

# **VMA Functionality transfer to strong host**

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# Errors in data processing from ADC boards

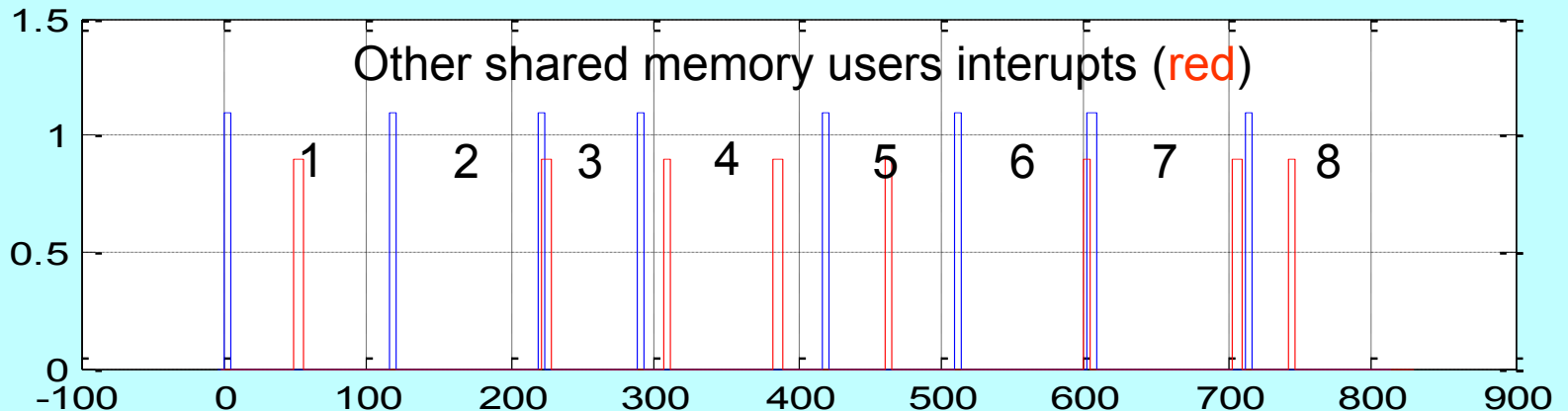
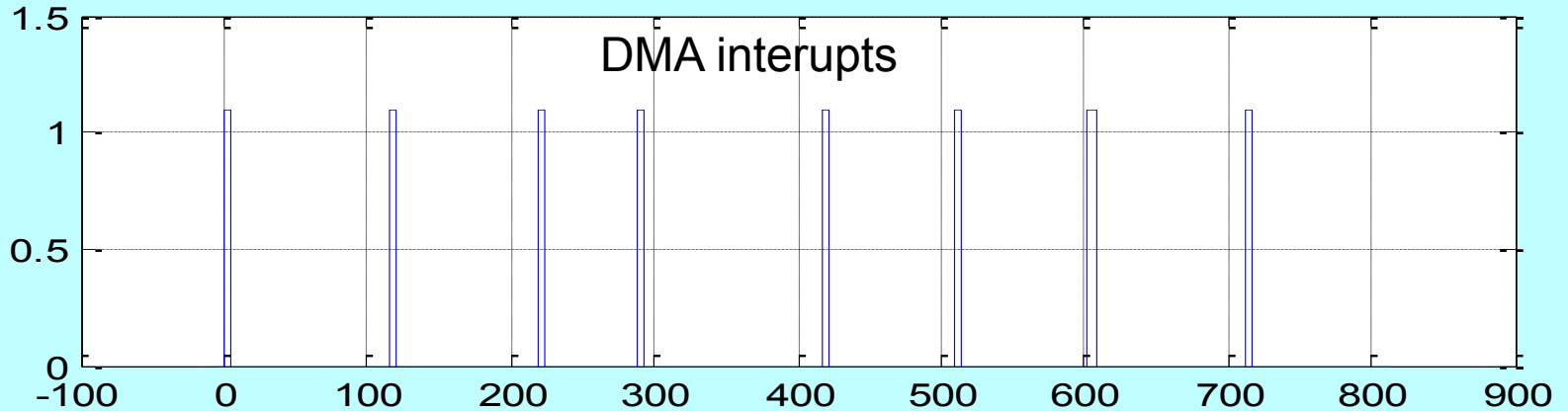
There was a request to decrease the errors during data acquisition. The following errors were acquired

1. Missed events
2. Doubled events

We studied the possible reasons for these errors.

The main reason is that system is not strong enough to allow the programs to work without any delay (The schematic picture will be shown in next slide). And due to this delay of working time the programs sometimes miss needed data.

# Main reason for errors schematically



One can see that for processing 2-nd buffer there are no signals, therefore this buffer will be lost. Also one can see that for buffer 4, there are 2 signals, this means we will have doubled data.

# Percentage of mentioned errors

0.33%

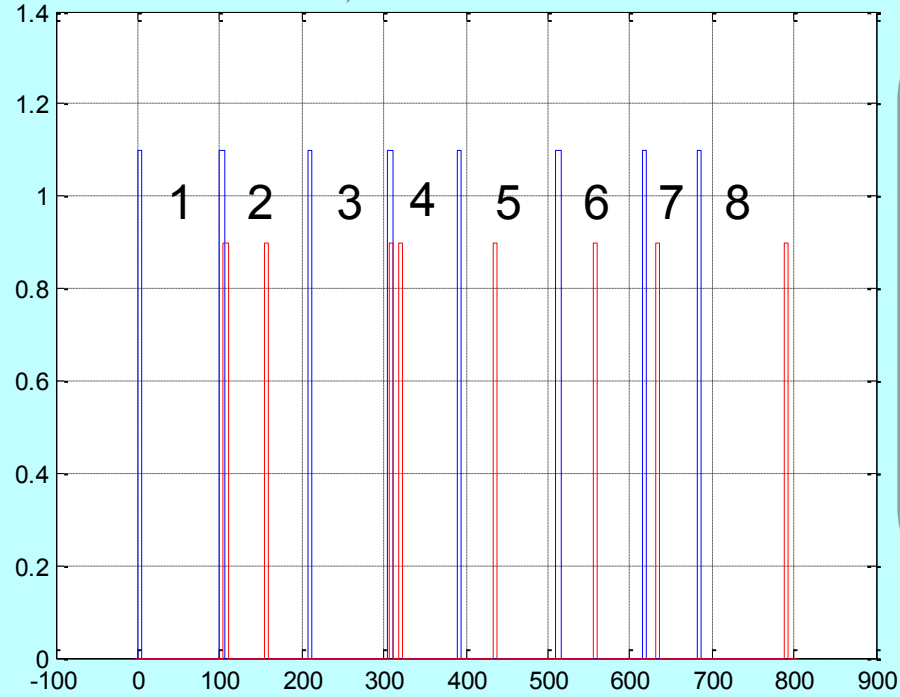
- Systematic

0.2%

- chaotic

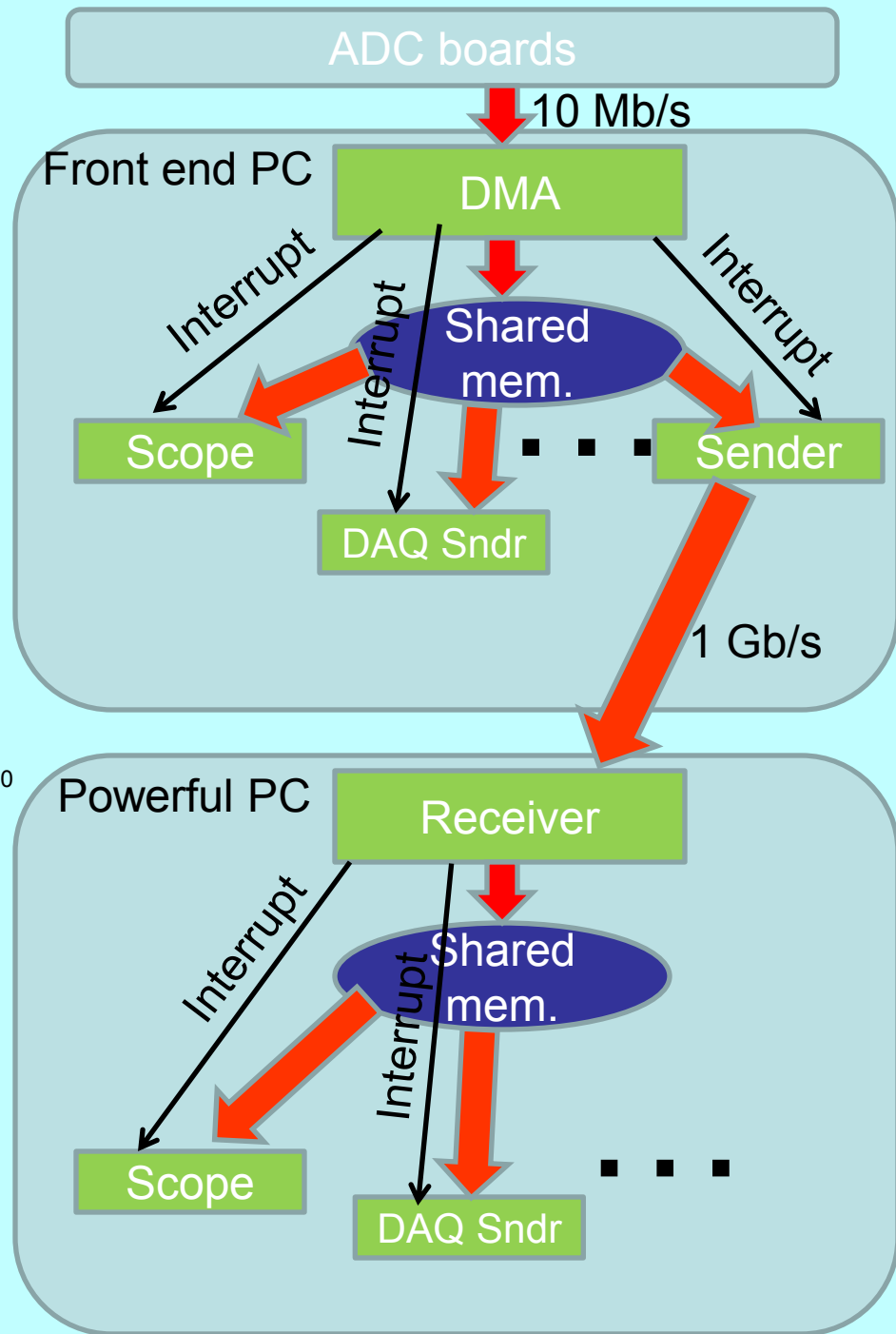
~0.5%

There was a proposal to make system which will provide some situation (shared memory and SIGUSR1 signals) in strong host instead of weak front end host, to see if the errors will decrease (graphically this will be shown in next slide).

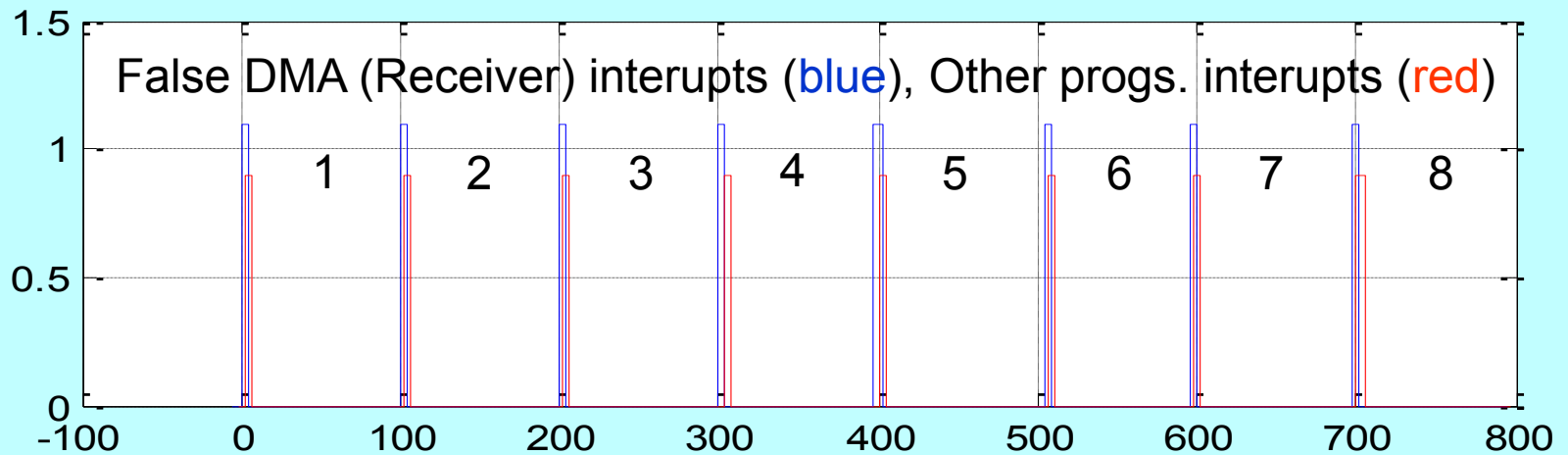
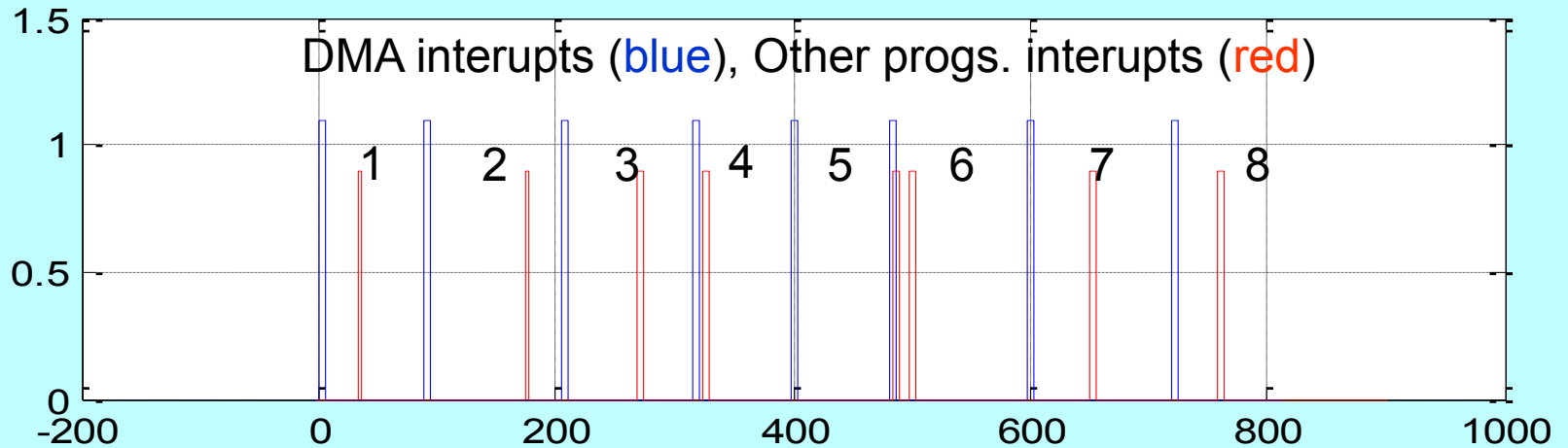


### Possible errors

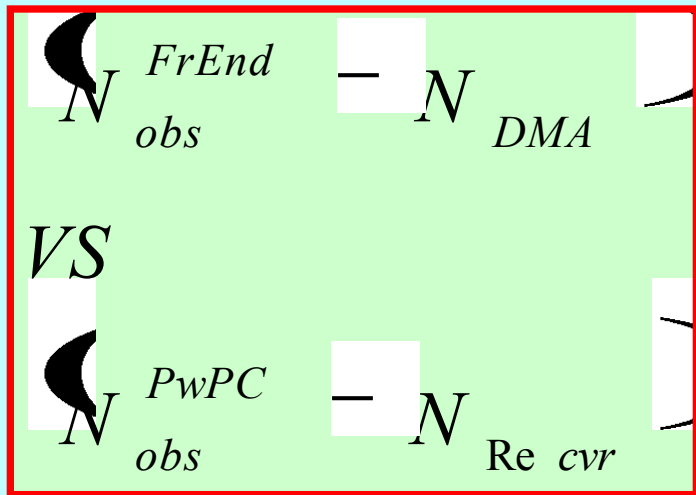
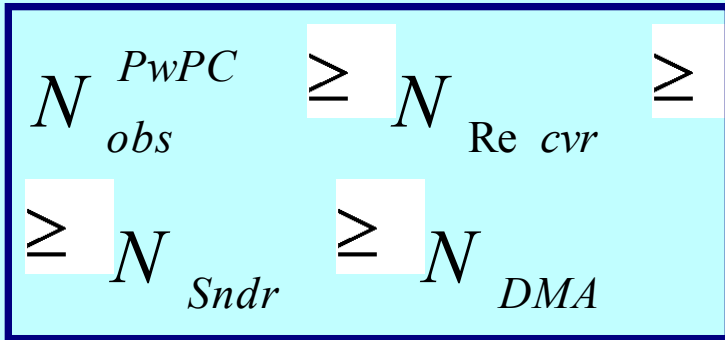
1. Changing buffer during sending.
2. Missing buffer during sending



# Interrupts situation in past and now



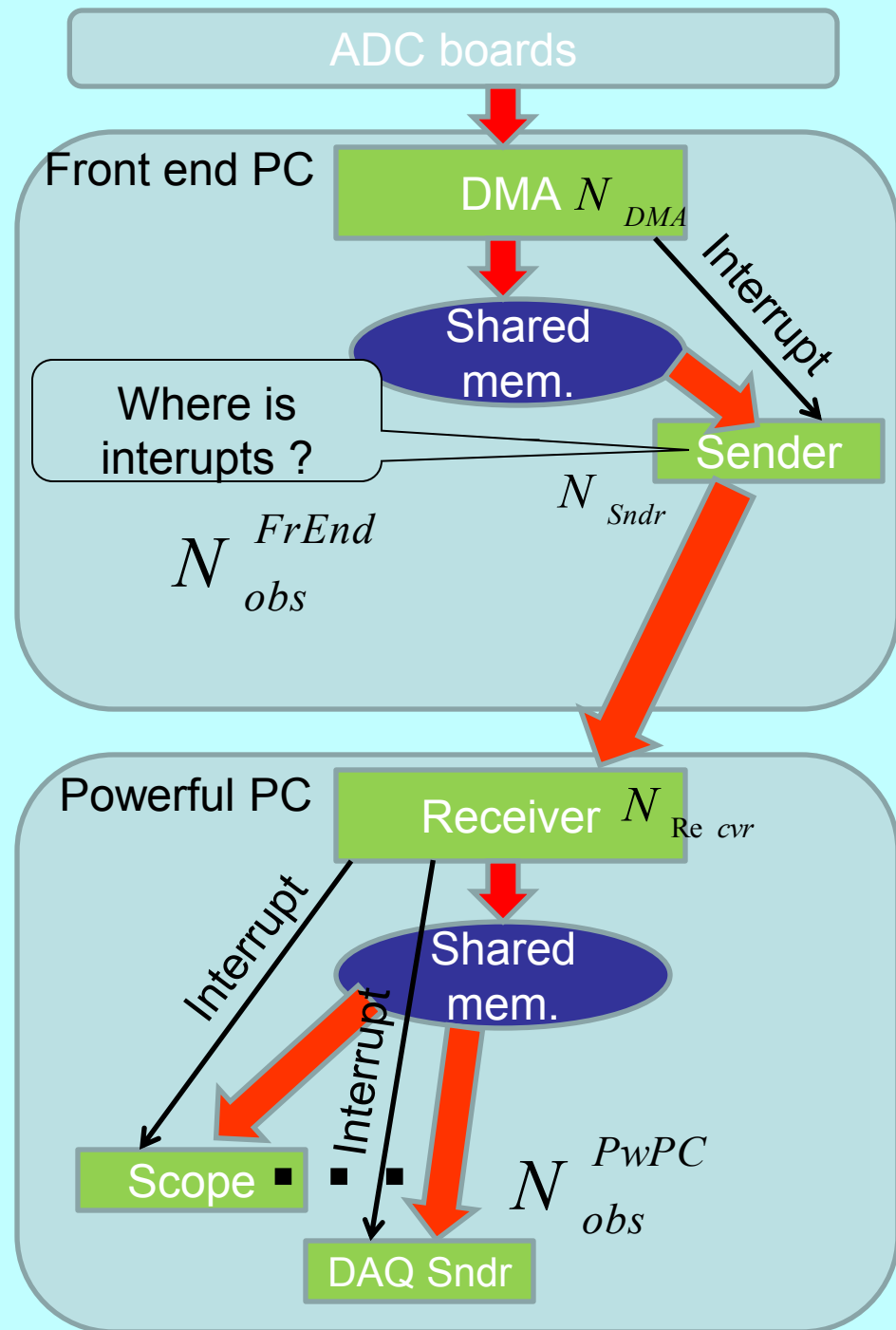
One can see that processing of each buffer takes approximately 100ms time. And also all programs will run on strong host instead of running on weak front end host.



I think it is possible to improve Sender-Receiver system to have

$$N_{Re\ cvr} \approx N_{DMA}$$

(TCP / IP)

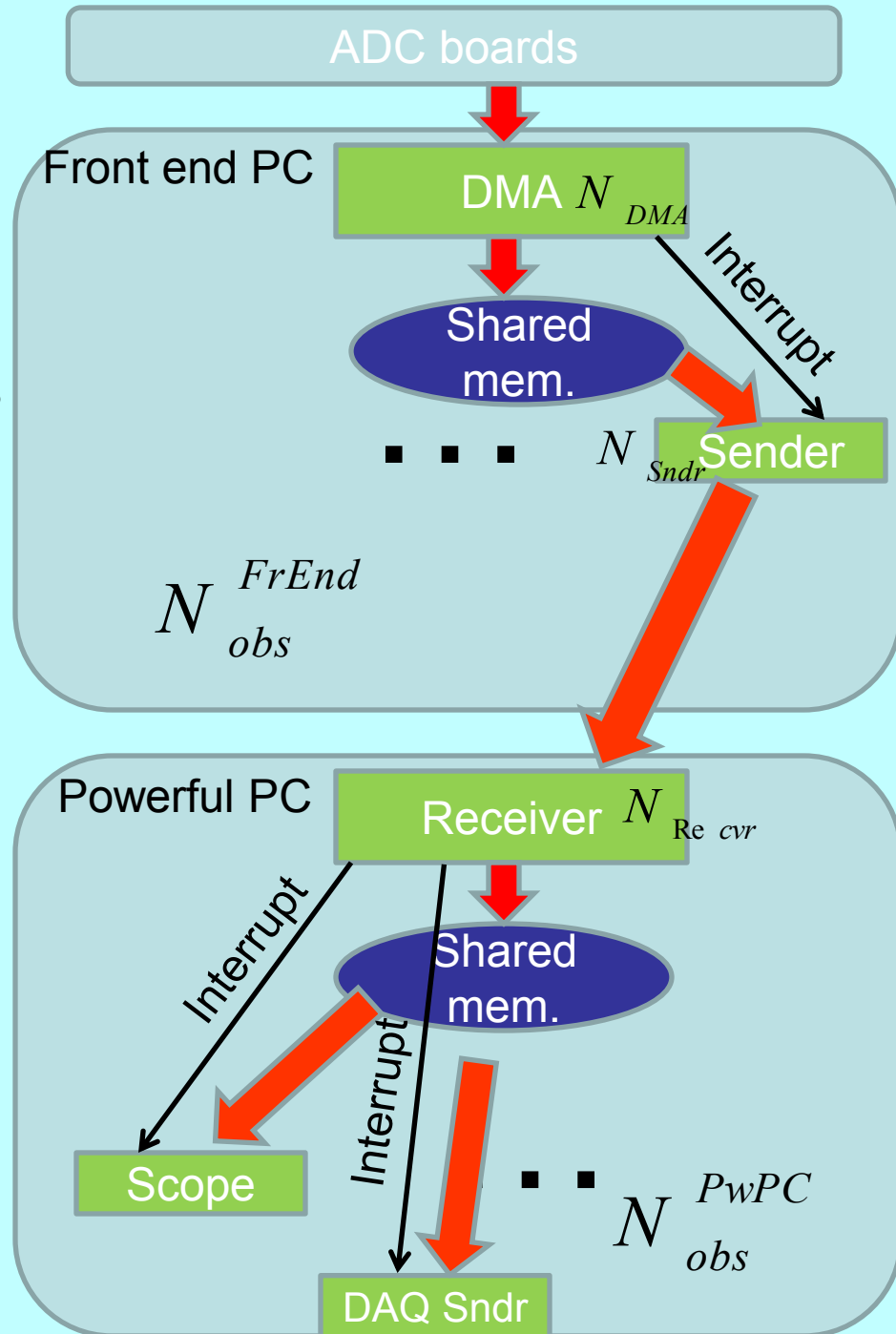


# TCP/IP or UDP or ... ???

The main criteria for choosing TCP/IP or UDP or other protocol is possible errors and speed of sending buffer.

1. In the case of large buffer, The info sending speed is almost the same for TCP and UDP
2. In the case of TCP/IP we achieve, that there is no loose of info during sending, while in the case of UDP there is.

$$\begin{array}{ccc}
 N_{obs}^{PwPC} & \geq & N_{Re\ cvr} \\
 \geq & N_{Sndr} & \geq N_{DMA}
 \end{array}$$





ADC boards

Front end PC

DMA Half1 (lib)

Shared memory  
writer

Shared  
mem.

...

Sender

Interrupt

Powerful PC

Receiver

Shared  
mem.

Scope

DAQ Sndr

Interrupt

Interrupt

...

ADC boards

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DMA Half1 (lib)

TCP/IP or UDP  
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...

# Summary

1. Now even if sender priority is very low (+20), anyhow sender works without any errors and in receiver site we have no more errors than DMA errors, those approximately ~0%.
2. The TCP is more reliable than UDP. For example during sending data by UDP the probability of data loses of 256 bytes is 0.02%. I think it will be better to use TCP/IP instead of UDP for DAQ data sending.
3. Sending and receiving functionality loads from lib. If there will be better functions (by TCP or by UDP, or by more higher level protocol), then we can easily change the lib, without rebuilding the program.
4. **Problem.** Now we have problem in sender site, that signal handler is stopped to be called after long time work (it can be several weeks). This problem must be solved.
5. Realization of system without shared memory requires more discussions and long term work.