

libcin

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Chapter 1

FastCCD Communication Library (libcin)

Introduction

This library, based in C is designed to control the FastCCD detector from Lawrence Berkeley National Laboratory. It controls both camera control functions and data acquisition (frame acquisition). It is separated into two distinct parts, the control part ,`cin_ctl`, and the data (image) part named `cin_data`. It was written in part for use with `areaDetector`.

Prerequisites

The library relies on the following:

- `libbsd` (Used for string manipulation)
- `libconfig` (Used for nice config files)
- `libpthread` (Used for threading)
- `librt` (Used for time functions)

Installation

Installation of the library is like most unix based source packages:

```
./make
./make doc
./make test
./make install
```

TCP/IP Stack Tuning

In order for the CIN data to operate efficiently, the 10G interface on the host computer needs to be tuned. This needs to be done by adding the following to the file `/etc/sysctl.conf`.

```
# Increase the maximum buffer that user programs can request
# 2147483647 = 2048 Mb
net.core.rmem_max=2147483647
net.core.wmem_max=2147483647
# Set a default value 10 times bigger
net.core.rmem_default=1000000
net.core.wmem_default=1000000
# increase the length of the processor input queue
net.core.netdev_max_backlog = 250000
# recommended for hosts with jumbo frames enabled
net.ipv4.tcp_mt看u_probing=1
```

These can be reread by the system without rebooting by entering the command:

```
$sudo sysctl --system
```

Versioning

For the versions available, see the [tags on this repository](#).

Authors

- **Stuart B. Wilkins** - [stuwilkins](#)

See also the list of [contributors](#) who participated in this project.

License

This project is licensed under the BSD License - see the [LICENSE](#) file for details

Acknowledgments

A huge thanks to Peter Dennes, John Joseph and the detector team at LBNL and the team at Sydor Instruments.

Chapter 2

Module Index

2.1 Modules

Here is a list of all modules:

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Cin Control Read/Rwrite Routines	11
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CIN Control Timing Routines	15
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Chapter 3

Class Index

3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

cin_ctl	21
cin_ctl_config	21
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cin_ctl_listener	22
cin_ctl_pwr_mon_t	22
cin_ctl_pwr_val	23
cin_data	23
cin_data_callbacks	23
cin_data_frame	24
cin_data_packet	24
cin_data_proc	24
cin_data_stats	25
cin_data_threads	25
cin_map_t	25
cin_port	26
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Chapter 4

File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

src/ cin.h	27
src/ cin_register_map.h	33
src/ cinregisters.h	??
src/ common.h	??
src/ config.h	??
src/ control.h	??
src/ data.h	??
src/ descramble.h	??
src/ descramble_map.h	??
src/ fclk_program.h	??
src/ fifo.h	??
src/ report.h	??

Chapter 5

Module Documentation

5.1 Cin Control Initialization Routines

Functions

- int [cin_ctl_init](#) ([cin_ctl_t](#) *cin, const char *ipaddr, const char *bind_addr, uint16_t oport, uint16_t iport, uint16_t soport, uint16_t siport)
- int [cin_ctl_destroy](#) ([cin_ctl_t](#) *cin)

5.1.1 Detailed Description

5.1.2 Function Documentation

5.1.2.1 [cin_ctl_destroy\(\)](#)

```
int cin_ctl_destroy (
    cin\_ctl\_t * cin )
```

Destroy (close) the cin control library

Close connections, free memory and exit library

Parameters

<i>cin</i>	handle to cin library
------------	-----------------------

Returns

Returns 0 on success non-zero if error

5.1.2.2 cin_ctl_init()

```
int cin_ctl_init (
    cin_ctl_t * cin,
    const char * ipaddr,
    const char * bind_addr,
    uint16_t oport,
    uint16_t iport,
    uint16_t soport,
    uint16_t siport )
```

Initialize the cin control library

Initialize the control structures and communications with the CIN via the control interface. This function opens the UDP ports and starts a listening thread to receive packets from the CIN.

Parameters

<i>cin</i>	handle to cin library
<i>ipaddr</i>	ip address of CIN base address
<i>bind_addr</i>	ip address to bind to
<i>oport</i>	output udp port of cin
<i>iport</i>	input udp port of cin
<i>soport</i>	stream output udp port of cin
<i>siport</i>	stream input udp port of cin

Returns

Returns 0 on success non-zero if error

5.2 Cin Control Read/Rwrite Routines

Functions

- int `cin_ctl_read` (`cin_ctl_t` *cin, uint16_t reg, uint16_t *val)
- int `cin_ctl_write` (`cin_ctl_t` *cin, uint16_t reg, uint16_t val, int wait)
- int `cin_ctl_stream_write` (`cin_ctl_t` *cin, unsigned char *val, int size)
- int `cin_ctl_write_with_readback` (`cin_ctl_t` *cin, uint16_t reg, uint16_t val)
- int `cin_ctl_pwr` (`cin_ctl_t` *cin, int pwr)
- int `cin_ctl_fp_pwr` (`cin_ctl_t` *cin, int pwr)
- int `cin_ctl_fo_test_pattern` (`cin_ctl_t` *cin, int on_off)

5.2.1 Detailed Description

5.2.2 Function Documentation

5.2.2.1 `cin_ctl_read()`

```
int cin_ctl_read (
    cin_ctl_t * cin,
    uint16_t reg,
    uint16_t * val )
```

Read register from CIN

Parameters

<i>cin</i>	handle to cin library
<i>reg</i>	register to read
<i>val</i>	variable to read value of register to

Returns

Returns 0 on success non-zero if error

5.2.2.2 `cin_ctl_stream_write()`

```
int cin_ctl_stream_write (
    cin_ctl_t * cin,
    unsigned char * val,
    int size )
```

Write stream data to CIN

Parameters

<i>cin</i>	handle to cin library
<i>val</i>	array of values to write
<i>size</i>	size of array pointed to by val

Write stream data to cin in form of 16 bit array.

Returns

Returns 0 on success non-zero if error

5.2.2.3 cin_ctl_write()

```
int cin_ctl_write (
    cin_ctl_t * cin,
    uint16_t reg,
    uint16_t val,
    int wait )
```

Write register to CIN

Parameters

<i>cin</i>	handle to cin library
<i>reg</i>	register to write to
<i>val</i>	value to write to register
<i>wait</i>	if non-zero

Write register value to CIN. If wait is non-zero then wait a sleep time of i CIN_CTL_WRITE_SLEEP before releasing the mutex to add flow control to the cin.

Returns

Returns 0 on success non-zero if error

5.2.2.4 cin_ctl_write_with_readback()

```
int cin_ctl_write_with_readback (
    cin_ctl_t * cin,
    uint16_t reg,
    uint16_t val )
```

Write register to CIN with readback verification

Parameters

<i>cin</i>	handle to cin library
<i>reg</i>	register to write to
<i>val</i>	value to write to register

Write register value to CIN. Follow write with read of register and compare value. CIN_CTL_WRITE_SLEEP before releasing the mutex to add flow control to the cin.

Returns

Returns 0 on success non-zero if error

5.3 CIN Control Bias Routines

Functions

- int **cin_ctl_set_bias** ([cin_ctl_t](#) *cin, int val)
- int **cin_ctl_get_bias** ([cin_ctl_t](#) *cin, int *val)
- int **cin_ctl_set_bias_regs** ([cin_ctl_t](#) *cin, uint16_t *vals, int verify)
- int **cin_ctl_get_bias_regs** ([cin_ctl_t](#) *cin, uint16_t *vals)
- int **cin_ctl_set_bias_voltages** ([cin_ctl_t](#) *cin, float *voltage, int verify)
- int **cin_ctl_get_bias_voltages** ([cin_ctl_t](#) *cin, float *voltage)

5.3.1 Detailed Description

Initialization group

5.4 CIN Control Timing Routines

Functions

- int **cin_ctl_set_timing_regs** ([cin_ctl_t](#) *cin, uint16_t *vals, int vals_len)

5.4.1 Detailed Description

Timing setup group

5.5 CIN Data Initialization Routines

Functions

- int [cin_data_init](#) ([cin_data_t](#) *cin, int packet_buffer_len, int frame_buffer_len, char *ipaddr, uint16_t port, char *cin_ipaddr, uint16_t [cin_port](#), int rcvbuf, cin_data_callback push_callback, cin_data_callback pop_callback, void *usr_ptr)
- void [cin_data_stop_threads](#) ([cin_data_t](#) *cin)

5.5.1 Detailed Description

Initialization group

5.5.2 Function Documentation

5.5.2.1 cin_data_init()

```
int cin_data_init (
    cin\_data\_t * cin,
    int packet_buffer_len,
    int frame_buffer_len,
    char * ipaddr,
    uint16_t port,
    char * cin_ipaddr,
    uint16_t cin_port,
    int rcvbuf,
    cin_data_callback push_callback,
    cin_data_callback pop_callback,
    void * usr_ptr )
```

Initialize the cin data library

Initialize the data handling routines and start the threads for listening.

Parameters

<i>cin</i>	Handle to cin data library
<i>packet_buffer_len</i>	Length of packet buffer fifo (in units number of packets)
<i>frame_buffer_len</i>	Length of frame (assembler) buffer fifo (in units of number of frames)
<i>ipaddr</i>	IP-Address to bind to (if NULL binds to 0.0.0.0)
<i>port</i>	UDP Port of host
<i>cin_ipaddr</i>	IP-Address of cin (if NULL defaults to standard)
cin_port	UDP Port of CIN
<i>rcvbuf</i>	TCP/IP Kernel receive buffer size
<i>push_callback</i>	This function is called when a data structure is needed
<i>pop_callback</i>	This function is called when an image has been processed
<i>usr_ptr</i>	Pointer passed to callback functions

5.5.2.2 cin_data_stop_threads()

```
void cin_data_stop_threads (
    cin_data_t * cin )
```

Stop all threads and wait

Stop all the processing threads and join them to the main thread. This function blocks until all threads have joined the main thread (program). This should be called to clean up the library before the program is exited

Parameters

<i>cin</i>	Handle to cin data library
------------	----------------------------

5.6 CIN Data Framestore Functions

Functions

- void `cin_data_framestore_trigger` (`cin_data_t` *cin, int count)
- void `cin_data_framestore_skip` (`cin_data_t` *cin, int count)
- int `cin_data_get_framestore_counter` (`cin_data_t` *cin)
- void `cin_data_framestore_disable` (`cin_data_t` *cin)
- void `cin_data_framestore_trigger_enable` (`cin_data_t` *cin)

5.6.1 Detailed Description

Framestore Group

5.6.2 Function Documentation

5.6.2.1 `cin_data_framestore_disable()`

```
void cin_data_framestore_disable (
    cin_data_t * cin )
```

Disable the framestore modes

This function disables the framestore modes (software trigger and skip). If the camera is hardware triggering then the images will start to be processed.

Parameters

<i>cin</i>	Handle to the cin library
------------	---------------------------

5.6.2.2 `cin_data_framestore_skip()`

```
void cin_data_framestore_skip (
    cin_data_t * cin,
    int count )
```

Enable framestore skip mode

Enable the framestore skip mode. This function should be called before hardware triggering the camera. This causes the data processing to skip

Parameters

<i>count</i>	frames from the first images to be read. This is usually done to stop the first few frames from being over exposed.
<i>cin</i>	handle to the cin_data library

5.6.2.3 `cin_data_framestore_trigger()`

```
void cin_data_framestore_trigger (
    cin_data_t * cin,
    int count )
```

Send a framestore (software) trigger

Send a software trigger to the CIN by timestamping the request time and allow images to be processed when recieved after this time. The count option sets the number of frames to trigger. A value of -1 indicated that the trigger should not count images but run indefinitely after the trigger has occurred.

Parameters

<i>cin</i>	handle to the cin_data library
<i>count</i>	number of frames to trigger

5.6.2.4 `cin_data_framestore_trigger_enable()`

```
void cin_data_framestore_trigger_enable (
    cin_data_t * cin )
```

Enable the framestore trigger mode

This function enables the framestore trigger mode. It cases the images to not be processed pending a call to the function to (software) trigger the camera.

Parameters

<i>cin</i>	Handle to the cin library
------------	---------------------------

5.6.2.5 `cin_data_get_framestore_counter()`

```
int cin_data_get_framestore_counter (
    cin_data_t * cin )
```

Get the value of the framestore counter

Return the number of frames in the framestore counter. In trigger mode, this returns the number of frames to go. In skip mode, this returns the number of frames that have to be skipped.

Parameters

<i>cin</i>	handle to the cin_data library
------------	--

Returns

Number of frames to go in trigger

Chapter 6

Class Documentation

6.1 cin_ctl Struct Reference

Public Attributes

- [cin_port_t](#) **ctl_port**
- [cin_port_t](#) **stream_port**
- [cin_ctl_config_t](#) **config**
- [cin_ctl_listener_t](#) * **listener**
- [pthread_mutex_t](#) **access**
- [pthread_mutexattr_t](#) **access_attr**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.2 cin_ctl_config Struct Reference

Public Attributes

- char **name** [CIN_CONFIG_MAX_STRING]
- char **firmware_filename** [CIN_CONFIG_MAX_STRING]
- int **overscan**
- int **columns**
- int **fclk**
- [uint16_t](#) **timing** [CIN_CONFIG_MAX_DATA][2]
- int **timing_len**
- [uint16_t](#) **fcric** [CIN_CONFIG_MAX_DATA][2]
- int **fcric_len**
- [uint16_t](#) **bias** [CIN_CONFIG_MAX_DATA][2]
- int **bias_len**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.3 cin_ctl_id Struct Reference

Public Attributes

- uint16_t **board_id**
- uint16_t **serial_no**
- uint16_t **fpga_ver**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.4 cin_ctl_listener Struct Reference

Public Attributes

- struct [cin_port](#) * **cp**
- [fifo](#) **ctl_fifo**
- pthread_t **thread_id**
- pthread_barrier_t **barrier**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.5 cin_ctl_pwr_mon_t Struct Reference

Public Attributes

- [cin_ctl_pwr_val_t](#) **bus_12v0**
- [cin_ctl_pwr_val_t](#) **mgmt_3v3**
- [cin_ctl_pwr_val_t](#) **mgmt_2v5**
- [cin_ctl_pwr_val_t](#) **mgmt_1v2**
- [cin_ctl_pwr_val_t](#) **enet_1v0**
- [cin_ctl_pwr_val_t](#) **s3e_3v3**
- [cin_ctl_pwr_val_t](#) **gen_3v3**
- [cin_ctl_pwr_val_t](#) **gen_2v5**
- [cin_ctl_pwr_val_t](#) **v6_0v9**
- [cin_ctl_pwr_val_t](#) **v6_1v0**
- [cin_ctl_pwr_val_t](#) **v6_2v5**
- [cin_ctl_pwr_val_t](#) **fp**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.6 cin_ctl_pwr_val Struct Reference

Public Attributes

- double **i**
- double **v**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.7 cin_data Struct Reference

Public Attributes

- [fifo](#) * **packet_fifo**
- [fifo](#) * **frame_fifo**
- [fifo](#) * **image_fifo**
- [cin_data_threads_t](#) **listen_thread**
- [cin_data_threads_t](#) **assembler_thread**
- [cin_data_threads_t](#) **descramble_thread**
- [pthread_mutex_t](#) **listen_mutex**
- [pthread_mutex_t](#) **assembler_mutex**
- [pthread_mutex_t](#) **descramble_mutex**
- [pthread_mutex_t](#) **stats_mutex**
- [pthread_mutex_t](#) **framestore_mutex**
- [cin_data_callbacks_t](#) **callbacks**
- [cin_port_t](#) **dp**
- struct timespec **framerate**
- unsigned long int **dropped_packets**
- unsigned long int **malformed_packets**
- [uint16_t](#) **last_frame**
- [descramble_map_t](#) **map**
- int **framestore_mode**
- struct timespec **framestore_trigger**
- int **framestore_counter**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.8 cin_data_callbacks Struct Reference

Public Attributes

- void *(* **push**)([cin_data_frame_t](#) *)
- void *(* **pop**)([cin_data_frame_t](#) *)
- [cin_data_frame_t](#) * **frame**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.9 cin_data_frame Struct Reference

Public Attributes

- uint16_t * **data**
- uint16_t **number**
- struct timespec **timestamp**
- int **size_x**
- int **size_y**
- void * **usr_ptr**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.10 cin_data_packet Struct Reference

Public Attributes

- unsigned char * **data**
- int **size**
- struct timespec **timestamp**

The documentation for this struct was generated from the following file:

- [src/data.h](#)

6.11 cin_data_proc Struct Reference

Public Attributes

- void *(* **input_get**)(void *, int)
- void *(* **input_put**)(void *, int)
- void * **input_args**
- int **reader**
- void *(* **output_put**)(void *)
- void *(* **output_get**)(void *)
- void * **output_args**
- [cin_data_t](#) * **parent**

The documentation for this struct was generated from the following file:

- [src/data.h](#)

6.12 cin_data_stats Struct Reference

Public Attributes

- int **last_frame**
- double **framerate**
- double **datarate**
- double **packet_percent_full**
- double **frame_percent_full**
- double **image_percent_full**
- long int **packet_overruns**
- long int **frame_overruns**
- long int **image_overruns**
- long int **packet_used**
- long int **frame_used**
- long int **image_used**
- long int **dropped_packets**
- long int **malformed_packets**

The documentation for this struct was generated from the following file:

- src/[cin.h](#)

6.13 cin_data_threads Struct Reference

Public Attributes

- pthread_t **thread_id**
- int **started**

The documentation for this struct was generated from the following file:

- src/[cin.h](#)

6.14 cin_map_t Struct Reference

Public Attributes

- char * **name**
- uint16_t **reg**

The documentation for this struct was generated from the following file:

- src/cinregisters.h

6.15 cin_port Struct Reference

Public Attributes

- char * **srvaddr**
- char * **cliaddr**
- uint16_t **srvport**
- uint16_t **cliport**
- int **sockfd**
- struct timeval **tv**
- struct sockaddr_in **sin_srv**
- struct sockaddr_in **sin_cli**
- socklen_t **slen**
- int **rcvbuf**
- int **rcvbuf_rb**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.16 descramble_map_t Struct Reference

Public Attributes

- uint32_t * **map**
- int **size_x**
- int **size_y**
- int **overscan**
- int **rows**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

6.17 fifo Struct Reference

Public Attributes

- void * **data**
- void * **head**
- void * **tail** [FIFO_MAX_READERS]
- void * **end**
- int **readers**
- long int **size**
- int **elem_size**
- int **full**
- long int **overruns**
- pthread_mutex_t **mutex**
- pthread_cond_t **signal**

The documentation for this struct was generated from the following file:

- [src/cin.h](#)

Chapter 7

File Documentation

7.1 src/cin.h File Reference

```
#include <stdint.h>
#include <stdio.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <netinet/ip.h>
#include <sys/time.h>
#include <pthread.h>
```

Classes

- struct [cin_ctl_config](#)
- struct [fifo](#)
- struct [cin_ctl_listener](#)
- struct [cin_port](#)
- struct [cin_ctl](#)
- struct [cin_data_frame](#)
- struct [cin_data_stats](#)
- struct [cin_data_threads](#)
- struct [cin_data_callbacks](#)
- struct [descramble_map_t](#)
- struct [cin_data](#)
- struct [cin_ctl_id](#)
- struct [cin_ctl_pwr_val](#)
- struct [cin_ctl_pwr_mon_t](#)

Macros

- #define **CIN_CTL_IP** "192.168.1.207"
- #define **CIN_CTL_SVR_PORT** 49200
- #define **CIN_CTL_CLI_PORT** 50200
- #define **CIN_CTL_SVR_FRMW_PORT** 49202
- #define **CIN_CTL_CLI_FRMW_PORT** 50202

- #define **CIN_CTL_RCVBUF** 10
- #define **CIN_CTL_MAX_READ_TRIES** 10
- #define **CIN_CTL_MAX_WRITE_TRIES** 5
- #define **CIN_CTL_WRITE_SLEEP** 2000
- #define **CIN_CTL_STREAM_CHUNK** 256
- #define **CIN_CTL_POWER_ENABLE** 0x001F
- #define **CIN_CTL_POWER_DISABLE** 0x0000
- #define **CIN_CTL_FP_POWER_ENABLE** 0x0020
- #define **CIN_CTL_DCM_LOCKED** 0x0001
- #define **CIN_CTL_DCM_PSDONE** 0x0002
- #define **CIN_CTL_DCM_STATUS0** 0x0004
- #define **CIN_CTL_DCM_STATUS1** 0x0008
- #define **CIN_CTL_DCM_STATUS2** 0x0010
- #define **CIN_CTL_DCM_TX1_READY** 0x0020
- #define **CIN_CTL_DCM_TX2_READY** 0x0040
- #define **CIN_CTL_DCM_ATCA_ALARM** 0x0080
- #define **CIN_CTL_TRIG_INTERNAL** 0x0000
- #define **CIN_CTL_TRIG_EXTERNAL_1** 0x0001
- #define **CIN_CTL_TRIG_EXTERNAL_2** 0x0002
- #define **CIN_CTL_TRIG_EXTERNAL_BOTH** 0x0003
- #define **CIN_CTL_FOCUS_BIT** 0x0002
- #define **CIN_CTL_FCLK_125** 0x0000
- #define **CIN_CTL_FCLK_200** 0x0001
- #define **CIN_CTL_FCLK_250** 0x0002
- #define **CIN_CTL_FCLK_125_C** 0x0003
- #define **CIN_CTL_FCLK_200_C** 0x0004
- #define **CIN_CTL_FCLK_250_C** 0x0005
- #define **CIN_CTL_FCLK_156_C** 0x0006
- #define **CIN_CTL_FPGA_STS_CFG** 0x8000
- #define **CIN_CTL_FPGA_STS_FP_PWR** 0x0008
- #define **CIN_CTL_DCM_STS_ATCA** 0x0080
- #define **CIN_CTL_DCM_STS_LOCKED** 0x0001
- #define **CIN_CTL_DCM_STS_OVERRIDE** 0x0800
- #define **CIN_CTL_MUX1_VCLK1** 0x0001
- #define **CIN_CTL_MUX1_VCLK2** 0x0002
- #define **CIN_CTL_MUX1_VCLK3** 0x0003
- #define **CIN_CTL_MUX1_ATG** 0x0004
- #define **CIN_CTL_MUX1_VFCLK1** 0x0005
- #define **CIN_CTL_MUX1_VFCLK2** 0x0006
- #define **CIN_CTL_MUX1_VFCLK3** 0x0007
- #define **CIN_CTL_MUX1_HCLK1** 0x0008
- #define **CIN_CTL_MUX1_HCLK2** 0x0009
- #define **CIN_CTL_MUX1_OSW** 0x000A
- #define **CIN_CTL_MUX1_RST** 0x000B
- #define **CIN_CTL_MUX1_CONVERT** 0x000C
- #define **CIN_CTL_MUX1_SHUTTER** 0x000D
- #define **CIN_CTL_MUX1_SWTRIGGER** 0x000E
- #define **CIN_CTL_MUX1_TRIGMON** 0x000F
- #define **CIN_CTL_MUX1_EXPOSE** 0x0000
- #define **CIN_CTL_MUX2_VCLK1** 0x0010
- #define **CIN_CTL_MUX2_VCLK2** 0x0020
- #define **CIN_CTL_MUX2_VCLK3** 0x0030
- #define **CIN_CTL_MUX2_ATG** 0x0040
- #define **CIN_CTL_MUX2_VFCLK1** 0x0050
- #define **CIN_CTL_MUX2_VFCLK2** 0x0060

- `#define CIN_CTL_MUX2_VFCLK3 0x0070`
- `#define CIN_CTL_MUX2_HCLK1 0x0080`
- `#define CIN_CTL_MUX2_HCLK2 0x0090`
- `#define CIN_CTL_MUX2_HCLK3 0x00A0`
- `#define CIN_CTL_MUX2_OSW 0x00B0`
- `#define CIN_CTL_MUX2_RST 0x00C0`
- `#define CIN_CTL_MUX2_CONVERT 0x00D0`
- `#define CIN_CTL_MUX2_SAVE 0x00E0`
- `#define CIN_CTL_MUX2_HWTRIG 0x00F0`
- `#define CIN_CTL_MUX2_EXPOSE 0x0000`
- `#define CIN_CTL_FO_REG1 0x821D`
- `#define CIN_CTL_FO_REG2 0x821E`
- `#define CIN_CTL_FO_REG3 0x821F`
- `#define CIN_CTL_FO_REG4 0x8001`
- `#define CIN_CTL_FO_REG5 0x8211`
- `#define CIN_CTL_FO_REG6 0x8212`
- `#define CIN_CTL_FO_REG7 0x8213`
- `#define CIN_DATA_IP "10.0.5.207"`
- `#define CIN_DATA_PORT 49201`
- `#define CIN_DATA_CTL_PORT 49203`
- `#define CIN_DATA_MAX_MTU 9000`
- `#define CIN_DATA_UDP_HEADER 8`
- `#define CIN_DATA_MAGIC_PACKET UINT64_C(0x0000F4F3F2F1F000)`
- `#define CIN_DATA_MAGIC_PACKET_MASK UINT64_C(0x0000FFFFFFFFFFFF00)`
- `#define CIN_DATA_TAIL_MAGIC_PACKET UINT64_C(0x010DF0ADDEF2F1F0)`
- `#define CIN_DATA_TAIL_MAGIC_PACKET_MASK UINT64_C(0xFFFFFFFFFFFFFFFF)`
- `#define CIN_DATA_DROPPED_PACKET_VAL 0x2000`
- `#define CIN_DATA_DATA_MASK 0x1FFF`
- `#define CIN_DATA_CTRL_MASK 0xE000`
- `#define CIN_DATA_SIGN_MASK 0x1000`
- `#define CIN_DATA_GAIN_8 0xC000`
- `#define CIN_DATA_GAIN_4 0x4000`
- `#define CIN_DATA_PACKET_LEN 8184`
- `#define CIN_DATA_MAX_PACKETS 542`
- `#define CIN_DATA_RCVBUF 100`
- `#define CIN_DATA_MAX_FRAME_X 1152`
- `#define CIN_DATA_MAX_FRAME_Y 2050`
- `#define CIN_DATA_MAX_STREAM 2400000`
- `#define CIN_DATA_CCD_COLS 96`
- `#define CIN_DATA_CCD_COLS_PER_CHAN 10`
- `#define CIN_DATA_PIPELINE_FLUSH 1344`
- `#define CIN_CTL_NUM_BIAS_VOLTAGE 20`
- `#define CIN_CTL_BIAS_POSH 0`
- `#define CIN_CTL_BIAS_NEGH 1`
- `#define CIN_CTL_BIAS_POSRG 2`
- `#define CIN_CTL_BIAS_NEGRG 3`
- `#define CIN_CTL_BIAS_POSSW 4`
- `#define CIN_CTL_BIAS_NEGSW 5`
- `#define CIN_CTL_BIAS_POSV 6`
- `#define CIN_CTL_BIAS_NEGV 7`
- `#define CIN_CTL_BIAS_POSTG 8`
- `#define CIN_CTL_BIAS_NEGTG 9`
- `#define CIN_CTL_BIAS_POSVF 10`
- `#define CIN_CTL_BIAS_NEGVF 11`
- `#define CIN_CTL_BIAS_NEDGE 12`

- `#define CIN_CTL_BIAS_OTG 13`
- `#define CIN_CTL_BIAS_VDDR 14`
- `#define CIN_CTL_BIAS_VDD_OUT 15`
- `#define CIN_CTL_BIAS_BUF_BASE 16`
- `#define CIN_CTL_BIAS_BUF_DELTA 17`
- `#define CIN_CTL_BIAS_SPARE1 18`
- `#define CIN_CTL_BIAS_SPARE2 19`
- `#define DEBUG_PRINT(fmt, ...) if(_debug_print_flag) { fprintf(stderr, "%s:%d:%s(): " fmt, __FILE__, __LINE__, __func__, __VA_ARGS__); }`
- `#define DEBUG_COMMENT(fmt) if(_debug_print_flag) { fprintf(stderr, "%s:%d:%s(): " fmt, __FILE__, __LINE__, __func__); }`
- `#define ERROR_COMMENT(fmt) if(_error_print_flag) { fprintf(stderr, "%s:%d:%s(): " fmt, __FILE__, __LINE__, __func__); }`
- `#define ERROR_PRINT(fmt, ...) if(_error_print_flag) { fprintf(stderr, "%s:%d:%s(): " fmt, __FILE__, __LINE__, __func__, __VA_ARGS__); }`
- `#define CIN_CONFIG_MAX_STRING 256`
- `#define CIN_CONFIG_MAX_DATA 5000`
- `#define FIFO_MAX_READERS 10`

Typedefs

- `typedef struct cin_ctl_config cin_ctl_config_t`
- `typedef struct cin_ctl_listener cin_ctl_listener_t`
- `typedef struct cin_port cin_port_t`
- `typedef struct cin_ctl cin_ctl_t`
- `typedef struct cin_data_frame cin_data_frame_t`
- `typedef struct cin_data_stats cin_data_stats_t`
- `typedef struct cin_data_threads cin_data_threads_t`
- `typedef struct cin_data_callbacks cin_data_callbacks_t`
- `typedef struct cin_data cin_data_t`
- `typedef void(* cin_data_callback) (cin_data_frame_t *)`
- `typedef struct cin_ctl_id cin_ctl_id_t`
- `typedef struct cin_ctl_pwr_val cin_ctl_pwr_val_t`

Functions

- `void cin_set_debug_print (int debug)`
- `void cin_set_error_print (int error)`
- `void cin_report (FILE *fp, int details)`
- `int cin_ctl_init (cin_ctl_t *cin, const char *ipaddr, const char *bind_addr, uint16_t oport, uint16_t iport, uint16_t soport, uint16_t siport)`
- `int cin_ctl_destroy (cin_ctl_t *cin)`
- `int cin_ctl_read (cin_ctl_t *cin, uint16_t reg, uint16_t *val)`
- `int cin_ctl_write (cin_ctl_t *cin, uint16_t reg, uint16_t val, int wait)`
- `int cin_ctl_stream_write (cin_ctl_t *cin, unsigned char *val, int size)`
- `int cin_ctl_write_with_readback (cin_ctl_t *cin, uint16_t reg, uint16_t val)`
- `int cin_ctl_pwr (cin_ctl_t *cin, int pwr)`
- `int cin_ctl_fp_pwr (cin_ctl_t *cin, int pwr)`
- `int cin_ctl_test_pattern (cin_ctl_t *cin, int on_off)`
- `int cin_ctl_load_config (cin_ctl_t *cin, char *filename)`
- `int cin_ctl_load_firmware (cin_ctl_t *cin)`
- `int cin_ctl_load_firmware_file (cin_ctl_t *cin, char *filename)`
- `int cin_ctl_load_firmware_data (cin_ctl_t *cin, unsigned char *data, int data_len)`

- int [cin_ctl_get_fclk](#) ([cin_ctl_t](#) *cin, int *clkfreq)
- int [cin_ctl_set_fclk](#) ([cin_ctl_t](#) *cin, int clkfreq)
- int [cin_ctl_get_cfg_fpga_status](#) ([cin_ctl_t](#) *cin, uint16_t * _val)
- int [cin_ctl_get_id](#) ([cin_ctl_t](#) *cin, [cin_ctl_id_t](#) * _val)
- int [cin_ctl_get_dcm_status](#) ([cin_ctl_t](#) *cin, uint16_t * _val)
- int [cin_ctl_get_power_status](#) ([cin_ctl_t](#) *cin, int full, int *pwr, [cin_ctl_pwr_mon_t](#) *values)
- int [cin_ctl_set_bias](#) ([cin_ctl_t](#) *cin, int val)
- int [cin_ctl_get_bias](#) ([cin_ctl_t](#) *cin, int *val)
- int [cin_ctl_set_bias_regs](#) ([cin_ctl_t](#) *cin, uint16_t *vals, int verify)
- int [cin_ctl_get_bias_regs](#) ([cin_ctl_t](#) *cin, uint16_t *vals)
- int [cin_ctl_set_bias_voltages](#) ([cin_ctl_t](#) *cin, float *voltage, int verify)
- int [cin_ctl_get_bias_voltages](#) ([cin_ctl_t](#) *cin, float *voltage)
- int [cin_ctl_set_timing_regs](#) ([cin_ctl_t](#) *cin, uint16_t *vals, int vals_len)
- int [cin_ctl_get_camera_pwr](#) ([cin_ctl_t](#) *cin, int *val)
- int [cin_ctl_set_camera_pwr](#) ([cin_ctl_t](#) *cin, int val)
- int [cin_ctl_set_clocks](#) ([cin_ctl_t](#) *cin, int val)
- int [cin_ctl_get_clocks](#) ([cin_ctl_t](#) *cin, int *val)
- int [cin_ctl_set_trigger](#) ([cin_ctl_t](#) *cin, int val)
- int [cin_ctl_get_trigger](#) ([cin_ctl_t](#) *cin, int *val)
- int [cin_ctl_set_focus](#) ([cin_ctl_t](#) *cin, int val)
- int [cin_ctl_get_focus](#) ([cin_ctl_t](#) *cin, int *val)
- int [cin_ctl_get_triggering](#) ([cin_ctl_t](#) *cin, int *trigger)
- int [cin_ctl_int_trigger_start](#) ([cin_ctl_t](#) *cin, int nimages)
- int [cin_ctl_int_trigger_stop](#) ([cin_ctl_t](#) *cin)
- int [cin_ctl_ext_trigger_start](#) ([cin_ctl_t](#) *cin, int trigger_mode)
- int [cin_ctl_ext_trigger_stop](#) ([cin_ctl_t](#) *cin)
- int [cin_ctl_set_exposure_time](#) ([cin_ctl_t](#) *cin, float e_time)
- int [cin_ctl_set_trigger_delay](#) ([cin_ctl_t](#) *cin, float t_time)
- int [cin_ctl_set_cycle_time](#) ([cin_ctl_t](#) *cin, float ftime)
- int [cin_ctl_frame_count_reset](#) ([cin_ctl_t](#) *cin)
- int [cin_ctl_set_mux](#) ([cin_ctl_t](#) *cin, int setting)
- int [cin_ctl_get_mux](#) ([cin_ctl_t](#) *cin, int *setting)
- int [cin_ctl_set_fcric_clamp](#) ([cin_ctl_t](#) *cin, int clamp)
- int [cin_ctl_set_fcric_gain](#) ([cin_ctl_t](#) *cin, int gain)
- int [cin_ctl_set_fabric_address](#) ([cin_ctl_t](#) *cin, char *ip)
- int [cin_ctl_reg_dump](#) ([cin_ctl_t](#) *cin, FILE *fp)
- int [cin_config_read_file](#) ([cin_ctl_t](#) *cin, const char *file)
- int [cin_data_init](#) ([cin_data_t](#) *cin, int packet_buffer_len, int frame_buffer_len, char *ipaddr, uint16_t port, char *cin_ipaddr, uint16_t [cin_port](#), int rcvbuf, [cin_data_callback](#) push_callback, [cin_data_callback](#) pop_callback, void *usr_ptr)
- void [cin_data_stop_threads](#) ([cin_data_t](#) *cin)
- void [cin_data_framestore_trigger](#) ([cin_data_t](#) *cin, int count)
- void [cin_data_framestore_skip](#) ([cin_data_t](#) *cin, int count)
- int [cin_data_get_framestore_counter](#) ([cin_data_t](#) *cin)
- void [cin_data_framestore_disable](#) ([cin_data_t](#) *cin)
- void [cin_data_framestore_trigger_enable](#) ([cin_data_t](#) *cin)
- struct [cin_data_frame](#) * [cin_data_get_next_frame](#) ([cin_data_t](#) *cin)
- void [cin_data_release_frame](#) ([cin_data_t](#) *cin, int free_mem)
- struct [cin_data_frame](#) * [cin_data_get_buffered_frame](#) (void)
- void [cin_data_release_buffered_frame](#) (void)
- void [cin_data_compute_stats](#) ([cin_data_t](#) *cin, [cin_data_stats_t](#) *stats)
- void [cin_data_show_stats](#) (FILE *fp, [cin_data_stats_t](#) stats)
- void [cin_data_reset_stats](#) ([cin_data_t](#) *cin)
- int [cin_data_set_descramble_params](#) ([cin_data_t](#) *cin, int rows, int overscan)
- void [cin_data_get_descramble_params](#) ([cin_data_t](#) *cin, int *rows, int *overscan, int *xsize, int *ysize)

Variables

- const char * **cin_build_git_time**
- const char * **cin_build_git_sha**
- const char * **cin_build_version**
- int **_debug_print_flag**
- int **_error_print_flag**
- uint16_t **cin_config_timing []**
- int **cin_config_timing_len**
- unsigned char **cin_config_firmware []**
- unsigned **cin_config_firmware_len**
- uint16_t **cin_config_bias []**
- int **cin_config_bias_len**
- uint16_t **cin_config_fcric_200 []**
- int **cin_config_fcric_200_len**

7.1.1 Detailed Description

Author

Stuart B. Wilkins swilkins@bnl.gov

7.1.2 LICENSE

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7.1.3 DESCRIPTION

header file for CIN communications

7.2 src/cin_register_map.h File Reference

Macros

- #define **REG_COMMAND** 0x0001
- #define **REG_READ_ADDRESS** 0x0002
- #define **REG_STREAM_TYPE** 0x0003
- #define **CMD_FCLK_125** 0xB000
- #define **CMD_FCLK_200** 0x7000
- #define **CMD_FCLK_250** 0x3000
- #define **REG_IF_MAC0** 0x0010
- #define **REG_IF_MAC1** 0x0011
- #define **REG_IF_MAC2** 0x0012
- #define **REG_IF_IP0** 0x0013
- #define **REG_IF_IP1** 0x0014
- #define **REG_IF_CMD_PORT_NUM** 0x001A
- #define **REG_IF_STREAM_IN_PORT_NUM** 0x001C
- #define **REG_IF_STREAM_OUT_PORT_NUM** 0x001D
- #define **REG_ETH_RESET** 0x0020 /* Reset Eth Hardware 1=Rx, 2=Tx, 3=Both */
- #define **REG_ETH_ENABLE** 0x0021 /* Enable Eth Hardware 1=Rx, 2=Tx, 3=Both */
- #define **REG_PHY1_MDIO_CMD** 0x0022 /* Start(1), RnW(1), WDRd(1), PHY Addr(5), REG Addr(5) */
- #define **REG_PHY1_MDIO_CMD_DATA** 0x0023
- #define **REG_PHY1_MDIO_STATUS** 0x0024
- #define **REG_PHY1_MDIO_RD_ADDR** 0x0025
- #define **REG_PHY1_MDIO_RD_DATA** 0x0026
- #define **REG_MAC_CFG_VECTOR1** 0x0027 /* Ethernet Hardware Conf */
- #define **REG_PHY2_MDIO_CMD** 0x0028
- #define **REG_PHY2_MDIO_CMD_DATA** 0x0029
- #define **REG_PHY2_MDIO_STATUS** 0x002A
- #define **REG_PHY2_MDIO_RD_ADDR** 0x002B
- #define **REG_PHY2_MDIO_RD_DATA** 0x002C
- #define **REG_MAC_CFG_VECTOR2** 0x002D /* Ethernet Hardware Conf */
- #define **CMD_PS_ENABLE** 0x0021 /* Enable Selected Power Modules */
- #define **CMD_PS_POWERDOWN** 0x0022 /* Start power down sequence */
- #define **REG_PS_ENABLE** 0x0030 /* Power Supply Enable: */
- #define **REG_PS_SYNC_DIV0** 0x0031 /* 2.5V Gen */
- #define **REG_PS_SYNC_DIV1** 0x0032 /* 3.3V Gen */
- #define **REG_PS_SYNC_DIV2** 0x0033 /* 2.5V Frame */
- #define **REG_PS_SYNC_DIV3** 0x0034 /* 0.9V Frame */
- #define **REG_PS_SYNC_DIV4** 0x0035 /* 5.0V FP */
- #define **CMD_PROGRAM_FRAME** 0x0041
- #define **REG_FRM_RESET** 0x0036 /* Frame Reset */
- #define **REG_FRM_10GbE_SEL** 0x0037; /* 10GbE Link Select */
- #define **CMD_ENABLE_CLKS** 0x0031 /* Enable selected Frame FPGA clock crystals */
- #define **CMD_DISABLE_CLKS** 0x0032 /* Disable Frame FPGA clock crystals */
- #define **REG_CLOCK_EN_REG** 0x0038 /* Clock Enable Register */
- #define **REG_SI570_REG0** 0x0039
- #define **REG_SI570_REG1** 0x003A
- #define **REG_SI570_REG2** 0x003B
- #define **REG_SI570_REG3** 0x003C
- #define **CMD_MON_STOP** 0x0011 /* Stop voltage and current monitor */
- #define **CMD_MON_START** 0x0012 /* Start voltage and current monitor */
- #define **REG_VMON_ADC1_CH1** 0x0040 /* V12P_BUS Voltage Monitor */
- #define **REG_IMON_ADC1_CH0** 0x0041 /* V12P_BUS Current Monitor */

- #define **REG_VMON_ADC0_CH5** 0x0042 /* V3P3_MGMT Voltage Monitor */
- #define **REG_IMON_ADC0_CH5** 0x0043 /* V3P3_MGMT Current Monitor */
- #define **REG_VMON_ADC0_CH4** 0x0044 /* V3P3_S3E Voltage Monitor */
- #define **REG_IMON_ADC0_CH4** 0x0045 /* V3P3_S3E Current Monitor */
- #define **REG_VMON_ADC0_CH7** 0x0046 /* V2P5_MGMT Voltage Monitor */
- #define **REG_IMON_ADC0_CH7** 0x0047 /* V2P5_MGMT Current Monitor */
- #define **REG_VMON_ADC0_CH6** 0x0048 /* V1P8_MGMT Voltage Monitor */
- #define **REG_IMON_ADC0_CH6** 0x0049 /* V1P8_MGMT Current Monitor */
- #define **REG_VMON_ADC0_CH2** 0x004A /* V1P2_MGMT Voltage Monitor */
- #define **REG_IMON_ADC0_CH2** 0x004B /* V1P2_MGMT Current Monitor */
- #define **REG_VMON_ADC0_CH3** 0x004C /* V1P0_ENET Voltage Monitor */
- #define **REG_IMON_ADC0_CH3** 0x004D /* V1P0_ENET Current Monitor */
- #define **REG_VMON_ADC0_CH8** 0x004E /* V3P3_GEN Voltage Monitor */
- #define **REG_IMON_ADC0_CH8** 0x004F /* V3P3_GEN Current Monitor */
- #define **REG_VMON_ADC0_CH9** 0x0050 /* V2P5_GEN Voltage Monitor */
- #define **REG_IMON_ADC0_CH9** 0x0051 /* V2P5_GEN Current Monitor */
- #define **REG_VMON_ADC0_CHE** 0x0052 /* V0P9_V6 Voltage Monitor */
- #define **REG_IMON_ADC0_CHE** 0x0053 /* V0P9_V6 Current Monitor */
- #define **REG_VMON_ADC0_CHD** 0x0054 /* V2P5_V6 Voltage Monitor */
- #define **REG_IMON_ADC0_CHD** 0x0055 /* V2P5_V6 Current Monitor */
- #define **REG_VMON_ADC0_CHB** 0x0056 /* V1P0_V6 Voltage Monitor */
- #define **REG_IMON_ADC0_CHB** 0x0057 /* V1P0_V6 Current Monitor */
- #define **REG_VMON_ADC0_CHC** 0x0058 /* V1P2_V6 Voltage Monitor */
- #define **REG_IMON_ADC0_CHC** 0x0059 /* V1P2_V6 Current Monitor */
- #define **REG_VMON_ADC0_CHF** 0x005A /* V5P0_FP Voltage Monitor (1/2) */
- #define **REG_IMON_ADC0_CHF** 0x005B /* V5P0_FP Current Monitor (1/2) */
- #define **REG_DCM_STATUS** 0x0080
- #define **REG_FPGA_STATUS** 0x0081
- #define **REG_BOARD_ID** 0x008D
- #define **REG_HW_SERIAL_NUM** 0x008E
- #define **REG_FPGA_VERSION** 0x008F
- #define **REG_SANDBOX_REG00** 0x00F0
- #define **REG_SANDBOX_REG01** 0x00F1
- #define **REG_SANDBOX_REG02** 0x00F2
- #define **REG_SANDBOX_REG03** 0x00F3
- #define **REG_SANDBOX_REG04** 0x00F4
- #define **REG_SANDBOX_REG05** 0x00F5
- #define **REG_SANDBOX_REG06** 0x00F6
- #define **REG_SANDBOX_REG07** 0x00F7
- #define **REG_SANDBOX_REG08** 0x00F8
- #define **REG_SANDBOX_REG09** 0x00F9
- #define **REG_SANDBOX_REG0A** 0x00FA
- #define **REG_SANDBOX_REG0B** 0x00FB
- #define **REG_SANDBOX_REG0C** 0x00FC
- #define **REG_SANDBOX_REG0D** 0x00FD
- #define **REG_SANDBOX_REG0E** 0x00FE
- #define **REG_SANDBOX_REG0F** 0x00FF
- #define **REG_FRM_COMMAND** 0x8001
- #define **REG_FRM_READ_ADDRESS** 0x8002
- #define **REG_FRM_STREAM_TYPE** 0x8003
- #define **CMD_SEND_SYNC_PULSE** 0x0100 /** ISSUES A SYNC PULSE */
- #define **CMD_SYNC_DETECTOR2READOUT** 0x0101 /* COMMAND TO SYNC DETECTOR AND READOUT (SEE IMAGE PROCESSING) */
- #define **CMD_WR_CCD_BIAS_REG** 0x0102 /** WRITE CCD BIAS REGISTERS */
- #define **CMD_WR_CCD_CLOCK_REG** 0x0103 /** WRITE CCD CLOCK REGISTER */

- #define **CMD_SEND_FCRIC_CONFIG** 0x0105 /** SEND CONFIG DATA TO FRIC */
- #define **CMD_RESET_FRAME_COUNT** 0x0106 /** RESET STATISTICS/DEBUG COUNTERS */
- #define **REG_IF_MAC_FAB1B0** 0x8010
- #define **REG_IF_MAC_FAB1B1** 0x8011
- #define **REG_IF_MAC_FAB1B2** 0x8012
- #define **REG_IF_IP_FAB1B0** 0x8013
- #define **REG_IF_IP_FAB1B1** 0x8014
- #define **REG_IF_CMD_PORT_NUM_FAB1B** 0x8015
- #define **REG_IF_STREAM_IN_PORT_NUM_FAB1B** 0x8016
- #define **REG_IF_STREAM_OUT_PORT_NUM_FAB1B** 0x8017
- #define **REG_XAUI_FAB1B** 0x8018
- #define **REG_MAC_CONFIG_VEC_FAB1B0** 0x8019
- #define **REG_MAC_CONFIG_VEC_FAB1B1** 0x801A
- #define **REG_MAC_STATS1_FAB1B0** 0x801B
- #define **REG_MAC_STATS1_FAB1B1** 0x801C
- #define **REG_MAC_STATS2_FAB1B0** 0x801D
- #define **REG_MAC_STATS2_FAB1B1** 0x801E
- #define **REG_IF_MAC_FAB2B0** 0x8020
- #define **REG_IF_MAC_FAB2B1** 0x8021
- #define **REG_IF_MAC_FAB2B2** 0x8022
- #define **REG_IF_IP_FAB2B0** 0x8023
- #define **REG_IF_IP_FAB2B1** 0x8024
- #define **REG_IF_CMD_PORT_NUM_FAB2B** 0x8025
- #define **REG_IF_STREAM_IN_PORT_NUM_FAB2B** 0x8026
- #define **REG_IF_STREAM_OUT_PORT_NUM_FAB2B** 0x8027
- #define **REG_XAUI_FAB2B** 0x8028
- #define **REG_MAC_CONFIG_VEC_FAB2B0** 0x8029
- #define **REG_MAC_CONFIG_VEC_FAB2B1** 0x802A
- #define **REG_MAC_STATS1_FAB2B0** 0x802B
- #define **REG_MAC_STATS1_FAB2B1** 0x802C
- #define **REG_MAC_STATS2_FAB2B0** 0x802D
- #define **REG_MAC_STATS2_FAB2B1** 0x802E
- #define **REG_SRAM_COMMAND** 0x8030
- #define **REG_SRAM_START_ADDR1** 0x8031
- #define **REG_SRAM_START_ADDR0** 0x8032
- #define **REG_SRAM_STOP_ADDR1** 0x8033
- #define **REG_SRAM_STOP_ADDR0** 0x8034
- #define **REG_SRAM_FRAME_DATA_OUT1** 0x8035
- #define **REG_SRAM_FRAME_DATA_OUT0** 0x8036
- #define **REG_SRAM_FRAME_DATA_IN1** 0x8037
- #define **REG_SRAM_FRAME_DATA_IN0** 0x8038
- #define **REG_SRAM_FRAME_DV** 0x8039
- #define **REG_SRAM_STATUS1** 0x803A
- #define **REG_SRAM_STATUS0** 0x803B
- #define **CMD_FCLK_COMMIT** 0x0012 /** Start I2C Write/Read */
- #define **REG_FCLK_I2C_ADDRESS** 0x8040 /** [Slave Address(7), RD/WRn(1), Reg Address(8)] Slave address Hx58 -> HxB when shifted up by 1 */
- #define **REG_FCLK_I2C_DATA_WR** 0x8041 /** [Clock Select(2), Clock Enable (1), 0(5), Write Data (8)] */
- #define **REG_FCLK_I2C_DATA_RD** 0x8042 /** [Read Failed (1), Write Failed(1), Toggle bit(1), 0(5), Read Data (8)] */
- #define **REG_TRIGGERSELECT_REG** 0x8050
- #define **REG_TRIGGERMASK_REG** 0x8051 /** [00]==SW Trigger, [01]==FP TrigIn2, [10]==FP TrigIn1, [11]==FP TrigIn1OR2 */
- #define **REG_CCDCLKSELECT_REG** 0x8052
- #define **REG_CDCLKDISABLE_REG** 0x8053

- **#define REG_FCLK_SET0** 0xB007
- **#define REG_FCLK_SET1** 0xB008
- **#define REG_FCLK_SET2** 0xB009
- **#define REG_FCLK_SET3** 0xB00A
- **#define REG_FCLK_SET4** 0xB00B
- **#define REG_FCLK_SET5** 0xB00C
- **#define REG_FRM_DCM_STATUS** 0x8080
- **#define REG_FRM_FPGA_STATUS** 0x8081
- **#define REG_FRM_BOARD_ID** 0x808D
- **#define REG_FRM_HW_SERIAL_NUM** 0x808E
- **#define REG_FRM_FPGA_VERSION** 0x808F
- **#define REG_FRM_SANDBOX_REG00** 0x80F0
- **#define REG_FRM_SANDBOX_REG01** 0x80F1
- **#define REG_FRM_SANDBOX_REG02** 0x80F2
- **#define REG_FRM_SANDBOX_REG03** 0x80F3
- **#define REG_FRM_SANDBOX_REG04** 0x80F4
- **#define REG_FRM_SANDBOX_REG05** 0x80F5
- **#define REG_FRM_SANDBOX_REG06** 0x80F6
- **#define REG_FRM_SANDBOX_REG07** 0x80F7
- **#define REG_FRM_SANDBOX_REG08** 0x80F8
- **#define REG_FRM_SANDBOX_REG09** 0x80F9
- **#define REG_FRM_SANDBOX_REG0A** 0x80FA
- **#define REG_FRM_SANDBOX_REG0B** 0x80FB
- **#define REG_FRM_SANDBOX_REG0C** 0x80FC
- **#define REG_FRM_SANDBOX_REG0D** 0x80FD
- **#define REG_FRM_SANDBOX_REG0E** 0x80FE
- **#define REG_FRM_SANDBOX_REG0F** 0x80FF
- **#define REG_DETECTOR_REVISION_REG** 0x8100
- **#define REG_DETECTOR_CONFIG_REG1** 0x8101
- **#define REG_DETECTOR_CONFIG_REG2** 0x8102
- **#define REG_DETECTOR_CONFIG_REG3** 0x8103
- **#define REG_DETECTOR_CONFIG_REG4** 0x8104
- **#define REG_DETECTOR_CONFIG_REG5** 0x8105
- **#define REG_DETECTOR_CONFIG_REG6** 0x8106
- **#define REG_DETECTOR_CONFIG_REG7** 0x8107
- **#define REG_DETECTOR_CONFIG_REG8** 0x8108
- **#define REG_IMG_PROC_REVISION_REG** 0x8120
- **#define REG_IMG_PROC_CONFIG_REG1** 0x8121
- **#define REG_IMG_PROC_CONFIG_REG2** 0x8122
- **#define REG_IMG_PROC_CONFIG_REG3** 0x8123
- **#define REG_IMG_PROC_CONFIG_REG4** 0x8124
- **#define REG_IMG_PROC_CONFIG_REG5** 0x8125
- **#define REG_IMG_PROC_CONFIG_REG6** 0x8126
- **#define REG_IMG_PROC_CONFIG_REG7** 0x8127
- **#define REG_IMG_PROC_CONFIG_REG8** 0x8128
- **#define REG_BIASANDCLOCKREGISTERADDRESS** 0x8200
- **#define REG_BIASANDCLOCKREGISTERDATA** 0x8201
- **#define REG_CLOCKREGISTERDATAOUT** 0x8202
- **#define REG_BIASREGISTERDATAOUT** 0x8203
- **#define REG_BIASCONFIGREGISTER0_REG** 0x8204
- **#define REG_CLOCKCONFIGREGISTER0_REG** 0x8205
- **#define REG_BIASPARAM_READ_START** 0x3000
- **#define REG_EXPOSURETIMEMSB_REG** 0x8206
- **#define REG_EXPOSURETIMELSB_REG** 0x8207
- **#define REG_ALTEXPOSURETIMEMSB_REG** 0x8306

- #define REG_ALTEXPOSURETIMELSB_REG 0x8307
- #define REG_TRIGGERREPETITIONTIMEMSB_REG 0x8208
- #define REG_TRIGGERREPETITIONTIMELSB_REG 0x8209
- #define REG_DELAYTOEXPOSUREMSB_REG 0x820A
- #define REG_DELAYTOEXPOSURELSB_REG 0x820B
- #define REG_NUMBEROFEXPOSURE_REG 0x820C
- #define REG_SHUTTERTIMEMSB_REG 0x820D
- #define REG_SHUTTERTIMELSB_REG 0x820E
- #define REG_DELAYTOSHUTTERMSB_REG 0x820F
- #define REG_DELAYTOSHUTTERLSB_REG 0x8210
- #define REG_FCRIC_MASK_REG1 0x8211
- #define REG_FCRIC_MASK_REG2 0x8212
- #define REG_FCRIC_MASK_REG3 0x8213
- #define REG_LVDS_OVERFLOW_ERROR_REG1 0x8214
- #define REG_LVDS_OVERFLOW_ERROR_REG2 0x8215
- #define REG_LVDS_OVERFLOW_ERROR_REG3 0x8216
- #define REG_LVDS_PARITY_ERROR_REG1 0x8217
- #define REG_LVDS_PARITY_ERROR_REG2 0x8218
- #define REG_LVDS_PARITY_ERROR_REG3 0x8219
- #define REG_LVDS_STOP_BIT_ERROR_REG1 0x821A
- #define REG_LVDS_STOP_BIT_ERROR_REG2 0x821B
- #define REG_LVDS_STOP_BIT_ERROR_REG3 0x821C
- #define REG_FCRIC_WRITE0_REG 0x821D
- #define REG_FCRIC_WRITE1_REG 0x821E
- #define REG_FCRIC_WRITE2_REG 0x821F
- #define REG_FCRIC_READ0_REG 0x8220
- #define REG_FCRIC_READ1_REG 0x8221
- #define REG_FCRIC_READ2_REG 0x8222
- #define REG_DEBUGVIDEO0_REG 0x8223
- #define REG_DEBUGVIDEO1_REG 0x8224
- #define REG_DEBUGVIDEO2_REG 0x8225
- #define REG_DEBUGVIDEO3_REG 0x8226
- #define REG_DEBUGVIDEO4_REG 0x8227
- #define REG_DEBUGVIDEO5_REG 0x8228
- #define REG_DEBUGVIDEO6_REG 0x8229
- #define REG_DEBUGVIDEO7_REG 0x822A
- #define REG_DEBUGVIDEO8_REG 0x822B
- #define REG_DEBUGVIDEO9_REG 0x822C
- #define REG_DEBUGVIDEO10_REG 0x822D
- #define REG_DEBUGVIDEO11_REG 0x822E
- #define REG_DEBUGCOUNTER00_REG 0x822F
- #define REG_DEBUGCOUNTER01_REG 0x8230
- #define REG_DEBUGCOUNTER02_REG 0x8231
- #define REG_DEBUGCOUNTER03_REG 0x8232
- #define REG_DEBUGCOUNTER04_REG 0x8233
- #define CMD_READ_REG 0x0001 /* Read Register */

7.2.1 Detailed Description

Author

Stuart B. Wilkins swilkins@bnl.gov

7.2.2 LICENSE

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7.2.3 DESCRIPTION

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