Chapter 2

Network, Topology and Interfaces

2.1 Topology

The FAIR timing network will be carried out in a true star topology and connects one global system timing master to about 2000 timing event receivers. Some layers of timing switches using the white rabbit layer 2 protocol standard will be used. Dependent on the number of ports per switch, redundant fibre connections or construction issues between two and five layers of switches between master and receivers are necessary:
Two redundant uplink channels for each switch are foreseen (connected to the μTCAs MCH) that from the GSI point of view must be connected to one and the same switch because the true star topology mustn't be violated - independent from the usage of spanning tree protocol mentioned in the wr specs. Of course the number of possible downlink connections is only half of the switches downlink ports in this case.
It is foreseen to use up to eight AMCs with eight downlink ports each inside each switch, but it isn't clear yet if this will work out properly or not. Therefore in table 2.1 the necessary number of switches needed to connect 2000 timing receivers is shown for different number of switch downlink ports using redundancy or not ('std. connections'). The redundancy case accounts for the fact that in the last layer the two MCH uplink ports are needed while single copper (or fibre) connections to the timing receivers are used. These are the minimal numbers of nodes needed while boundary conditions like civil construction issues most probably will slightly increase these numbers.

The layout of the system is shown in Fig. 2.1.

Connections between switches will be realised in fibre optics while connections between the last switch and most event receivers will be conducted either with standard ethernet twisted pair copper cables using RJ45 connectors or also with fibre optics: Within each AMC eight SFPs ('small form-factor pluggable transceivers') will be available. If no electrically conducting connection is allowed of course fibre connection has to be used.

	fiber redundancy				std. connections			
switch ports	dl nodes	per AMC	layers	switches	dl nodes	per AMC	layers	switches
8+2	4	0.5	5	668	8	1	3	286
16+2	8	1	3	287	16	2	2	134
24+2	12	1.5	3	184	24	3	2	89
32+2	16	2	2	134	32	4	2	66
40+2	20	2.5	2	106	40	5	2	53
48+2	24	3	2	89	48	6	1	43
56+2	28	3.5	2	76	56	7	1	37
64+2	32	4	2	66	64	8	1	33

Table 2.1: Necessary number of switch layers and switches needed to connect 2000 timing receivers. 'redundancy' denotes the case where two redundant fibres are used for inter-switch-connections and single connections to all timing receivers. In 'std. connections' single connections are used exclusively. 'dl nodes' describes the number of possible downlink switches. Switch ports are given as e.g. 8+2 denoting AMC ports + the two uplink MCH ports.

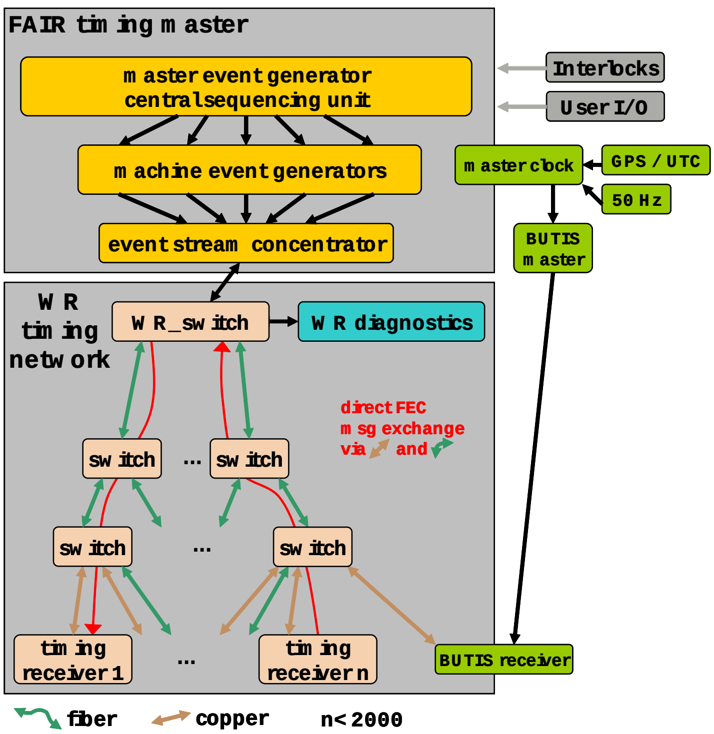

Figure 2.1: Topology of the FAIR timing network