Level 2 Trigger Overview

(for DAQ shifters ...)

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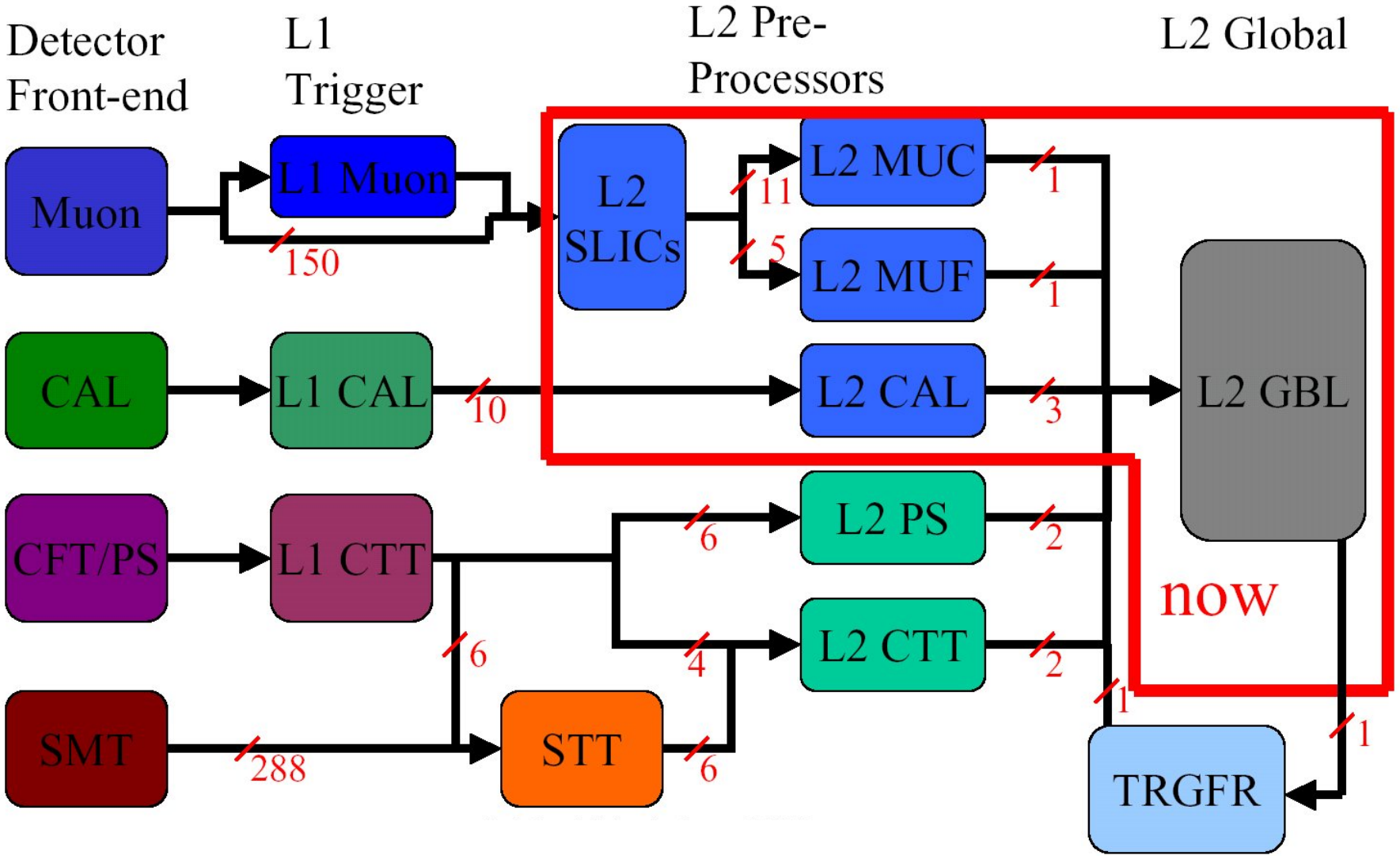
L2 Trigger Group

DØ Operation meeting - May 18, 2004

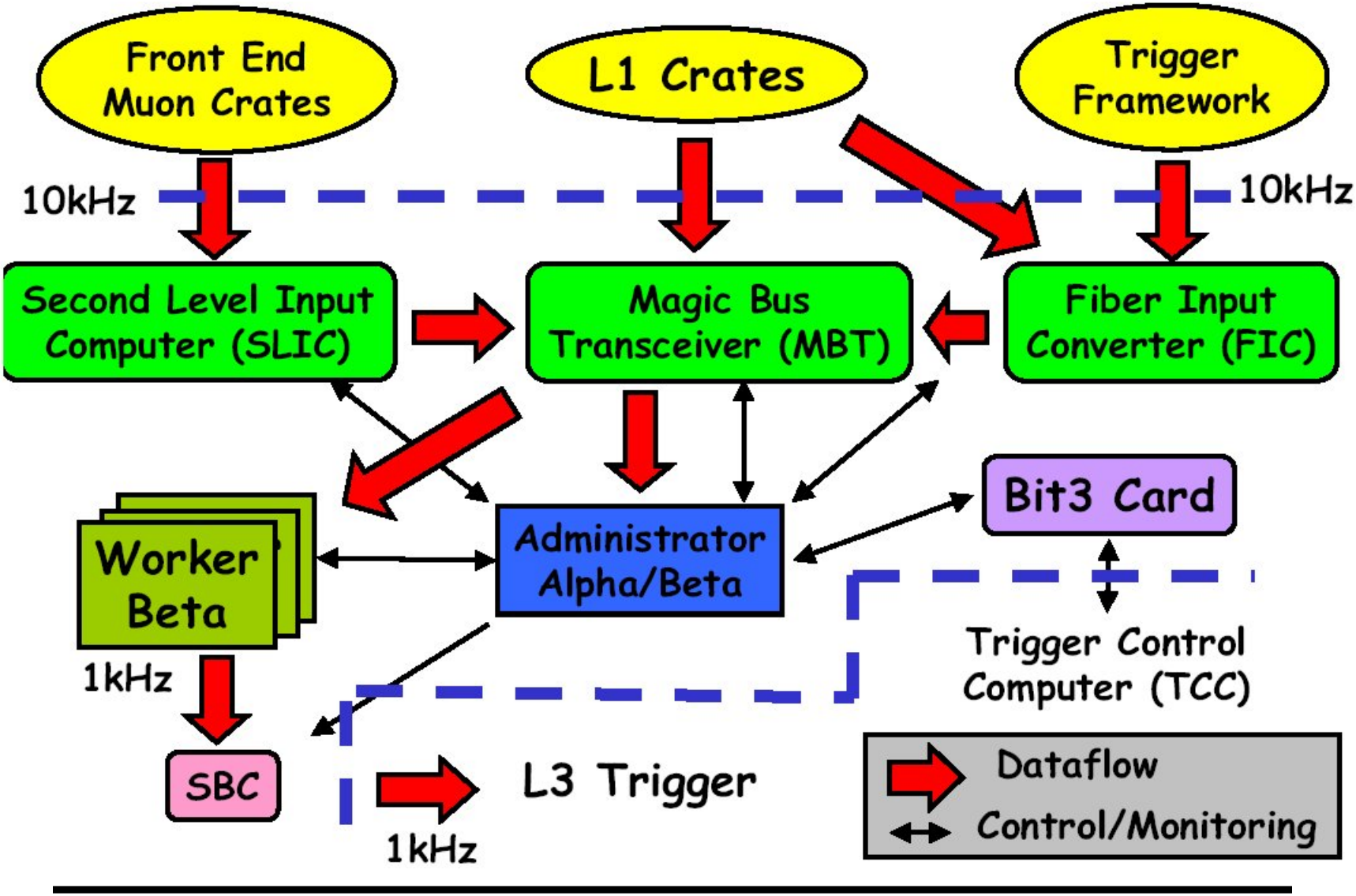
Outline

- L2 Trigger Data Flow
- L2 Controls
  - L2 Trigger Control Computer
- L2 Monitoring
  - L2 Data Flow GUI
- L2 Operations
  - Common Problems and Solutions
  - DAQ shifter vs. L2 expert
  - Resources (where to find infos about L2)

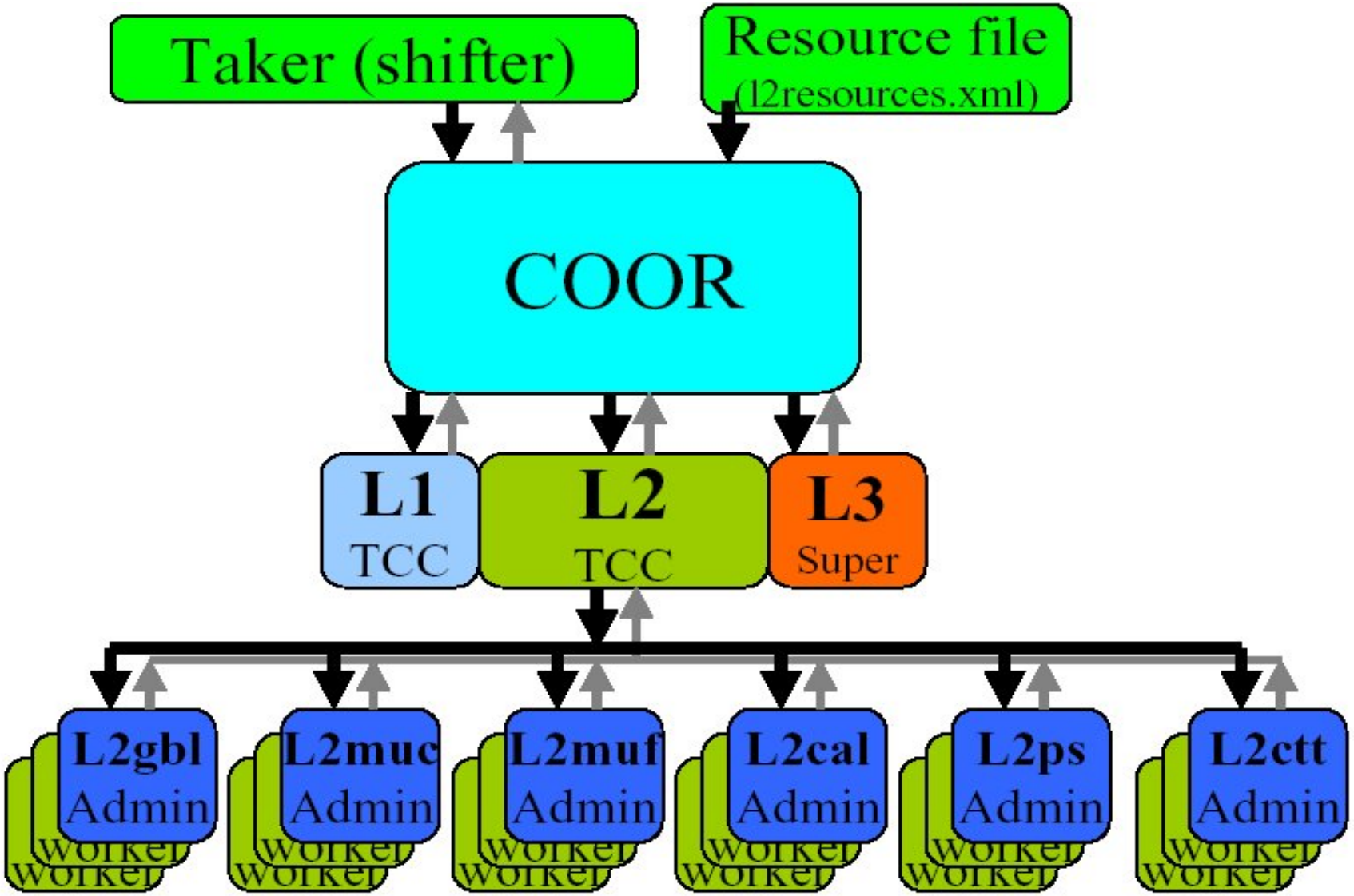
L2 Trigger Data Flow – trigger framework



L2 Trigger Data Flow - Single L2 Crate



L2 Trigger Data Flow - configuration



L2 Controls - L2TCC

- L2 Trigger Control Computer (or L2TCC)
  - runs L2 Relay Software (or L2RS)
- interface to COOR and monitor servers
- configures and controls all L2 crates
  - static configuration files are loaded when COOR is initialized
  - forwards and coordinates COOR messages to all L2 crates when run is being started or stopped

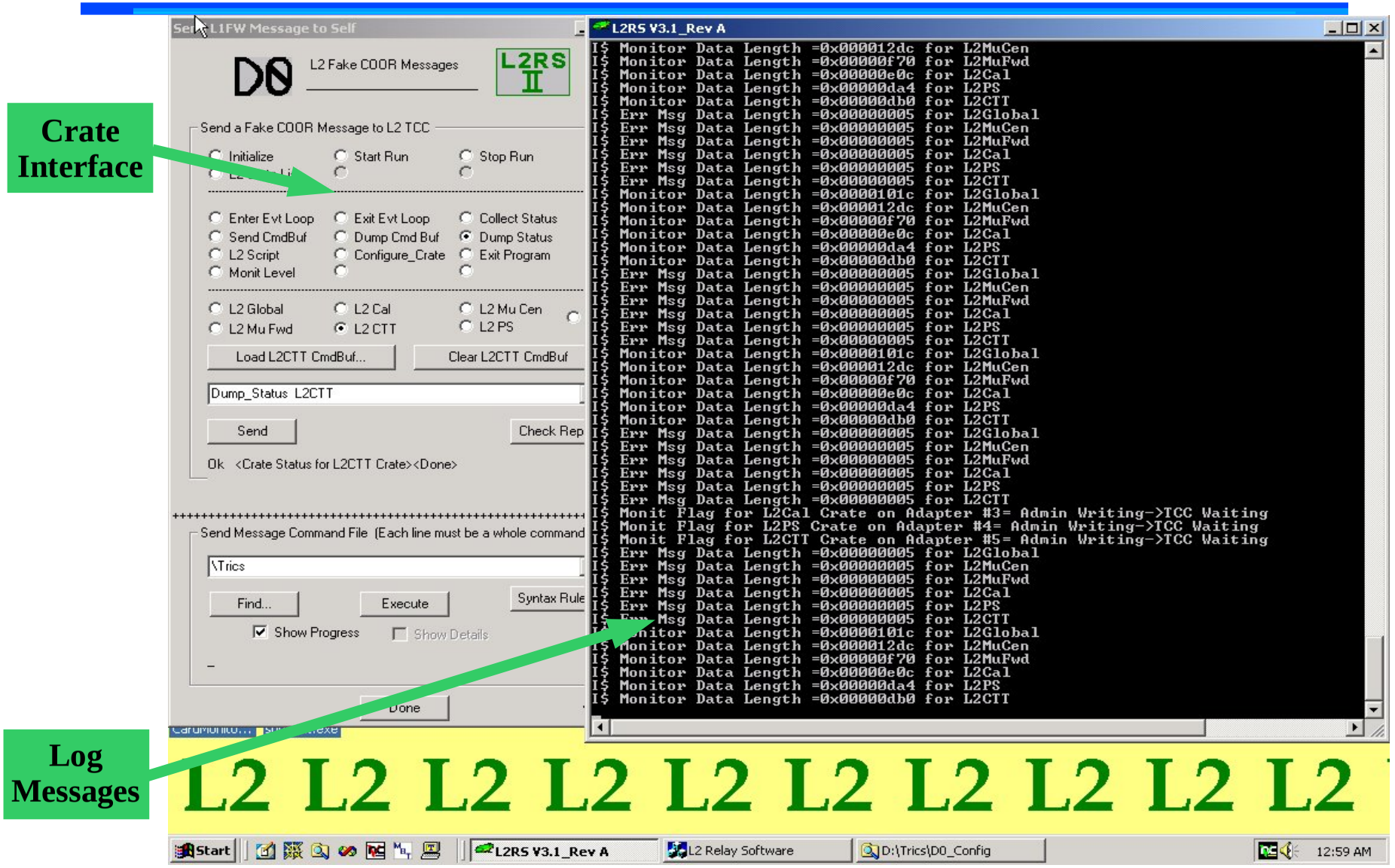
L2 Controls - L2RS

- Equivalent to Trics in L1TCC
- allows access for L2 experts to all L2 crates
  - send messages to L2 administrator (configure, exit/enter event loop, etc. ...)
- provides a log window with recent activity
  - monitoring information: I$ ("<done>")
  - messages from COOR: M$
  - error messages: E$ (e.g. "failure communication with admin")

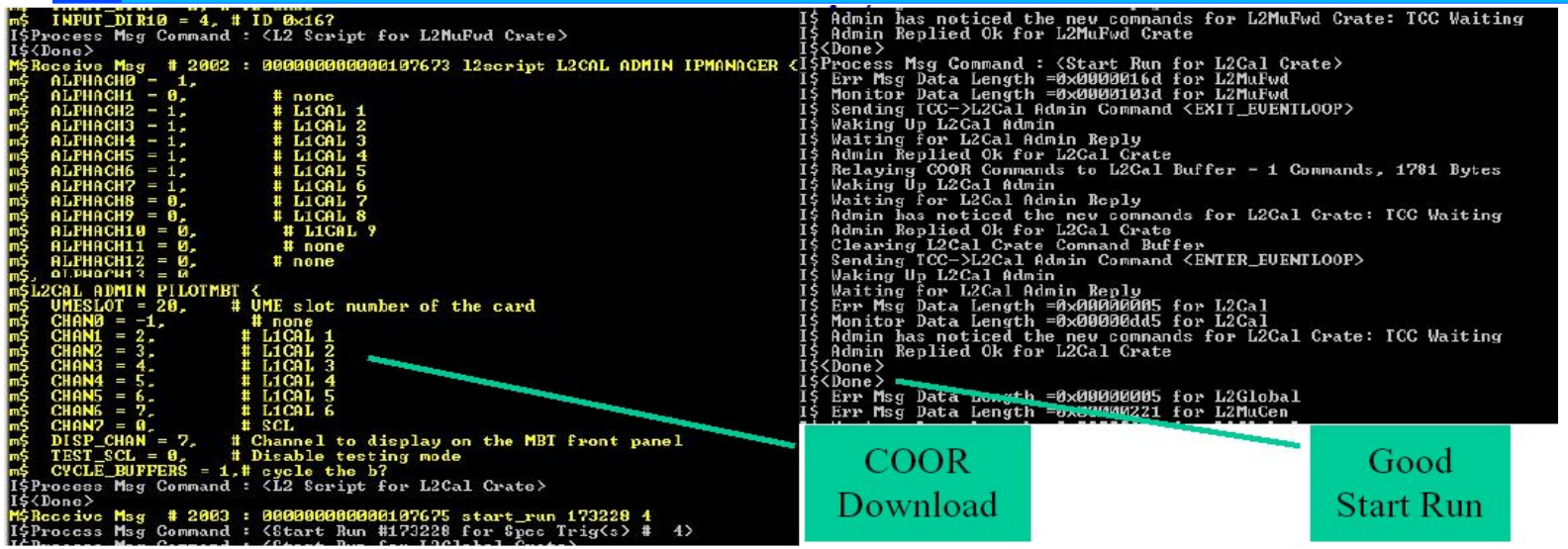
Useful when debugging L2 problems!

You CAN look at it, but you CANNOT touch it!

L2 Controls - L2RS



L2 Controls - L2RS

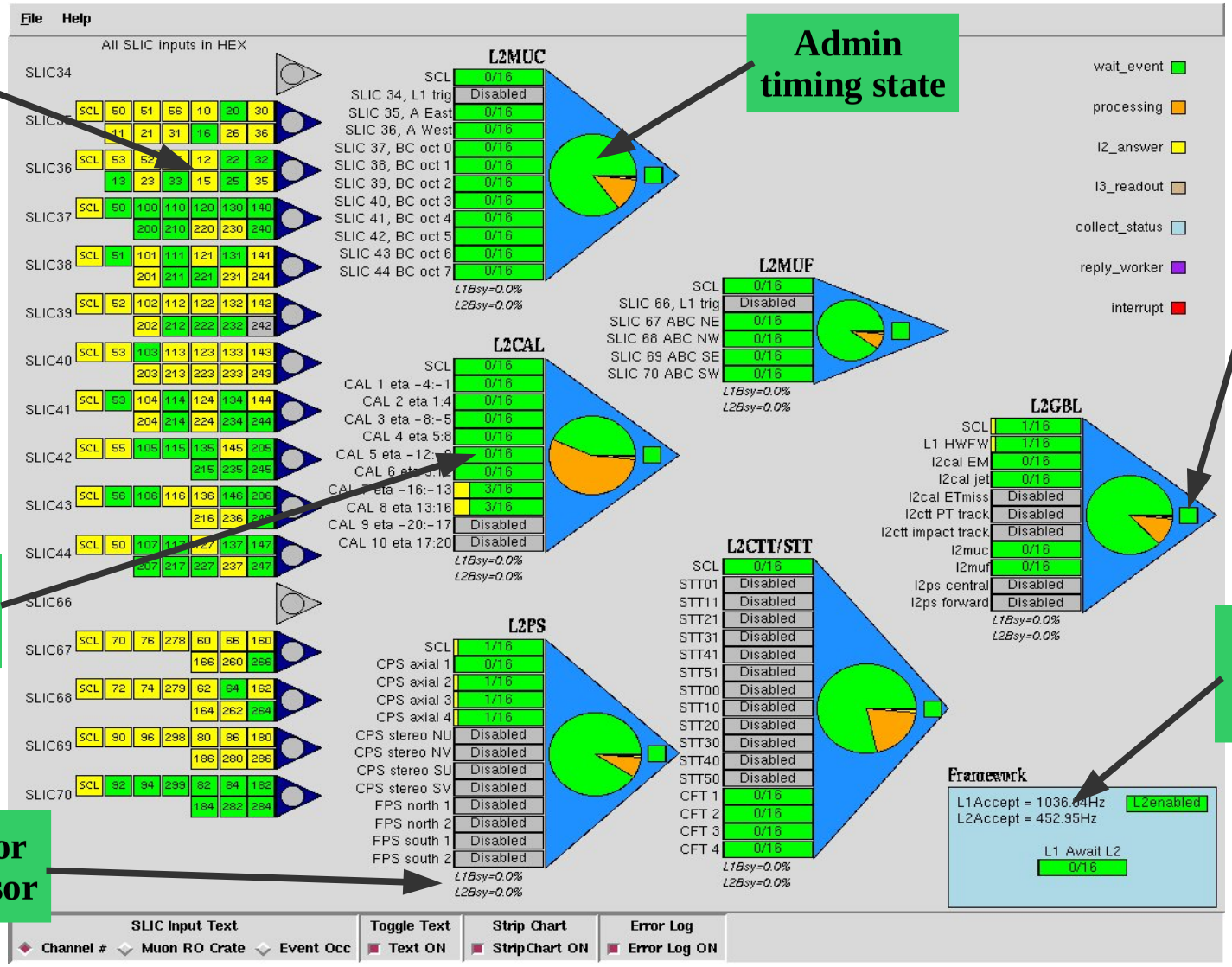


COOR Download

Good Start Run

Error: Beta is not responding to L2TCC

L2 Monitoring – L2 data flow GUI



SLIC input buffer

Admin timing state

Error light

Crate nput buffer (MBT)

L1/L2 accept rates

L1/L2 busy for L2 preprocessor

L2 Monitoring - L2 data flow GUI

- information flow: from left to right
  - SLIC outputs = input for L2 muon crates
  - L2 crates outputs = input for L2 global crate
- small triangles = SLICs (one per SLIC)
- big triangles = L2 pre-processors (crate's Administrator)
- pie charts = timing information
  - await an event, processing, L2 answer, L3 readout, collect status, worker replay, interrupt
- update - every 5 sec - L3 monitor server from the DAQMON scraper (l3ms_util_clients)

L2 Monitoring - L2 data flow GUI

GREEN color = idle/empty

- empty input buffer
- SLIC/Beta in idle state
- TFW is not waiting for L2 global

RED color = error

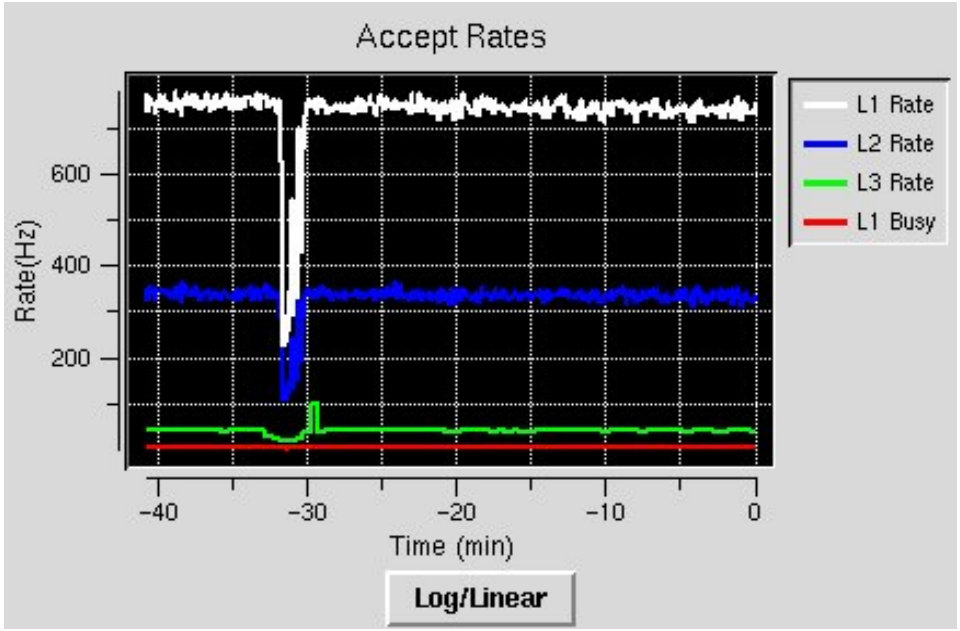
- administrator errors (red box)
- input error

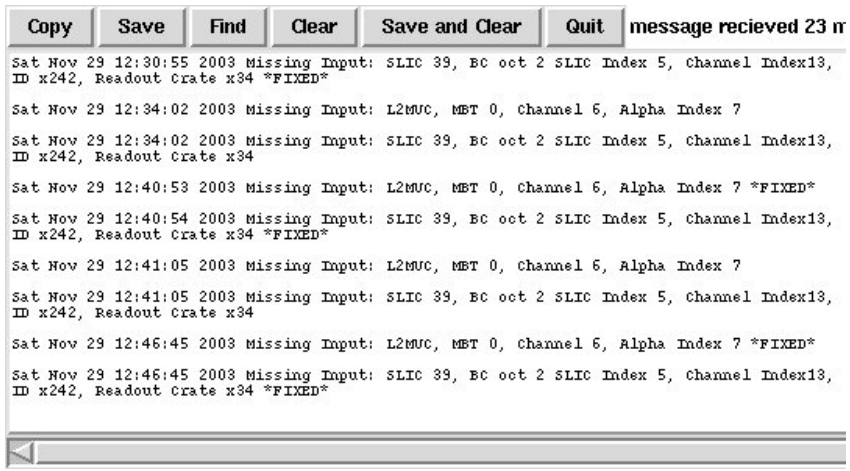
ORANGE/YELLOW color = working

- processing event (orange)
- input buffers filled (yellow)

GRAY color = inputs are disabled (for crates/SLICs)

L2 Monitoring - L2 data flow GUI





- Stripmon - up to 70 min of L1, L2, L3 and busy rates
- Also available as stand alone plot (but usually part of l2df)
  - global L1, L2 and L3 rates
  - specific triggers rates/busies
  - Geometric-sector rates and busies

- L2 message box
  - information about missing inputs
  - time to the last missing input

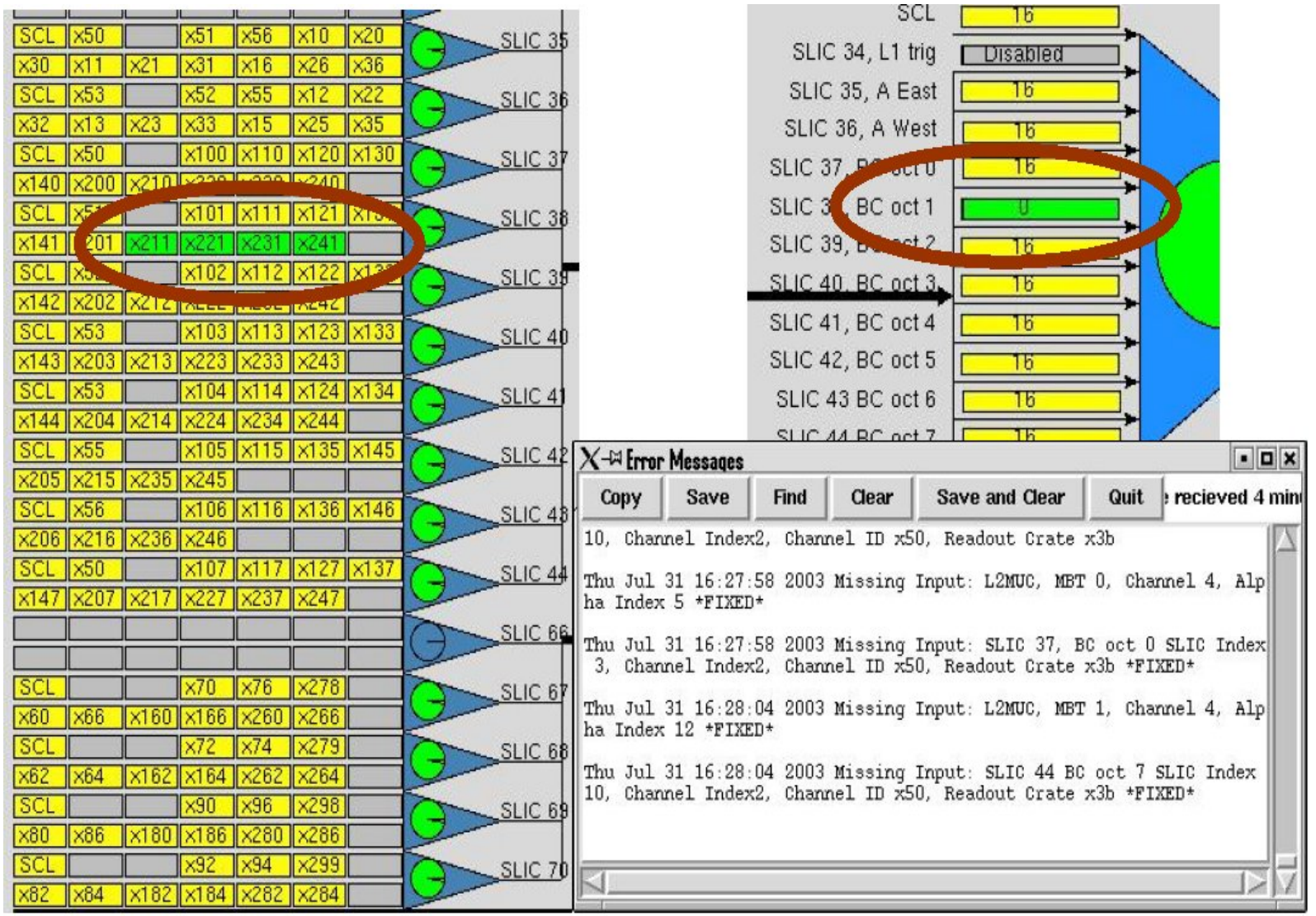
L2 Operations

- When DAQ shifter downloads a trigger, COOR:
  - configures L1 framework
  - sends L2 configuration to L2TCC
  - configures L3 supervisor
- When DAQ shifter starts run, COOR
  - sends start run to L1, L2 and L3
  - L2TCC sends configuration to L2 administrator and administrator configures pre-processor (enables MBT channels) = workers
- TWF issues SCL-init

L2 Operations - problems and solutions

- When/How DAQ shifter can see an L2 problem?
  - by looking at l2df GUI
    - red box, pie chart is moslty orange (blue)
    - L2 crate is missing from events or is L1/L2 100% FEB
  - L2TCC (L2RS) contains red messages about L2 crate/crates
- When it is likely NOT an L2 problem?
  - no red box but framework shows "14/16" and we have no rates or pie chart is brown
  - no red L2 crate in daq_dialog/uMon
  - some other crate is red in daq_dialog/uMon
- Check daq_dialog/uMon, l2df GUI, check taker's messages and L2TCC (L2RS) messages

L2 Operations – problems and solutions



L2 Operations – problems and solutions

- DAQ shifters are able to deal with some L2 problems, for instance

I. missing inputs to an L2 crate

- detected by daqAI, often it happens to l2muc (x21) or l2muf (x22)
- Diagnostic:
  - input buffers are yellow (at least 1 event) except one, which is green (no events = missing events in this one!)
  - check the L2 message box, which tells you which input channel and which front-end crate is involved
- Action: notify MUON/CAL shifter
- disabling of the L2 input channel is done automatically, when muon front-end channel is disabled (by MUON/CAL shifter)

L2 Operations - problems and solutions

Ib. disabling input (MBT) channels to L2 crates

- should be done only by the L2 expert (or following his instructions)
- using l2inputer program:
  - stop run, start the L2 inputer
  - select input MBT, select channel, save changed configuration
  - re-initiliaze COOR, and download the trigger, start run
  - entire process takes at least 2 min!
  - l2inputer re-writes l2resources.xml configuration file
- other crates (l2ps or l2ctt) - by disabling an L1 readout crate in taker, also L2 input channels are disabled = faster (done by COOR)

L2 Operations – problems and solutions

II. L2 crate is 100% FEB/missing from events

- also detected by daqAI
- it may/may not be something which requires L2 expert's attention
- Diagnostic:
  - daqdialog/uMon shows which crate is involved
- Action:
  - issue an SCL-init (once, twice, ...) = small hammer
  - If it does not help, proceed to medium hammer – do not try it more than twice it's better to contact the L2 expert
  - medium hammer = l2reset <L2 crate name>

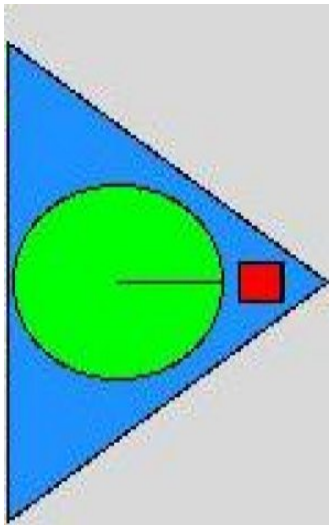
ALL RUNS MUST BE STOPPED!

<L2 crate name> = l2gbl (x20), l2muc (x21), l2muf (x22), l2cal (x23), l2ps (x24) or l2ctt (x25)

L2 Operations - problems and solutions

III. Diagnostics of L2 errors

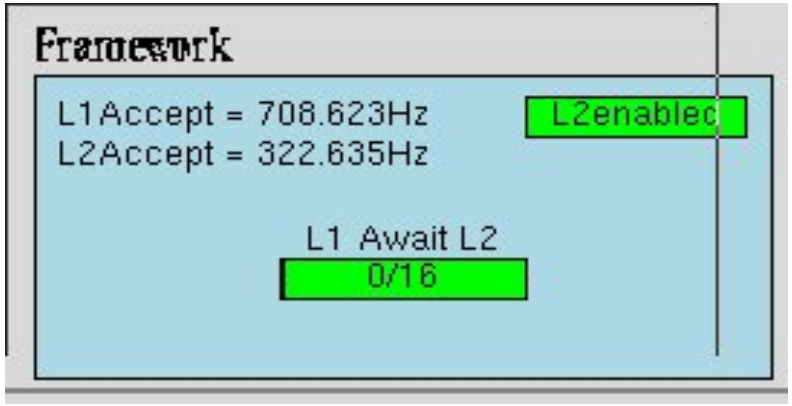
- red box in l2df

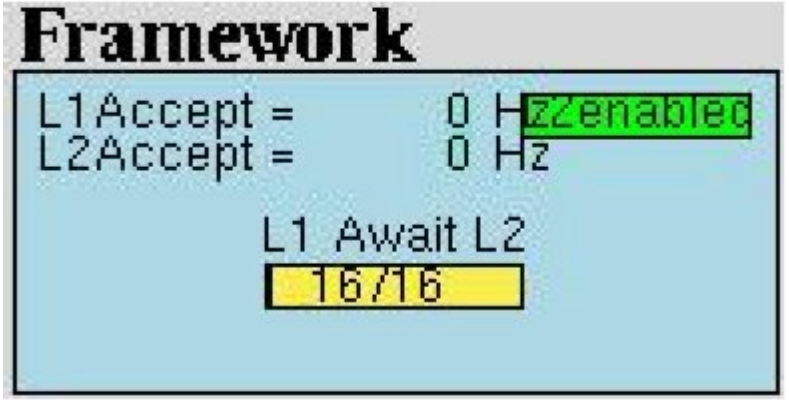


  - Requires an SCL-init
  - typical problems may be:
    - input sync errors - recognized by daqAI
    - configuration problem - in L2 global. In this case run should be stopped, SCL-init should be issued and triggers re-downloaded

L2 Operations - problems and solutions

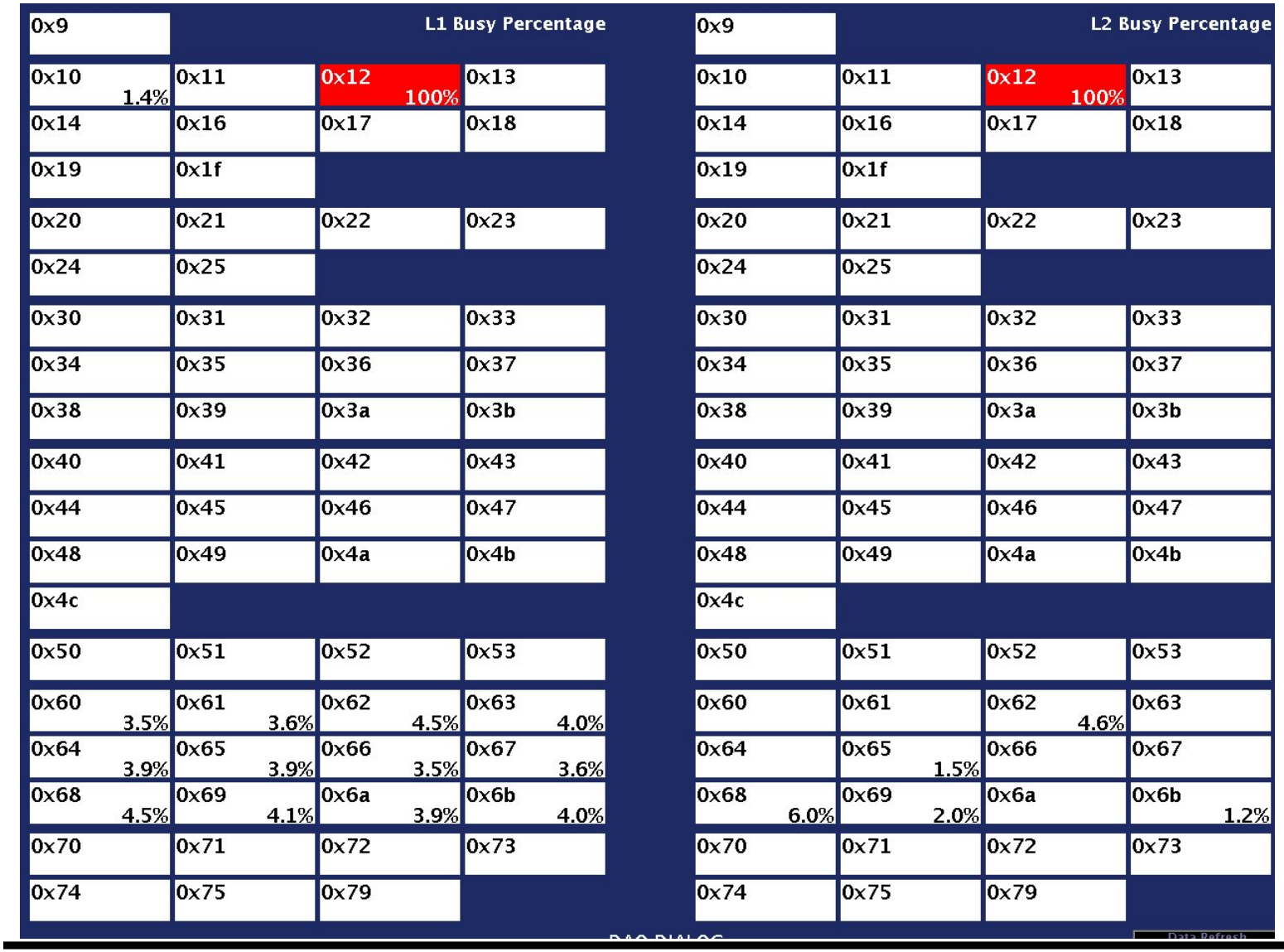
- L2 busy
  - l2df shows "L1 await L2: 14/16"
  - but no missing inputs





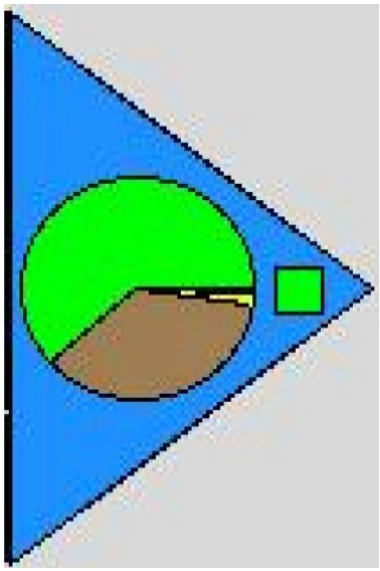
  - check daq_dialog for busy crate/crates

L2 Operations - problems and solutions



L2 Operations - problems and solutions

- SBC/L3 problem
  - l2df shows large "L3 readout" fraction in the pie chart



  - Typically it's an L3 problem:
    - reset the SBC
    - reset Routing Master
    - last resort = page the L3 expert

L2 Operations - DAQ vs. L2 expert

- August '03 vs. Novembevr '03 vs. May '04
  - L2 has 6 preprocessors, the most recent ones are:
    - L2ps (x24) - pre-shower preprocessor
    - l2ctt/stt (x25) - tracking preprocessor
  - do not require a special treatment BUT no triggers have been formed in v12 BUT v13 will use l2ctt/stt
- DAQ shifter watches daq_dialog, uMon and fuMon
  - ✔ confront daq_dialog and uMon information with l2df GUI
  - ✔ try SCL-init first, then try medium hammer
  - ✔ page the L2 expert (follow his instructions)

L2 Operations - DAQ vs. L2 expert

- L2 expert duties:
  - apply L2 hammers = small, medium, large
    - small hammer = SCL-init
    - medium hammer = restart L2 executable (l2reset <crate_name>)
    - large hammer = power cycle L2 crate
    - diagnose the L2 system
  - help to diagnose whether it's an L2 problem or not (it's not a Level 2 issue but we'll try to help ...)
- L2 experts pagers:
  - primary pager: 630-266-0744
  - secondary pager: 630-266-0750

L2 Operations - resources

- Documentation sits on the web!

General L2 web page:

www.pa.msu.edu/hep/d0/l2

L2 online web page:

www-d0online.fnal.gov/www/groups/trigger/l2/online

L2 DAQ web page:

www-d0online.fnal.gov/www/groups/trigger/l2/online/daq_shifter/index.html

L2 expert web page:

www-d0online.fnal.gov/www/groups/trigger/l2/online/expert/index.html

L2

- Only L2 muon preprocessors have SLIC inputs
- L2df GUI
  - switches on the bottom:
    - MUON channel
    - MUON readout crate
    - event occupancy (number of events)
  - L2 enabled/disabled
- DAQ taker - L2 global is always IN!
- Run with all L2 crates - even with l2ps and l2ctt - all the time!

L2

- COOR - L2 connection problems
  - L2 crate/crates in error state:
    - red box in l2df
    - red error messages in taker - L2TCC times out and fails to respond to COOR
    - red error messages in L2RS - administrator does not replay to L2TCC

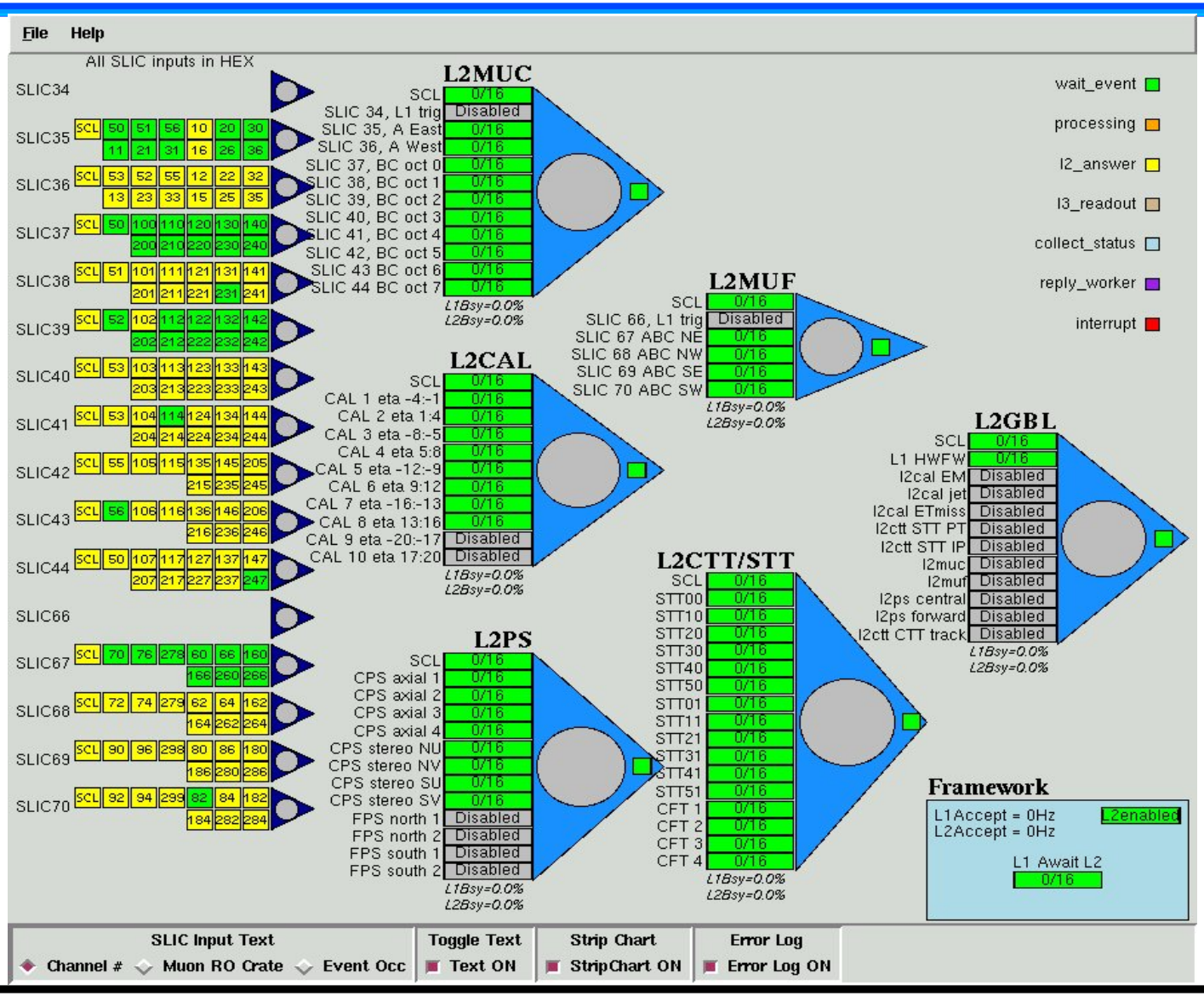
  ✔ stop run, SCL-init, re-download, start run

  - time out when starting run:
    - SLIC configuration has changed (some MUON input channels were enabled/disabled)

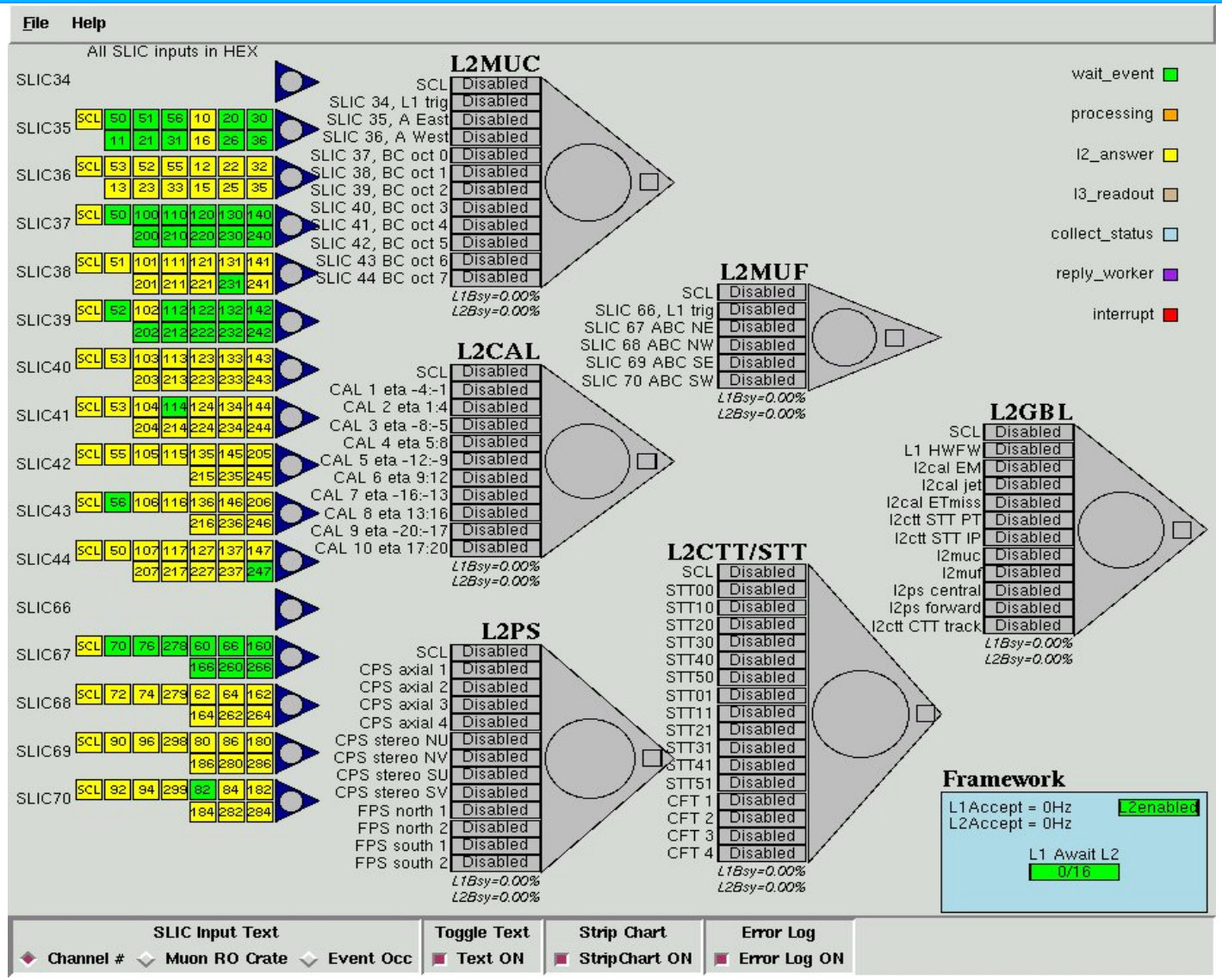
  ✔ wait ~ 30 sec and start run again

L2 - first β

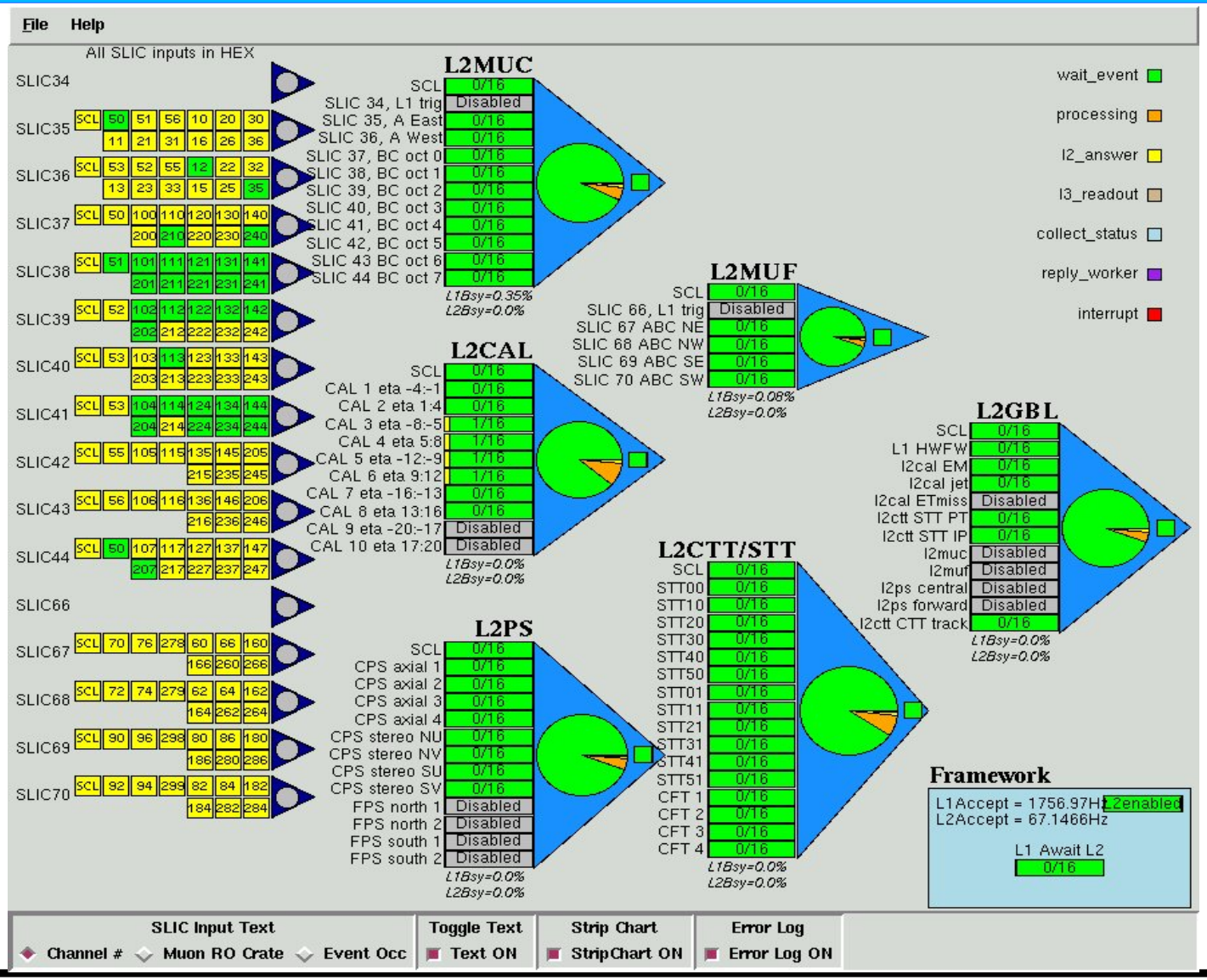
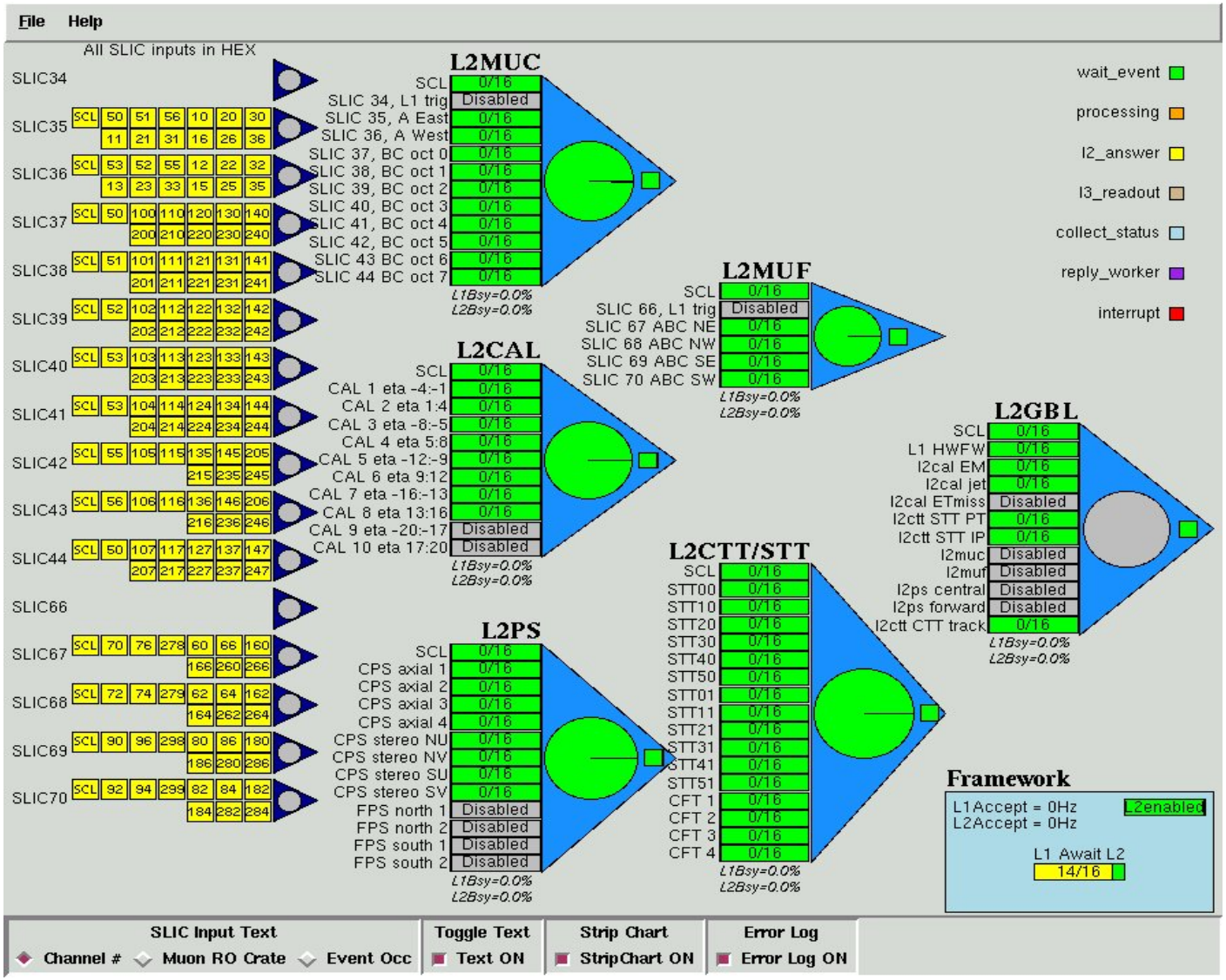
L2df - downloaded zero_bias



L2df - loading a trigger



L2df - global physics run with v13 trigger list



L2df - l2gbl is crashed ...