DAQ MEETING, 19/2-MG

Answer to Tingxuan, meeting 18/2:

What is the UDP data recv port ? Is it 58880+GEMROC ID ?

·myaddr.sin port =htons(58880+roc id);// 58880 + GEMROC IDTo test with the UDp recv data code ."

According to the document that was circulated,

0xE620 + 0..15' and is used for frame's reception

So 58912+ GEMROC ID

Angelo does not know about any change

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versione 2.0

Notes on GEMROC Ethernet controller

The GEMROC module exploits an Ethernet Controller IP (Intellectual Property) developed by Stefano Chiozzi of INFN-Ferrara to allow the GEMROC module's FPGA to efficiently exchange UDP/IP packets over the Ethernet network connecting them to the PCs running the Slow Control and the DAQ tasks, in the following simply referred to as the server PCs.
To achieve the highest possible optimization of the EC some constraints have been necessarily introduced by the designer on its network connections features, mainly to minimize the FPGA resources needed to generate UDP packets yet achieving a data throughput close to the

EVALUATION of DATA transfer needs->A. BORTONE, INFN TO

DAQ *Data size: cross-check from simulation*

1. #hit_noise electronics

2. #hit_bkg_machine

3. #hit_phys_signal

Trigger Time window=1 us

Multiplicity=5 (5 tracks), L1 Area=2924 cm^2, L2 Area=5755 cm^2, L3 Area=9327 cm^2

1. #hit_noise electronics

#channels × Avg noise rate × Trigger Time window = $\sim 10000 \times 5\ \text{kHz} \times 1\mu\text{s} = 50$

Confirmed by

#average_hit_number from cosmic ray data acquisition=84/(1.6 μs) = 53

2. #hit_bkg_machine

BKG BEPCII-UPDATE

Layer 1: 0.45 kHz/cm^2 x L1 Area x 2 views x multiplicity x 1μs=13

Layer 2: 0.3 kHz/cm^2 x L2 Area x 2 views x multiplicity x 1 μs=17

Total= 53 hit

Layer 3: 0.25 kHz/cm^2 x L3 Area x 2 views x multiplicity x 1 μs=23

3. #hit_phys_signal

Multiplicity=5, #Layer=3. Avg_track_number=5

Total=Multiplicity x #Layer x Avg_track_number x 2 views=150

Total= 256 hit

We take as reference→300 hits

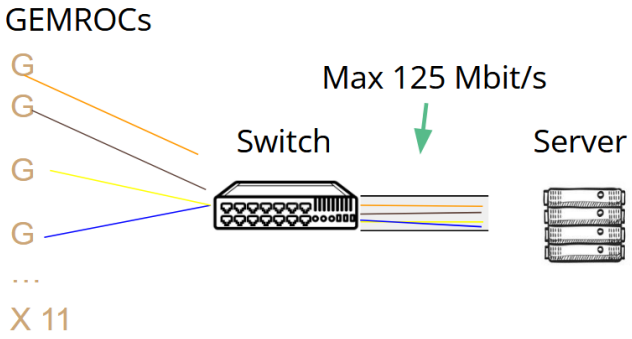
300 hit * 64 bit = 19200 bit
hdr+trailer+udp = 64*3 =4224 bit
Per packet = 22.9 Kbit
4kHz trigger rate -> 90 Mbit/s

CONSERVATIVE UPPER LIMIT
Safety factor + noise increase :
250 Mbit/s

EVALUATION of DATA transfer needs->A. BORTONE, INFN TO

VLAN Configuration

Symmetric east and west



VLAN should avoid UDP packets lost without adding workload to the system.
The VLAN tag will be untagged by the ethernet card directly.

Ok!

Write test in Turin

Old but powerful machine (40 core, >300 GB ram, 1 TB HDD, 2013). On localhost loop (no networking test).

```
Simulazione in corso su 8 core con 24 FPGA.
***
 SENDER RESULT
Packet sender: Elapsed time 190.17387795448303, packets = 960000, rate = 5048.01190534575
Single packet size:308 byte, total size 6.6GiB, data_rate = 35.6MiB/s
**** RESULTS *****
Execution time 196.31496715545654
______
 GEMROC 0
Received 282.0MiB, wrote 282.0MiB in 196.31496715545654
Write rate 1.4MiB/s


______
 Full system
Received 6.6GiB, wrote 6.6GiB in 196.31496715545654
Write rate 34.5MiB/s
```

35 Mib/s -> 270 Mbit/s

Server specifications

We have ordered a **DELL R7525 server** for the project.

- 2X AMD 7313 (32*2 Threads)
- 2X SATA SDD for OS (raid 1)
- 4X SAS HDD 1.2 TB, 10krpm (raid 10? 2 raid 1?) → Data storage
- 4X 1 GBit/s port (2 on Intel Interface Card) → Data from GEMRO + Contol
- 2X 10/25 Gbit/s SFP28 port on Interface Card → To BESIII DAQ
- Redundant power supply
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