slice at 100kHz.**
- **Each tower has 9 data plus 1.5 status bits.**
- **Assume zero-suppression and packing as CP system.**
  - Put 2 towers per longword into each event.
  - Put JEM no & Crate no in separate longword with slice number and status bits.
  - Also read (& zero suppress) Jet hits and Energy sums.

CP Data Rates (2)

- **Data per slice per event per CPM before suppression :**
  - 44 longwords for 88 towers
  - 8 longwords for Jet hits
  - 1 longword for address/status
  - 2 longwords for energy sums
  - Total 55 longwords
- **Data rate for half crate is 55 * 4 * 7 = 1540 bytes/event.**
- **At 100 kHz, 1 link would carry 154 Mbytes/sec out of 160 Mbyte/sec capacity, 2 links would each carry 770 Mbytes/sec.**
- **Running at 75kHz will reduce load; reading multiple slices will increase the load. Compression may not save a big factor.**

RoIs

- **Data rates from CP and J/E are low, maximum 64 longwords/event. Link occupancy is not a problem.**
- **Two links are needed, 1 to RoIB and one to ROS.**
- **Diagram assumes 1 RROD per crate, with 14 inputs for CP and 16+1 for JEP. This makes 6 RRODs.**

Summary of Requirements

System	No Used	No of Inputs	No of Outputs
1/2 CP crate	8	7+1(CMM)=8	2
1/2 J/E crate	4	8+1(CMM)=9	2
CP RoI	4	14	2
J/E RoI	2	16+1(CMM)=17	2

- Total of 18 RODs with 17 G-Links each.
- With unused G-Links powered off, 190/306 are powered.
- Could (just) fit 21 slot crate with CPU, TCM, ROD-busy.
- Required connections + 2 ODINs just fit on front panel.

Denser Options ?

- **Put 4 ODINs on DRODs?**
  - Need 18 G-Links to service full J/E crate.
  - RoIB/RROD will (probably) use 128 MB/s ODIN; DROD/ROS needs 160 MB version. So two ODINs need to be plugged in.
  - Not enough front-panel space for 4 ODIN front panels. Could mount components for the other 2 ODINs directly on the ROD and bring fibre connectors and LEDS to front panel.
- **This would give total of 12 RODs instead of 18. Fits in 1 crate if single-width.**
- **Total no of G-Links is 216.**

Dense ROD Requirements

System	No Used	No of Inputs	No of Outputs
CP crate	4	14+2(CMMs)=16	2+2 ODIN
J/E crate	2	16+2(CMMs)=18	2+2 ODIN
CP RoI	4	14	2 ODIN
J/E RoI	2	16+1(CMM)=17	2 ODIN

- Total of 12 RODs with 18 G-Links each.
- With unused G-Links powered off, 190/216 are powered.
- Easily fits one crate with CPU, TCM, ROD-busy if single width.
- Dense front panel: 2 ODINs + 4 fibre pairs + 18 G-links.

How to Proceed

- **Want to order G-Links.**
- **Need to agree ODIN strategy with RoIB builders. I will raise this at next LVL1/LVL2 interface phone conference.**
- **Circulate this talk to Sam & Uli, then phone conference (to check numbers and feasibility).**
- **Sketched block diagrams to check engineering feasibility.**
- **Present again in Mainz 28-30 June, with plan for cost sharing.**