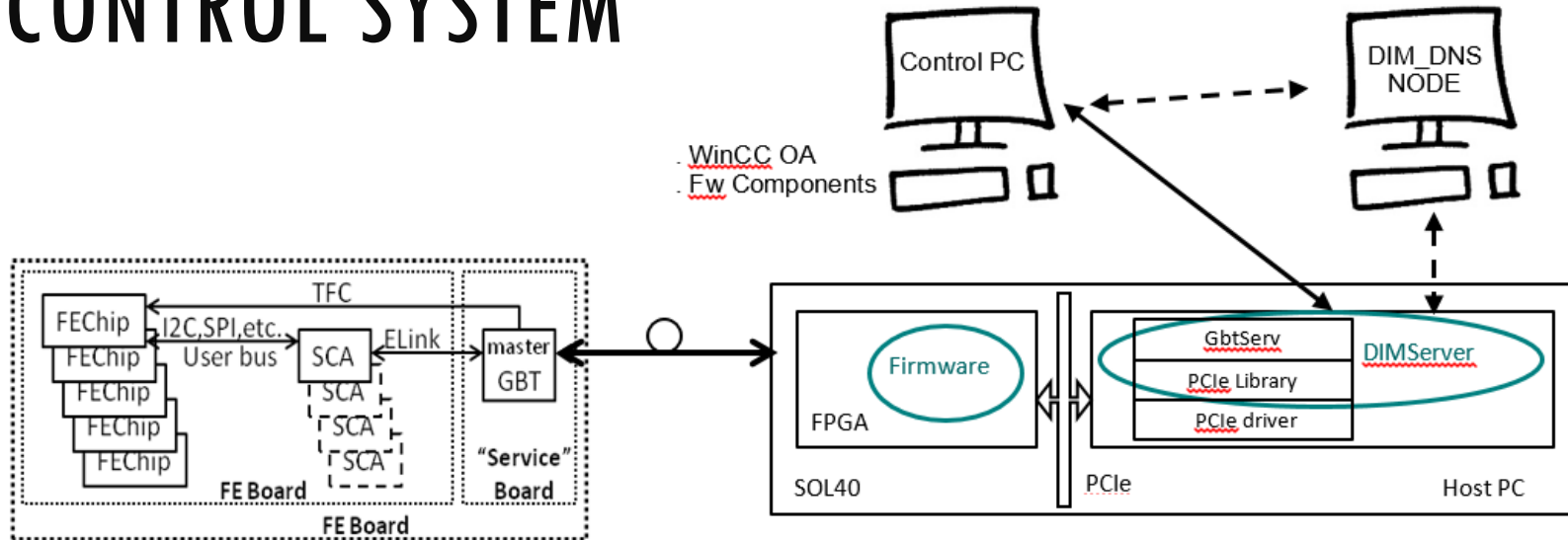


# MINIDAQ2 WORKSHOP

01.08.2017

Control System

# CONTROL SYSTEM



## Requirements:

- SCADA (WinCC OA)
- DIM
- JCOP Core Components:
  - FwCore
  - FwDim
  - FwConfigurationDB (for usage of recipes)
- Gbt Server
- Gbt Client (FwGbt)
- Hardware Tool (FwHw)
- MiniDAQ Component (FwMiniDAQ)



# CONTROL NODE CONFIGURATION

## First steps:

- Have a CC7 machine
- Configure the daq40 repository (<http://lbyum.cern.ch/daq40/>)
- Install WinCC OA 3.15  
(<https://readthedocs.web.cern.ch/display/ICKB/PVSS+Service+Download>)
- Install required RPMs
  - dim
  - dim-programs
- Start the DNS server
  - Note: it might be a good idea to set it to start on boot (“sudo systemctl enable dnssd”)
- Install the GBT Server  
(<https://gitlab.cern.ch/lhcb-amc40firmware-mng/lhcb-amc40software>)

# WINCC OA PROJECT CONFIGURATION

1. Create a new project
2. Get the fwInstallation Tool to be able to install the components  
(<http://jcop.web.cern.ch/jcop-framework-component-installation-tool>)
3. Install the core JCOP components  
(<https://jcop.web.cern.ch/jcop-framework-0>) → JCOP Framework  
(<https://cernbox.cern.ch/index.php/s/UIbqqHTFE0wOZiU/download>) → (LbHwFw v2r0) JCOP Framework + LHCb components
  - fwCore
  - fwDIM
4. Install the LHCb Hw components  
(<https://gitlab.cern.ch/lhcb-amc40firmware-mng/lhcb-amc40software>)
5. Install the fwMiniDAQ component  
(<https://gitlab.cern.ch/lhcb-amc40firmware-mng/lhcb-amc40software>)
  - Note: due to the amount of datapoint data to import, this installation takes quite a bit (~15min), please be patient

# CONFIGURE THE SYSTEM

- Once the project is installed, you'll need to configure it and subscribe your devices.
  - Note: Make sure the checkbox is ticked if you're subscribing for MiniDAQ2
- The subscription will configure all the registers for the TELL40, SOL40 and SODIN, as well as configure the correct Writer subscriptions
- The Reload button is very useful as it performs the following actions:
  - Reloads the pcie driver
  - Recalibrates the fPLLs
  - Relaunches the Gbt Server
  - Restarts the ctrl managers

In the development phase, when trying out new firmwares it should come in handy

The screenshot displays the MiniDAQ software interface. At the top, the title bar reads "MiniDAQ: TOP (TEST\_GBT2 - TEST\_GBT2; #2)". The main window features a CERN logo, a "System" section with "MiniDAQ" and a "NOT\_READY" state, and a "Sub-System" table:

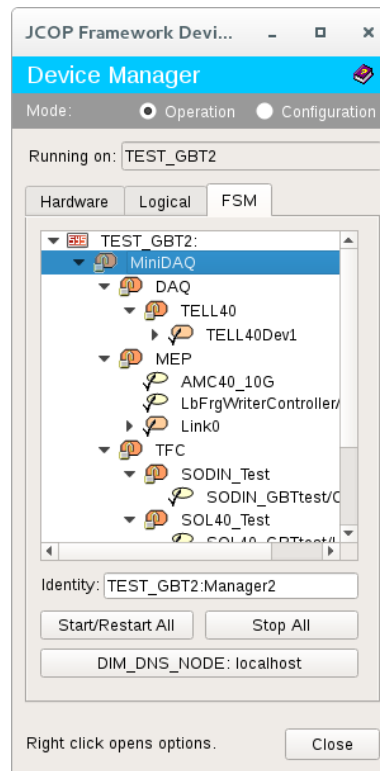
Sub-System	State
DAQ	NOT_READY
MEP	NOT_READY
TFC	NOT_READY

The "System Status" section includes "GBT Server Connection" (Reload), "Registers Subscription" (Configure Subscriptions...), and "Ctrl Managers" (Restart Ctrl Managers). A "Test System" section has a "Configure..." button. A "Reset" section includes checkboxes for Logic Regs (Global, LLU, TELL40) and Logic Regs (MEP, SOL40, SODIN). A "Trigger Configuration" section includes checkboxes for Limited, External, Periodic 1, and Fast Per 1, along with a "# of limit" field set to 10000. A "Subscribe Devices" dialog box is open, showing "fwMiniDAQ/fwMiniDAQ/GlobalConfigureCCPC.pnt (TEST\_GBT2 - TEST\_GBT2; #2)" and a "CCPC Name" field with "lbminidaq2-08". The dialog includes "Save Settings", "Subscribe Devices", and "Unsubscribe Devices" buttons. A "Messages" section is at the bottom left.

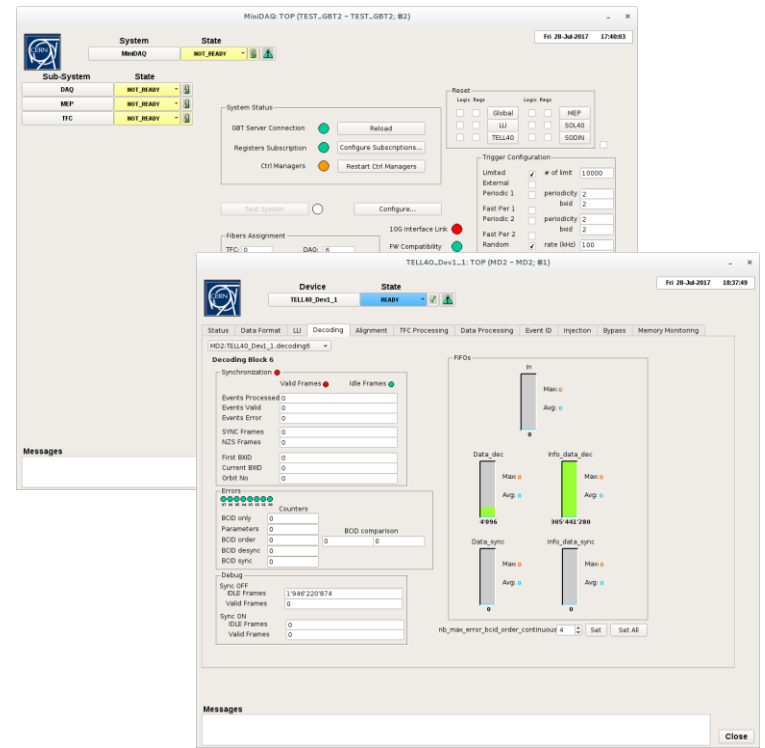
Numbered annotations (1-4) highlight the "Configure Subscriptions..." button (1), the "Subscribe Devices" button (2), the "Reload" button (4), and the "Configure Subscriptions..." button (3).

# FSM

- The FSM can be opened from the Device Editor Navigator
- Expanding the Tree you can see all of the nodes of the FSM



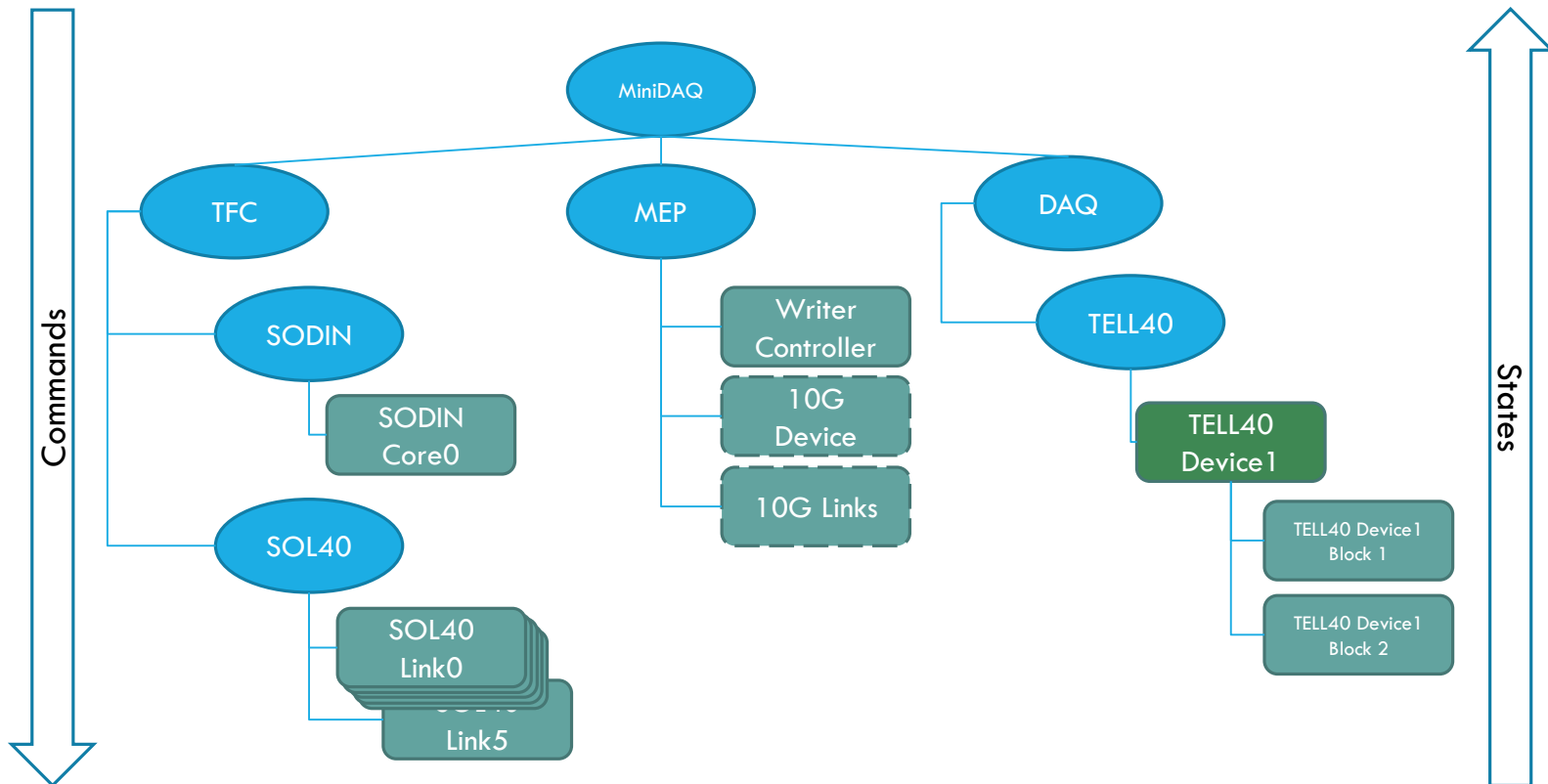
Right click opens options.



- Some of the nodes do not appear on the FSM panels as they are only visible/not visible depending on the MiniDAQ configured (e.g. no 10G device on MiniDAQ2)
- This will change in the future and MiniDAQ1 related devices will be removed



# FSM TREE

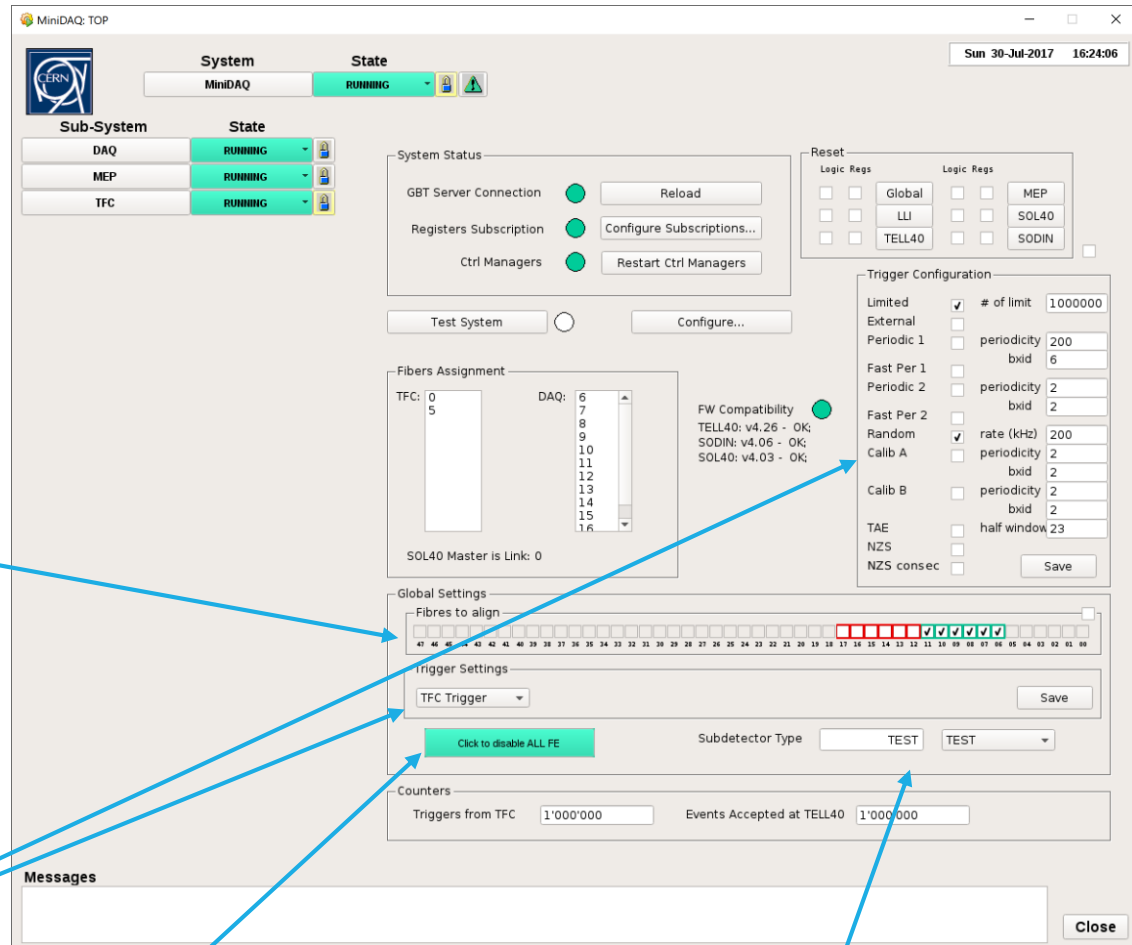


- Control Units – Logical structure that groups devices and other Control/Logical Units - Can be partitioned
- Logical Units – Logical structure that groups devices and other Control/Logical Units - Can not be partitioned
- Device Unit – Corresponds to a real device (hw or software) that performs a given action



# FSM TOP PANEL

- Main face of the whole system
- Allows for the quick configuration of the most relevant run parameters
- Selection of DAQ Fibers
  - MiniDAQ2 has up to 48 links of Data Acquisition
    - This means 2 blocks of the TELL40, each with 24 links
  - Green means fiber active and enabled
  - Red means fiber active and not enabled
  - Orange means fiber not active but selected on the current configuration → If you try to configure the TELL40 like this it will go to ERROR, you'll have to disable the non active fibers



## ▪ Trigger Configuration

## ▪ FE Generator switch

## ▪ Sub-detector type setting

- When the system is in the correct state it will be yellow when FEs generator not enabled and green when enabled
- If you don't have any FE connected it might be useful to test the system

- Should no longer be reset when resetting from the FSM



# TRYiNg ThInGs OuT

- To make sure everything is working as expected
  - Push the “Test System” button
    - This will read the current value from a test register, increase it by 1, write it back again
    - If everything went OK, the LED should go green
  - Send the commands from the top MiniDAQ node and see if you can get it to running
    - You can use the fibers in loopback and FE generators to help you
    - All the selected fibers should go to state RUNNING
    - On each of the decoding blocks
      - You should see the “Synchronization” and “Valid Frames” green
      - The “Sync ON” Valid Frames counter should be going up
    - On the “TFC processing” tab, you should see the same number of TFC events accepted going up to same number of triggers set as limit on the top panel (if set) and after this you should see the events rejected going up

The image displays three screenshots of the TELL40 software interface, showing the status of various components and the results of a test run.

**Top Screenshot: Device Status**

Dec Blocks	State	Error Status
Block 0	Not Active	Not Active
Block 1	Not Active	Not Active
Block 2	Not Active	Not Active
Block 3	Not Active	Not Active
Block 4	Not Active	Not Active
Block 5	Not Active	Not Active
Block 6	RUNNING	OK
Block 7	RUNNING	OK
Block 8	RUNNING	OK
Block 9	RUNNING	OK
Block 10	RUNNING	OK
Block 11	RUNNING	OK
Block 12	Not Selected	Not Selected
Block 13	Not Selected	Not Selected
Block 14	Not Selected	Not Selected
Block 15	Not Selected	Not Selected
Block 16	Not Selected	Not Selected
Block 17	Not Selected	Not Selected
Block 18	Not Active	Not Active
Block 19	Not Active	Not Active
Block 20	Not Active	Not Active
Block 21	Not Active	Not Active
Block 22	Not Active	Not Active
Block 23	Not Active	Not Active

**Middle Screenshot: Decoding Block - Synchronization**

Valid Frames: ●●●●●●●● Idle Frames: ●

Events Valid: 3247297934  
Events Error: 1

SYNC Frames: 10  
NZS Frames: 0

First BXID: 9  
Current BXID: 230  
Orbit No: 4555390

**Bottom Screenshot: TFC Processing**

Events Rejected: 4161913619  
Events Accepted: 1000000

Processing Counters:

trigger_decision	1000000
or_valid	4162989956
tfc_valid	4162978810

Data from S0L40:

reset_BXID	1167969
reset_EVD	0
reset_FE	0
reset_BE	0
header_only	3423
NZS	0
in_velo	0
trigger	1000000
snapshot	82
map_accept	1000000
sync	10
calibration_type	00000000
trigger_type	0000000F
MEP_destination	00000000
BXID	00000708
TFC Data Read	4162550971

Data Status:

Link	IN	OUT
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	4162845132	10000000
7	4162839844	10000000
8	4162835062	10000000
9	4162830231	10000000
10	4162825495	10000000
11	4162820769	10000000
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	4162656667	10000000

# TROUBLESHOOTING

- The values on the panels are not updating
  - Check if the Gbt Server is running (LED on Top panel)
  - Restart the Ctrl Managers (to restart the monitoring of the registers)
- The “Test system” comes back red
  - Try again (sometimes it takes a little while for the system to become stable)
  - Restart the Gbt Server, wait a couple of seconds and restart the ctrl managers
  - Sometimes, the firmwares are not ok and the control system becomes confused
    - Try to read some register from the terminal ('pcie40\_ecs -b 0 -a 0x700004 -r')
    - Try a known good firmware to check if the control system reacts appropriately.
- Lots of “Unknown Service ID” errors on the log viewer
  - Probably the Gbt Server was just started
  - The Ctrl Managers issued a start monitoring to registers that the Gbt Server still doesn't know
  - Wait a bit and try restart Ctrl managers again
- Check the log viewer often
  - Some times, errors happen which have not visible on the panels, but the log message can provide useful information
- We are always glad to check things out as sometimes things happen that we haven't seen before
  - The possibility to connect remotely to your system is really helpful
  - A vidyo connection can be setup so we can debug together