



FRL in the DAQ system



FRL during data taking

FRL as local DAQ

FRL as data generator



FRL during data taking



- Tasks during data taking

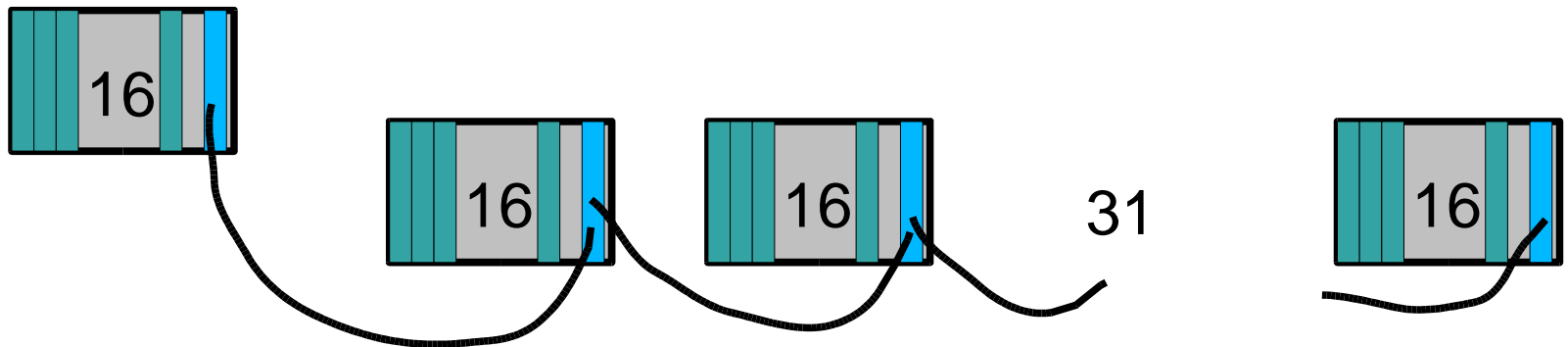
- Configuration:

- via chain RCMS-FunctionManager-XDAQ application
 - configuration parameters from some Database

- changes “on-the fly”

- Routing tables for FED Building
 - Could be synchronized with Trigger distributor: build a chain with one master

has TTCrx





FRL during data taking



- updating routing table on-the-fly:
 - FRL NIC keeps a set (8?) of tables in Memory
 - FRL card sends the table number to use in every event header to NIC.
 - FRL cards keeps to numbers in registers: “current routing table” and “next routing table”.
 - 1) If desired routing table not yet in NICs, write it to NICs
 - 2) Set the next routing table in all FRLs
 - 3) Software – command signals to “Master FRL”: at next BCreset broadcast update signal to slave FRLs (via Lemo chain)
 - 4) Slave FRLs on reception of update signal: At next BC == 0 change routing table. (swap “current” <--> “next”)



FRL during data taking



- contd: change routing table on the fly
 - Allows to change routing tables “on-the-fly” without pausing
 - Allows for 88 us to change tables via the chain
 - Allows arbitrary routing tables
 - Needs 32 FRLs to be chained with hardware cables.
 - Needs one FRL to be equipped with TTCrx to receiver BCreset



FRL during data taking



- Monitoring
 - Spy events
 - can only check/histogram header and trailer fields
 - send events to sub-detector specific monitoring applications
 - Histograms or single values to monitor
 - fragment size histogram, BC histogram
 - collected via XDAQ application and sent to IMS server
 - monitor the “credits per destination” in NIC
 - monitor memory usage in NIC
 - NIC internals



- conted: Monitoring
 - CRC check
 - If CRC is wrong 2 options:
 - flag in status and send event for investigation
 - flag in status and send empty event



FRL during data taking



- Other tasks
 - Issue self test of SLINK
could be a regular test at each start of the DAQ.

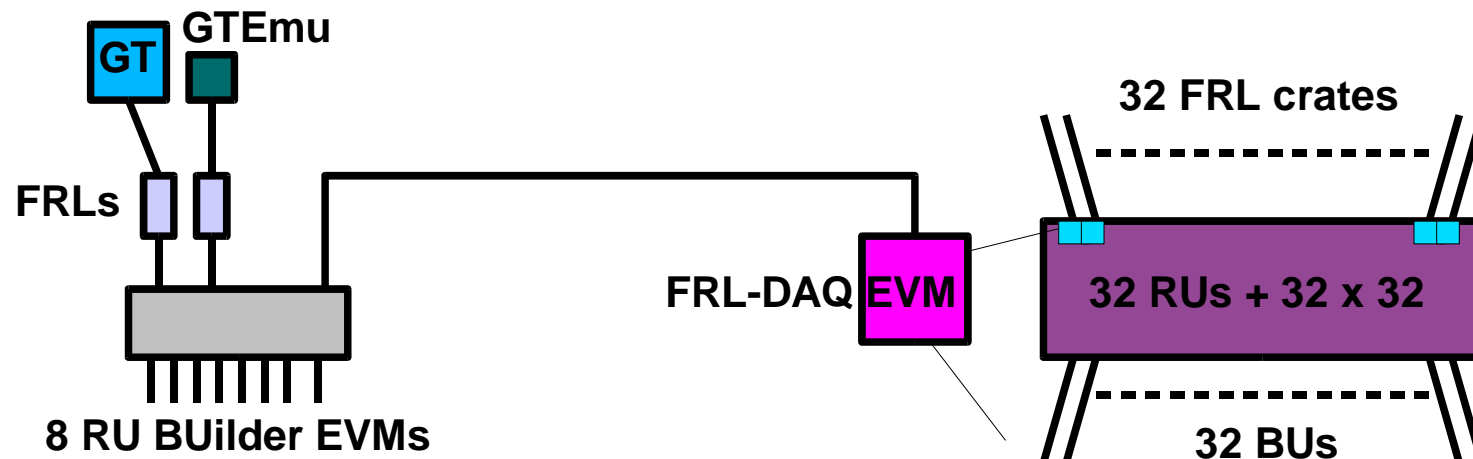


FRL in local DAQ



- All events are spied
- FRL generates back-pressure towards the FEDs
- Event building with evb-applications via Gb TCP/IP.
- EVB should be the same as in full system
 - Needs to emulate the FED Builder
 - Super-fragments with FRL-header should be built
 - could be done in RUI
 - could be done in application controlling the whole FRL-crate
 - could be done in “FED-Builder”-application between FRL and RUI

- Data rate estimation:
 - Assume: In PCI crate achieve 80-100 Mb/sec
 - with 16 FRLs and 2kB fragments corresponds to 2.5-3.1 kHz Trigger rate
 - needs 32x32 EVB in Gigabit Ethernet with 80-100 Mb/sec.
 - needs EVM and connection to Global trigger:



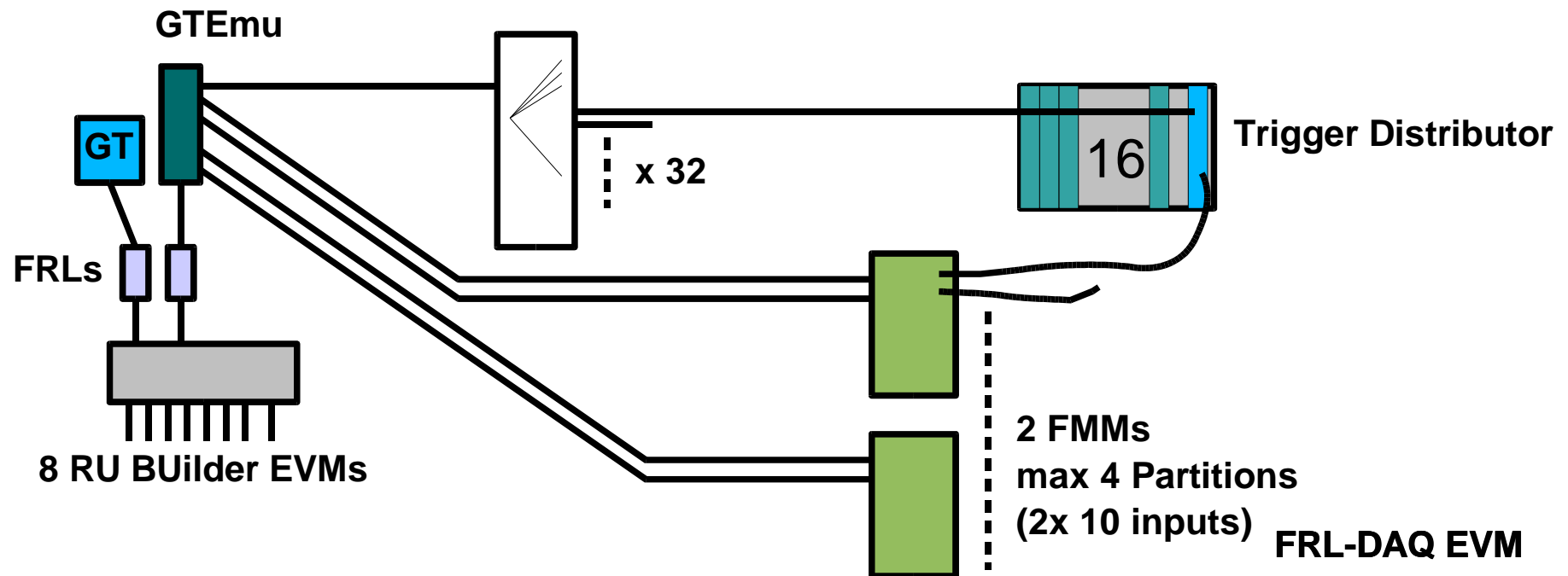


FRL in local DAQ



- This local DAQ could be used in parallel with full DAQ but on spy events:
 - All triggers are sent also to EVM of local DAQ.
 - Selection algorithm for spy-events in FRL must be implemented in local FRL-DAQ EVM.
 - local FRL DAQ can be run “in parallel” to full DAQ system (e.g. to test new software components)

- FRL must emulate FED
 - contains data generator
 - receives 1st level trigger via trigger distributor
 - generates sTTS signals (via Trigger distributor)





FRL as data generator



- Mode switching
 - Data generator mode should be a configuration switch without firmware change
- Operation
 - it should be possible to run the same FRL code in data generator mode
 - all monitoring facilities of the normal DAQ mode should be available
 - spying
 - histogram generation and status monitoring