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CarloTest

Introduction

This page describes the debugging procedures for FELIX systems. The first part of the twiki focuses on the **hardware** and is relevant for the on-call **readout expert**, the second is dedicated to the **software** and is relevant for on-call **DAQ/HLT experts**.

⚠ **Note on logging:** whenever an intervention is made on a system at P1 a dedicated elog⧉ entry should be made describing what was done and why, plus the expected impact on the system.

⚠ **Note of jargon, cards and devices:** one physical FELIX **card** is seen as two PCI **devices** by the computer. In many tools the card is selected via option `-c`, the device with `-d`. The enumeration starts at 0: card 0 includes devices 0 and 1. Card 1 corresponds to devices 2 and 3. Each device serves the e-links corresponding to one MTP connector (i.e. 12 GBT links per device on 24-channel cards). The TTC connector and BUSY are one per card.

Hardware

Diagnostic tools

Card identification, physical location

Some FELIX PCs are equipped with two cards. Card #0 is installed in the bottom slot of the FELIX PC, card #1 on the top slot. T

The location of the FELIX PCs is reported in the Table at the end of the page.

Optical power on GBT links

Each FELIX card is equipped with four optical transceivers called MiniPOD s. Two minipods emit light (TX), two receive light (RX). The emitted and received optical power can be visulised with the command

```
flx-info -c <card number>
```

The output is pasted below. The power is reported in the second table.

Observation	Conclusion	Action
RX power of a channel is 0	No light coming from the corresponding fibre.	Cross-check with the sub-detector expert that light is expected. If yes, swap two MTP cables and check if the dark channel correlates with the cable or the connector on the card. If the problem is on the FLX card, replace the FELIX PC.
RX power close to or below 100 uW	Too little light for safe data transmission	Swap two MTP cables and check if the dark channel correlates with the cable or the connector on the card.
TX power significantly below 800 uW	Laser (MiniPOD) ageing	Replace PC at next occasion without beam
RX light received but link status (first table) not #(#)	Link not aligned.	Run "flx-init -c <card number>" once more. Cross-check with detector expert that the front-end is in a good state. If the problem persists exchange the PC.

TTC fibre diagnostic

The status of the TTC optical connection can be checked with

```
flx-info -c <card number>
```

The output contains a section called "TTC (ADN2814) status" reporting one of the messages listed below

Message	Action
The TTC optical connection is up and working	Nothing to do.
No light arriving. Check the fibre connection to the FLX-712	Swap the TTC fibre with a fibre from a neighbouring FLX-712 reporting no issues.. If no light is detected replace the FELIX PC.
Light is arriving but the FLX-712 may have an internal problem	1. Swap the TTC fibre with a fibre from a neighbouring FLX-712 2. Log on to the neighbouring FELIX (from where you have taken the fibre) and and run "flx-info -c [X] ADN2814" 3. If on that FELIX you get "The TTC optical connection is up and working" you can conclude that the FLX-712 in the first FELIX has a problem. Replace the entire FELIX PC. 4. If you get the same error in the other FELIX as well, the problem is upstream in the TTC system. You cannot fix this.

BUSY LEMO diagnostic

The BUSY state can be manually switched. To verify the correct functionality

1. assert BUSY with

```
fttcbusy -d <device number> -m 1 -i 0
```

2. measure the output of the LEMO connector with a voltmeter. The output must be 0V (BUSY on = logical zero)

3. de-assert busy with

```
fttcbusy -d <device number> -m 1 -i 0
```

4. use the voltmeter to check that you have a logical 1 (between 3.3 and 5 V)

If you do not get the expected logic levels something is wrong with the FLX-712. Replace the entire PC by a spare.

Issues and solutions

flx-init reports "Lock not found" (failed recovery of TTC clock)

The output of flx-init produces the

```
Card type: FLX-712
Configuring Si5345...
Si5345 hard reset
Si5345 configuration done
```

```
Enabling Si5345 output
Si5345: LOS register = 0x20
Si5345: Sticky LOS register = 0xf0
Si5345: LOL register = 0x02
Si5345: LOL register = 0x02
Si5345: LOL register = 0x02
Si5345: LOL register = 0x02
Si5345: LOL register = 0x02
Si5345 ERROR: Lock not found in 5 secs
Si5345: Sticky LOL register = 0x06
```

Follow the instructions of section "TTC fibre diagnostic"

FELIX card not detected

If a FELIX card disappears from the system query the driver with

```
cat /proc/flx
```

and look for errors such as

Error message	Action	
ERROR: 1 card(s) were ignored because of a problem with the power status	Reboot the PC. If the problem persists note down the output of =lspci	grep CERN= and replace the PC

Monitoring via IS, ERS

Software

Diagnostic for the commissioning phase

List of FELIX nodes

The table below reports the list of all the FELIX nodes in USA15. The acronym HCA stands for Host Channel Adapter and indicated the type of Mellanox network card installed.

hostname	location	installed	firmware	HCA	notes
NSW others					
pc-tdq-flx-nsw-spare-00	2-5-1 U37	YES	GBT	x1 25 GbE	
pc-tdq-flx-nsw-tp-a-00	2-5-1 U34	YES	GBT	x1 25 GbE	(was pc-tdq-flx-nsw-stgc-tp-00)
pc-tdq-flx-nsw-tp-c-00	2-5-1 U32	YES	GBT	x1 25 GbE	(was pc-tdq-flx-nsw-mm-tp-00)
pc-tdq-flx-nsw-spare-01	3-5-1 U42	YES	GBT	x1 25 GbE	
NSW mm					
pc-tdq-flx-nsw-mm-06 *to* 11	3-5-1 U29/40	NO	GBT	x1 25 GbE	
pc-tdq-flx-nsw-mm-00 *to* 05	2-5-1 U19/30	YES	GBT	x1 25 GbE	
NSW stgc					
pc-tdq-flx-nsw-stgc-08 *to* 15	4-5-1 U24/39	NO	GBT	x1 25 GbE	
pc-tdq-flx-nsw-stgc-00 *to* 07	4-5-1 U06/21	YES	GBT	x1 25 GbE	
BIS 7/8					
pc-tdq-flx-rpc-bis-00	5-5-1 U17	YES	GBT	x1 25 GbE	
LAr LDPB					
pc-tdq-flx-lar-ldpb-07 *to* 13	5-16-2 U26/39	YES	FULL	x1 100 GbE	
pc-tdq-flx-lar-ldpb-00 *to* 6	4-16-2 U26/39	YES	FULL	x1 100 GbE	
L1Calo					
pc-tdq-flx-l1c-trex-01	7-11-2 U24	YES	FULL	x1 100 GbE	
pc-tdq-flx-l1c-trex-00	7-11-2 U22	YES	FULL	x1 100 GbE	
pc-tdq-flx-l1c-gfex-00	7-11-2 U20	YES	FULL	x1 100 GbE	
pc-tdq-flx-l1c-jfex-00	7-11-2 U18	YES	FULL	x1 100 GbE	
pc-tdq-flx-l1c-efex-00	7-11-2 U16	YES	FULL	x1 100 GbE	
Tile					
pc-tdq-flx-til-00	5-5-1 U25	YES	FULL	x1 100 GbE	
Spares					
pc-tdq-flx-spare-00 *to* 01	5-5-1 U22/24	NO	-	-	

List of SW ROD nodes

hostname	location	HCA	notes
pc-tdq-swrod-rpc-bis-00	5-5-1 U37	x1 25 GbE, x1 40 GbE	
pc-tdq-swrod-til-00	5-5-1 U36	x1 100 GbE, x1 40 GbE	
pc-tdq-swrod-nsw-00 *to* 08	5-5-1 U27/35	x1 25 GbE, x1 40 GbE	
pc-tdq-swrod-lar-06 *to* 13	7-16-2 U23/30	x1 100 GbE, x1 40 GbE	
pc-tdq-swrod-lar-00 *to* 05	6-16-2 U27/32	x1 100 GbE, x1 40 GbE	
pc-tdq-swrod-l1c-00 *to* 05	7-11-2 U32/38	x1 100 GbE, x1 40 GbE	

Major updates:
-- MarkusJoos - 2020-05-25

%RESPONSIBLE% CarloAlbertoGottardo
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