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# ITk - DAQ

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@CERN

A. Palazzo ***ITk Pixel and Strips SR1 DCS meeting*** Friday 20 May 2022, “Update on DCS-DAQ communication”

<https://indico.cern.ch/event/1160515/contributions/4884423/attachments/2447974/4194837/>

[DAQtoDCScommunication May20.pdf](#)

<https://indico.cern.ch/event/1160515/>

In the lab: flx03

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# OBIETTIVI

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- **Flx03**
- Goal:
  - Riprodurre B161 / SR1 setups
  - Alessandra integrata nel gruppo SR1 con un ruolo definito (anche se da sviluppare anche nei requirements, obiettivi, ecc) su comunicazione DAQ / DCS; accede/conosce i setup delle macchine su cui gira il DAQ dei pixel
  - dalla mini-ITk week della settimana scorsa, il sw di readout del DAQ a la Carlos (basato su TDAQ) e' ~in funzione in SR1 piu' o meno tanto quanto il sw Yarr con felix
  - Rinnovare le installazioni del sw su flx03 per metterci nelle stesse condizioni di B161 (e/o SR1) con i sw di readout di Carlos e/o Yarr cercando di fare qualche scan della SCC

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# PREMESSA

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# FLX03 SO FAR

- **Rifacciamo il punto di cosa e come bisogna installare su flx03 per riprodurre il setup di B161 e SR1**
  - Sono entrambi setup apparentemente in cui si possono runnare scan ...

- itkpix@flx03.le.infn.it

- Il filesystem:

- Afs / no nfs
    - Sotto home 96G liberi

- Installazioni attuali:

- Sotto /home/atlas

- tdaq/[tdaq-09-02-01](#) - nota che sotto /home/ c'e' il tar dell'installazione atlas-tdaq-921.tar.gz
      - tdaq-common/[tdaq-common-04-02-01](#)
      - [sw/lcg/](#)

Inoltre c'e' una /home/atlas-910 che si riferisce a una installazione di tdaq-09-01-00; buttare ?  
13 G potenzialmente da liberare

- Sotto /home/itkpix

- itk-felix-sw (da <https://gitlab.cern.ch/itk-felix-sw/itk-felix-sw>) non sappiamo quale versione c'era originariamente, ma ora e' aggiornata (per errore) alla master
        - Nota la versione master richiede tdaq-09-04-00, non disponibile su flx03; setup.sh patched per chiedere [tdaq-09-02-01](#)

```
[itkpix@flx03 ~]$ df -m
Filesystem                1M-blocks    Used Available Use% Mounted on
devtmpfs                   15933         0     15933   0% /dev
tmpfs                      15949         1     15949   1% /dev/shm
tmpfs                      15949        91     15859   1% /run
tmpfs                      15949         0     15949   0% /sys/fs/cgroup
/dev/mapper/cc_pc--itk--pix--flx--03-root 51175 19040     32136  38% /
/dev/sda1                   1014         187         828  19% /boot
/dev/mapper/cc_pc--itk--pix--flx--03-home 160562 63907     96655  40% /home
AFS                        2097152         0    2097152   0% /afs
tmpfs                       3190         1       3190   1% /run/user/1000
```

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# FLX03 SO FAR

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- [itkpix@flx03.le.infn.it](mailto:itkpix@flx03.le.infn.it)
  - Installazioni attuali:
    - Sotto /home/itkpix/itk-felix-sw
      - **RD53Emulator** (da <https://gitlab.cern.ch/itk-felix-sw/RD53Emulator>)
      - **Itk-monitor** da <https://gitlab.cern.ch/itk-felix-sw/itk-monitor>
        - Sw di Alessandra per istanziare un ISdictionary legato a una partizione IPC (inter-process communication)
      - **Itk-monitor-opc-server** (da <ssh://git@gitlab.cern.ch:7999/itk-felix-sw/itk-monitor-opc-server.git> .... Not found by browsing <https://gitlab.cern.ch/itk-felix-sw>) - da Alessandra & co
      - **ipc/ipc\_root.ref un unico file ...**

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# FROM DEC 2021 GENOVA DAQ/DCS WORKSHOP

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## Jira Firmware and software updates for YARR/pixel users

- From P.Morettini (dic 2021 <https://indico.cern.ch/event/1097890/>)
  - Ambiente di compilazione (comune a DAQ e DCS): include tdaq e lcg
    - Le versioni proposte sono diverse da quelle su flx03, ma l'ambiente e' identico (non basato su cvmfs)
  - Installazione software FELIX
    - `git clone ssh://git@gitlab.cern.ch:7999/atlas-tdaq-felix/software`
  - Installazione firmware FELIX
  - Installazione sw Yarr
  - Istruzioni suggerite:
    - <https://cds.cern.ch/record/2690124/files/ATL-COM-DAQ-2019-160.pdf> (Argonne, M. Trovato & co)
    - <https://ade-pixel-group.web.cern.ch/Felix/rd53a-tests.php> (SR1, Carlos & co)
- Felix releases:
  - <https://atlas-project-felix.web.cern.ch/atlas-project-felix/user/releases.html>

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# STATUS

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# ITKPIX@FLX03

- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - ***/home/itkpix/atlas-tdaq-felix***
    - ***software*** =====>>> ***Felix sw***
    - ***YARR*** =====>>> ***YARR daq applications***
    - ***itk-felix-sw*** =====>>> ***Carlos & co daq applications***
    - ***felix-driver*** =====>>> ***collecting driver for FLX-712***
    - ***downloadedFirmware*** =====>>> ***collecting fw for FLX-712***

- Driver seems to be installed correctly, 2 PCI interfaces seen
- FW loaded, and recognised
- Felix card started; minimal diagnostic tools (flx-info) shows coherent fw and PCI cards
- Elink configuration done (no diagnostics, but no complains) following instructions

## NEXT steps:

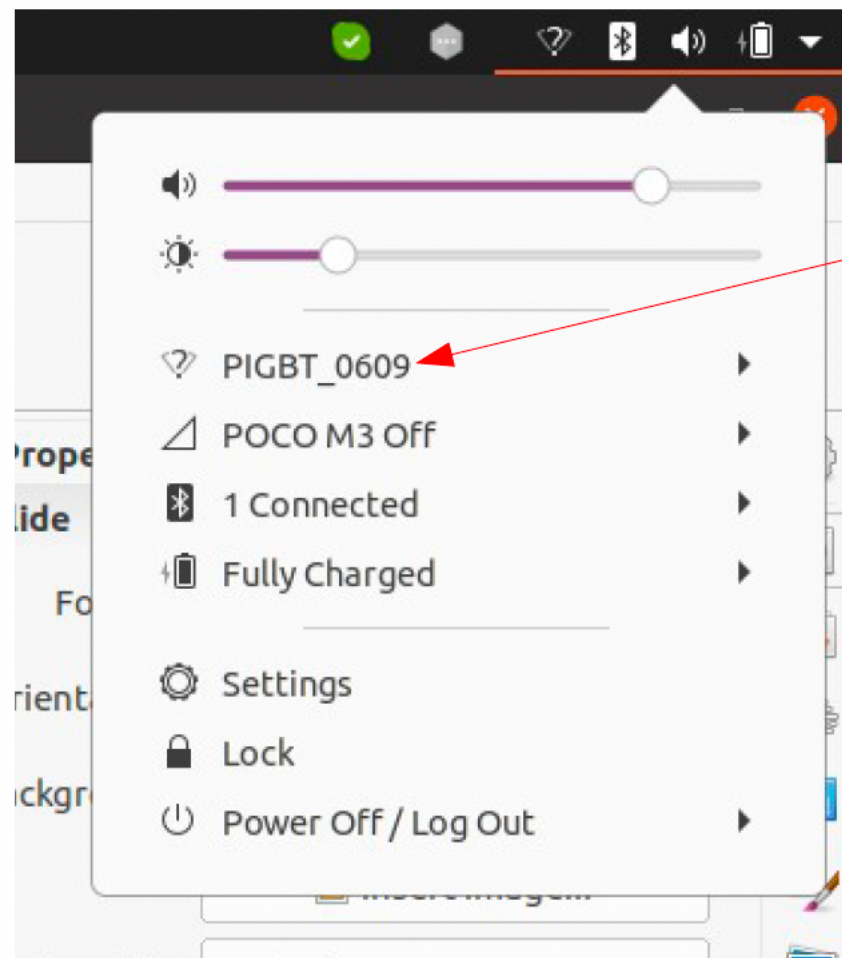
- configure IpGBT
- RD53a Voltage trimming
- Start Felix core
- Try scans

# FELIX READOUT

For this week

- *Next: configure IpGBT*

Programming the VLDB+ with PiGBT



Connect to the PiGBT WiFi

Any other way ???

Instruction on how to configure  
VLBD+ available (EJS + AP)

- Voltage trimming / start felix-core / run scans

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EXTRA

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# ITKPIX@FLX03

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- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - */home/itkpix/atlas-tdaq-felix*
    - ***felix-driver*** **====>>> collecting driver for FLX-712**
      - *tdaq\_sw\_for\_Flx-4.9.0-2dkms.noarch.rpm*
      - Latest available version as recommended in [https://ade-pixel-group.web.cern.ch/Felix/rd53a-tests.php#check\\_felix](https://ade-pixel-group.web.cern.ch/Felix/rd53a-tests.php#check_felix)
        - Uninstalled previous one (4.5.0), installed, started

# ITKPIX@FLX03

- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - **/home/itkpix/atlas-tdaq-felix**
    - ***felix-driver*** **====>>> collecting driver for FLX-712**
      - *tdaq\_sw\_for\_Flx-4.9.0-2dkms.noarch.rpm*
      - Latest available version as recommended in [https://ade-pixel-group.web.cern.ch/Felix/rd53a-tests.php#check\\_felix](https://ade-pixel-group.web.cern.ch/Felix/rd53a-tests.php#check_felix)
      - Uninstalled previous one (4.5.0), installed, started

```
(python_env) [itkpix@flx03 software]$ rpm -qa | grep tdaq
tdaq_sw_for_Flx-4.9.0-2dkms.noarch
```

Driver in use

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# ITKPIX@FLX03

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- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - */home/itkpix/atlas-tdaq-felix*
    - **downloadedFirmware =====>>> collecting fw for FLX-712**
      - *FLX712\_PIXEL\_4CH\_CLKSELECT\_GIT\_phase2-master\_FLX-1825\_LpGBTAlignment\_rm-5.0\_2227\_220314\_07\_38.tar.gz*
      - *From the link to a CERNBOX repository on <https://its.cern.ch/jira/browse/FLXUSERS-433>*
      - *Following Ismet suggestions on May 25th, 2022*
      - *Also instructions to use Yarr with this fw and Felix sw on <https://cds.cern.ch/record/2690124/files/ATL-COM-DAQ-2019-160.pdf>*
    - *Loaded with Vivado, disabling the use of debug file*
      - *Vivado (in /home/Xilinx/) is 2017.1 reading debug file in xml format*
      - *Currently (and also for 220314 fw) debug files in json format*
        - **Need Vivado >= 2018.3 =====>>> planning to update to this version**

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# ITKPIX@FLX03

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- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - */home/itkpix/atlas-tdaq-felix*
  - **YARR** =====>>> **YARR daq applications**
    - Branch **devel\_rd53a\_felixNetio\_multichip\_rebase** as recommended in <https://its.cern.ch/jira/browse/FLXUSERS-433>
      - P.Morettini recommendation was devel\_rd53a\_felixNetio\_multichip\_develbase
      - **NOTE:** *currently installed version does not have locaDB, we may need to move to another version; options are:*
        - devel\_rd53a\_felixNetio\_multichip\_develbase
        - **devel\_rd53a\_felixNetio\_multichip\_rebase\_master**
    - No compilation errors other than
      - *uint8\_i was not defined (in LCBUtils.h) sorted out with #include <stdint.h> in LCBUtils.h*

# ITKPIX@FLX03

- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - */home/itkpix/atlas-tdaq-felix*

- *itk-felix-sw* =====>>> *Carlos & co daq applications*

- *+itk-monitor*

A.Palazzo IS

- *+itk-monitor-opc-server*

- *+RD53Emulator*

- Git clone from master +

- In the setup.sh file

```
#TDAQPATHS=(/home/atlas /cvmfs/atlas.cern.ch/repo/sw/tdaq)
TDAQPATHS=(/cvmfs/atlas.cern.ch/repo/sw/tdaq)
```

```
#LCGPATHS=(/home/atlas/sw/lcg/releases /cvmfs/sft.cern.ch/lcg/releases)
LCGPATHS=(/cvmfs/sft.cern.ch/lcg/releases)
```

This allows to use the cvmfs installations of tdaq tdaq-common and lcg otherwise present on this server but only for old versions

Chip emulator and scans on  
emulated data work fine

IS service read/write works fine

**Checks by Alessandra**

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# ITKPIX@FLX03

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- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - */home/itkpix/atlas-tdaq-felix*
    - **software** =====>>> **Felix sw**

Downloaded from gitlab master branch May 25th 2022  
(export REGMAP\_VERSION=0x0500,  
**NOTE: export REGMAP\_VERSION=0x0500 added to setup.sh** )  
Built following README instruction on gitlab,  
**but x86\_64-centos7-gcc11-opt**  
instead of x86\_64-centos7-gcc8-opt (bug in README)

# ITKPIX@FLX03

- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - */home/itkpix/atlas-tdaq-felix*

- **software** =====>>> **Felix sw**

Downloaded from gitlab master branch May 25th 2022

(export REGMAP\_VERSION=0x0500,

**NOTE: export REGMAP\_VERSION=0x0500 added to setup.sh )**

Built following README instruction on gitlab,

**but x86\_64-centos7-gcc11-opt**

instead of x86\_64-centos7-gcc8-opt (bug in README)

```
[itkpix@flx03 software]$ source setup.sh
```

Setting up FELIX (developer)

Setting up FELIX (developer)

- REGMAP: 0x0500

- BINARY\_TAG: x86\_64-centos7-gcc11-opt

- LCG\_FULL\_VERSION: 101

- PYTHON: /cvmfs/sft.cern.ch/lcg/releases/LCG\_101/Python/3.9.6/  
x86\_64-centos7-gcc11-opt/bin/python

# FELIX BOARD

- After installing Felix sw
  - **INIT card**
    - source /home/itkpix/atlas-tdaq-felix/software/setup.sh
    - flx-init -c **X**
      - **OK ??**
      - **In ATL-COM-DAQ-2019-160**
    - flx-init to be run only once,
    - Otherways reboot needed
  - **X** = card number, **0** in our setup

```
(python_env) [itkpix@flx03 software]$ flx-init -c X
2022-05-27 15:56:47 Opening card 0 (dev 0)...
2022-05-27 15:56:47 Card type: FLX-712
2022-05-27 15:56:47 Firmware : PIXEL
2022-05-27 15:56:47 Clock : Local
2022-05-27 15:56:47 FLX soft reset
2022-05-27 15:56:47 Configuring Si5345...
2022-05-27 15:56:47 Si5345 hard reset
2022-05-27 15:56:51 Si5345 configured (525 registers)
2022-05-27 15:56:51 Enabling Si5345 output
2022-05-27 15:56:52 Si5345: LOS register = 0x66
2022-05-27 15:56:52 Si5345: Sticky LOS register = 0xFF
2022-05-27 15:56:52 Si5345: LOL register = 0x0C
2022-05-27 15:56:52 Si5345: Found lock within 1 secs
2022-05-27 15:56:52 Si5345: Sticky LOL register = 0x0C
2022-05-27 15:56:52 Links soft reset
2022-05-27 15:56:52 Setting up links...
2022-05-27 15:56:58 Links set up
2022-05-27 15:56:58 WARNING: 4 channels not aligned
2022-05-27 15:56:58 Resetting MiniPODs...
2022-05-27 15:56:58 NOTE: MINIPOD-TX3 not installed
2022-05-27 15:56:58 NOTE: MINIPOD-TX4 not installed
2022-05-27 15:56:58 NOTE: MINIPOD-RX3 not installed
2022-05-27 15:56:58 NOTE: MINIPOD-RX4 not installed
2022-05-27 15:56:58 MiniPOD resets done
```

# ITKPIX@FLX03

- /cvmfs/ installed => tdaq and lcg available from there (any required version)
- Created a new directory to install everything consistently from scratch
  - */home/itkpix/atlas-tdaq-felix*

- **software** =====>>> **Felix sw**

```
[Itkpix@flx03 software]$ flx-info  
Or  
[Itkpix@flx03 software]$ flx-info -c 0
```

Instead

```
[Itkpix@flx03 software]$ flx-info -c 1  
#### -c: card number out-of-range
```

## General information

```
-----  
Card type      : FLX-712  
Firmware type  : PIXEL  
Reg Map version : 5.0  
FW version date : 22/03/14 07:38  
GIT tag        : rm-5.0  
GIT commit number : 2227  
GIT hash       : 0x000000008be372f9  
Active F/W partition : 3  
Number of interrupts : 8  
Number of descriptors : 3  
Number of channels  : 2  
Number of endpoints : 2  
GBT Wrapper generated : YES  
MAIN clock source   : LCLK fixed  
Internal PLL Lock   : YES
```

## Output of lspci:

```
-----  
07:00.0 Communication controller: CERN/ECP/EDU Device 0428  
08:00.0 Communication controller: CERN/ECP/EDU Device 0427
```

## TTC (ADN2814) status

```
-----  
Bit D5=1: No light arriving. Check fiber connection to FLX card  
(Raw value of ADN2814 MISR register: 0x29)
```

good

good

good  
Driver  
OK

# FELIX BOARD

- **Configure the FELIX elinks**

- Elinkconfig (GUI from Felix-sw) does not support IpGBT
- M.Trovato: use config\_encoding\_decoding.sh (his cernbox, see ATL-COM-DAQ-2019-160)
  - Copied in [/home/itkpix/atlas-tdaq-felix/software/flx-firmware-tester/config\\_encoding\\_decoding.sh](/home/itkpix/atlas-tdaq-felix/software/flx-firmware-tester/config_encoding_decoding.sh)
  - Run with
    - source flx-firmware-tester/config\_encoding\_decoding.sh 0
      - => card 0
      - => inside: loop over 

```
LINK_MIN=0
LINK_MAX=1 # total channels / 2 - 1 (using 4CH fw => 4/2-1)
DEC_EGROUP_MIN=0
DEC_EGROUP_MAX=6
ENC_EGROUP_MIN=0
ENC_EGROUP_MAX=4
```
      - Set registers
      - **OK, no errors/warnings but also no diagnostics**

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# CVMFS INSTALLATION

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From A. Forte

- `yum install https://ecsft.cern.ch/dist/cvmfs/cvmfs-release/cvmfs-release-latest.noarch.rpm`
- `yum install cvmfs cvmfs-auto-setup cvmfs-init-scripts -y`
- `cvmfs_config chksetup`
- `cvmfs_config setup`
  
- `cat > /etc/cvmfs/default.local<<EOF`
- `CVMFS_REPOSITORIES=atlas.cern.ch,atlas-condb.cern.ch,atlas-nightlies.cern.ch`
- `CVMFS_CACHE_BASE=/data/cache/cvmfs2`
- `CVMFS_QUOTA_LIMIT=50000`
- `CVMFS_HTTP_PROXY="http://squid.le.infn.it:3128;DIRECT"`
- `CMS_LOCAL_SITE=T1_IT_CNAF`
- `EOF`
  
- `echo "/cvmfs /etc/auto.cvmfs" >> /etc/auto.master`
- `systemctl restart autofs`
  
- `cd /cvmfs/atlas.cern.ch`