

Proposed Cable Map for SMT Sector 1

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General Considerations

The following page shows a possible assignment of STC channels to silicon tracker detector elements for one 60 degree sector. The Considerations that went into the assignment are (in order of decreasing priority):

1. Separate 30 degree trigger sectors. Since there are 12 fibers that carry signals from both 30 degree sectors, there will be 3 (mixed) STCs which serve both 30 degree sectors and 6 STCs that serve one 30 degree sector, 3 per 30 degree sector.
2. separate 15 degree sectors. Should it ever become necessary to use more TFC cards we could assign 15 degree sectors to each TFC. Separating the STCs into 15 degree sectors would minimize the number of serial links needed in this case. There is very little flexibility for this. The 3 STCs that are dedicated to one 30 degree sectors cannot be separated into 15 degree sectors. The 3 mixed STCs can be organized to serve 3,4,3 15 degree sectors.
3. Balance the data load. All data that are sent to the TFC must go through a single LVDS serial link. Thus the transfer time is proportional to the number of hits found in roads in each STC. The TFC can only start processing after all hits are transferred. It is therefore advantageous to distribute these data evenly over all STCs.
4. Assign the top fibers to the South and the bottom fibers to the North. North and South fibers come through different splitter panels. It therefore makes cabling neater if they are not randomly mixed up. The top/bottom assignment is arbitrary.

Cable Maps

The following pages show four tables. Each shows a front view of the nine STC cards in one STT crate, numbered (for now) from 1 to 9. Each column corresponds to one STC. The rows are numbered 1 to 4 for the four incoming fibers.

Sector Assignment

Here 1 and 2 refers to the two 30 degree sector, A and B to the two 15 degree sectors within each 30 degree sector. AB refers to layers 1,2,3,4 which span both 15 degree sectors. Yellow (light) cells refer to the South detector half and blue (dark) to the North detector half.

STC	1	2	3	4	5	6	7	8	9
1	1A	1AB	1B	1B	2AB	2A	2A	2AB	2A
	1A	1AB	1A	2B	1AB	1A	2A	2AB	2A
2	1AB	1B	1B	1B	1AB	1B	2B	2B	2AB
	1AB	1A	1A	2B	2AB	2A	2B	2A	2AB
3	1A	1AB	1A	1B	2AB	1B	2B	2AB	2B
	1A	1AB	1B	2B	1AB	2A	2B	2AB	2B
4	1A	1A	1AB	2B	1AB	1B	2AB	2A	2A
	1B	1B	1AB	1A	2AB	2A	2AB	2B	2A

Sequencer Assignment

The fibers in a STT crate originate from two sequencer crates, one for the North and one for the South. The South sequencer crate is PC 20 crate 0B. The North is not known. Within each crate the sequencer cards are numbered from 1 to 20.

STC	1	2	3	4	5	6	7	8	9
1	16	13	14	16	11	12	14	13	16
	16	13	14	16	11	12	14	13	16
2	15	11	14	16	12	2	14	11	15
	15	11	14	16	12	2	14	11	15
3	6	3	4	12	1	6	4	3	6
	6	3	4	12	1	6	4	3	6
4	4	1	5	2	2	6	5	1	4
	4	1	5	2	2	6	5	1	4

Detector Assignment

The notation here is B<barrel><North/South>-<layer>-<detector>.

STC	1	2	3	4	5	6	7	8	9
1	B2S-7-12	B1S-4-1	B1S-5-1	B2S-8-1	B3S-2-1	B3S-7-1	B2S-6-1	B1S-3-1	B1S-7-1
	B1S-7-12	B2S-4-1	B1S-6-12	B2S-8-2	B3S-1-1	B3S-7-12	B1S-6-1	B2S-3-1	B2S-7-1
2	B1S-1-1	B3S-5-1	B2S-5-1	B1S-8-1	B3S-4-1	B3N-7-6	B1S-5-2	B3S-5-2	B1S-2-1
	B2S-1-1	B3S-6-12	B2S-6-12	B1S-8-2	B3S-3-1	B3N-8-6	B2S-5-2	B3S-6-1	B2S-2-1
3	B1N-8-7	B1N-4-4	B1N-5-7	B3S-8-1	B3N-2-3	B2N-7-6	B1N-6-5	B1N-3-3	B1N-7-5
	B2N-8-7	B2N-4-4	B1N-6-6	B3S-8-2	B3N-1-4	B2N-8-6	B2N-6-5	B2N-3-3	B2N-7-5
4	B2N-5-7	B3N-5-7	B1N-1-4	B3N-7-5	B3N-4-4	B1N-7-6	B1N-2-3	B3N-5-6	B1N-5-6
	B2N-6-6	B3N-6-6	B2N-1-4	B3N-8-7	B3N-3-3	B1N-8-6	B2N-2-3	B3N-6-5	B2N-5-6

Data Flow

I estimated the relative number of hits in road assuming that all tracks satisfy the following criteria:

- Straight (=no curvature)
- Uniformly distributed in pseudorapidity
- Primary vertex distribution is gaussian with 25 cm width
- Hits in all four layers
- Hits in at most two barrel segments

The detector geometry was simplified to

- Barrels spaced at 12.6 cm in z
- Layers 1,2 at radii of 2.5 cm, layers 3,4 at radii of 5.0 cm, layers 5,6 at radii of 7.5 cm, layers 7,8 at radii of 10.0 cm.

With these simple assumptions, I obtain the following hit multiplicities (normalized to 100 per layer).

		Barrel					
		3S	2S	1S	1N	2N	3N
Layer	1,2	8	19	24	24	19	8
	3,4	8	18	23	23	18	8
	5,6	5	9	11	11	9	5
	7,8	5	9	11	11	9	5

STC	1	2	3	4	5	6	7	8	9
1	9	23	11	9	8	5	9	23	11
2	11	18	11	9	8	5	11	18	9
3	24	5	9	11	8	5	11	5	24
4	19	5	9	11	8	5	9	5	19
5	11	23	11	5	8	9	11	23	11
6	9	18	11	5	8	9	9	18	9
7	9	5	24	5	8	11	24	5	11
8	9	5	19	5	8	11	19	5	9
total	101	102	105	60	64	60	103	102	103