1 Trigger processor ADDC Interface

The ART data from an entire wedge will be transmitted to a single trigger processor via the Art Data Driver Card (ADDC). This requires 32 ADDCs with one fiber optic connection per ADDC to cover one wedge, i.e. 32 total fibers per Trigger Processor. The ART Data from the ADDC will be transmitted using the GigaBit Transceiver (GBT) architecture and transmission protocol in a low-latency widebus mode. The Trigger Processor will take advantage of the GBT firmware developed by GBT Project to implement the receivers.

1.1 ART Data Protocol

The GBT packet in widebus mode will provide 112 data bits and arrives once every bunch crossing. One ADDC will service 32 VMMs and each packet can contain ART data from a maximum of 8 triggered VMMs. Each VMM will be uniquely identifed to determne which micromegas strip on the wedge was hit.

There are two options for how data packet bits will be defined. The difference between the two is how the VMM ID information is encoded. The first data protocol option will provide the VMM IDs of every VMM that was triggered by asserting a bit in a 32-bit hit list. The second option will encode each VMM ID in a list. For both options the triggered strip number within each VMM will be provided in a list. The first option would move the VMM ID encoding task from the ADDC ASIC to the Trigger Processor FPGA.

Option 1 GBT DATA[111:56]					
"1010"	BCID[11:0]	ERR_FLAGS[7:0]	HIT_LIST[31:0]	ARTDATA_PARITY[7:0]	8 x ART

Option 2 GBT DATA[111:56]					
HIT_CNT[3:0]	BCID[11:0]	8 x VMMIDx[4:0]	ARTDATA_PARITY[7:0]	8 x ARTDATAx[5:0	

- HIT_LIST[31:0] = 32-bit list of flags corresponding to each of the 32 VMMs. 0 - no hit, 1 - hit. A register controls if this is a filtered (i.e. 8 hits max) or an un- filtered copy of the VMM flags registered in a particular BC.
- HIT_CNT[3:0] = number of hits (range 0 - 8; 9 - 15 invalid)
- ARTDATA_PARITY[7:0] = parity bit of the ART data computed by each of the 32 ART de-serializer units. Each bit corresponds to one of the ART data field selected by the priority unit.