

streamout

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Chapter 1

Class Index

1.1 Class List

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Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

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Chapter 3

Class Documentation

3.1 Buffer Class Reference

```
#include <Buffer.h>
```

Public Member Functions

- [Buffer](#) ()
- [Buffer](#) (const [bit8_t](#) b[], const std::size_t &i)
- [Buffer](#) (const char b[], const std::size_t &i)
- template<typename T >
 [Buffer](#) (const std::vector< T > &rawdata)
- template<typename T , std::size_t N>
 [Buffer](#) (const std::array< T, N > &rawdata)
- std::size_t [size](#) () const
- std::size_t [capacity](#) () const
- void [set](#) (unsigned char *b)
- [bit8_t](#) * [begin](#) ()
- [bit8_t](#) * [end](#) ()
- [bit8_t](#) & [operator\[\]](#) (const std::size_t &pos)
- void [setSize](#) (const std::size_t &size)
- void [printBuffer](#) (uint32_t start, uint32_t stop, std::ostream &flux=std::cout)
- void [printBuffer](#) (uint32_t start=0, std::ostream &flux=std::cout)
- virtual [~Buffer](#) ()

3.1.1 Detailed Description

Definition at line 14 of file [Buffer.h](#).

3.1.2 Constructor & Destructor Documentation

3.1.2.1 Buffer() [1/5]

```
Buffer::Buffer ( ) [inline]
```

Definition at line 17 of file [Buffer.h](#).

```
00017 : m_Buffer(nullptr), m_Size(0), m_Capacity(0) {}
```

3.1.2.2 Buffer() [2/5]

```
Buffer::Buffer (
    const bit8_t b[],
    const std::size_t & i ) [inline]
```

Definition at line 18 of file [Buffer.h](#).

```
00018 : m_Buffer(const_cast<bit8_t*>(&b[0])), m_Size(i), m_Capacity(i) {}
```

3.1.2.3 Buffer() [3/5]

```
Buffer::Buffer (
    const char b[],
    const std::size_t & i ) [inline]
```

Definition at line 19 of file [Buffer.h](#).

```
00019 : m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(&b[0]))), m_Size(i), m_Capacity(i) {}
```

3.1.2.4 Buffer() [4/5]

```
template<typename T >
Buffer::Buffer (
    const std::vector< T > & rawdata ) [inline]
```

Definition at line 20 of file [Buffer.h](#).

```
00020 : m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(rawdata.data()))),
    m_Size(rawdata.size() * sizeof(T)), m_Capacity(rawdata.capacity() * sizeof(T)) {}
```

3.1.2.5 Buffer() [5/5]

```
template<typename T , std::size_t N>
Buffer::Buffer (
    const std::array< T, N > & rawdata ) [inline]
```

Definition at line 21 of file [Buffer.h](#).

```
00021 : m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(rawdata.data()))),
    m_Size(rawdata.size() * sizeof(T)), m_Capacity(rawdata.size() * sizeof(T)) {}
```


3.1.2.6 ~Buffer()

```
Buffer::~~Buffer ( ) [virtual]
```

Definition at line 15 of file [Buffer.cc](#).

```
00015 { std::cout << "SDHCAL_buffer destructor called" << std::endl; }
```

3.1.3 Member Function Documentation

3.1.3.1 begin()

```
bit8_t * Buffer::begin ( ) [inline]
```

Definition at line 27 of file [Buffer.h](#).

```
00027 { return m_Buffer; }
```

3.1.3.2 capacity()

```
std::size_t Buffer::capacity ( ) const [inline]
```

Definition at line 24 of file [Buffer.h](#).

```
00024 { return m_Capacity; }
```

3.1.3.3 end()

```
bit8_t * Buffer::end ( ) [inline]
```

Definition at line 28 of file [Buffer.h](#).

```
00028 { return m_Buffer + m_Size; }
```

3.1.3.4 operator[]()

```
bit8_t & Buffer::operator[] (
    const std::size_t & pos ) [inline]
```

Definition at line 29 of file [Buffer.h](#).

```
00029 { return m_Buffer[pos]; }
```

3.1.3.5 printBuffer() [1/2]

```
void Buffer::printBuffer (
    uint32_t start,
    uint32_t stop,
    std::ostream & flux = std::cout )
```

3.1.3.6 printBuffer() [2/2]

```
void Buffer::printBuffer (
    uint32_t start = 0,
    std::ostream & flux = std::cout ) [inline]
```

Definition at line 33 of file [Buffer.h](#).

```
00033 { printBuffer(start, size()); }
```

3.1.3.7 set()

```
void Buffer::set (
    unsigned char * b ) [inline]
```

Definition at line 26 of file [Buffer.h](#).

```
00026 { m_Buffer = b; }
```

3.1.3.8 setSize()

```
void Buffer::setSize (
    const std::size_t & size ) [inline]
```

Definition at line 31 of file [Buffer.h](#).

```
00031 { m_Size = size; }
```

3.1.3.9 size()

```
std::size_t Buffer::size ( ) const [inline]
```

Definition at line 23 of file [Buffer.h](#).

```
00023 { return m_Size; }
```

The documentation for this class was generated from the following files:

- [/home/runner/work/streamout/streamout/libs/core/include/Buffer.h](#)
- [/home/runner/work/streamout/streamout/libs/core/src/Buffer.cc](#)

3.2 ROOTtreeDest::DATA Struct Reference

```
#include <ROOTtreeDest.h>
```

Public Attributes

- UInt_t [DIFid](#)
- UInt_t [ASICid](#)
- UInt_t [CHANNELid](#)
- UInt_t [Thresh](#)
- UInt_t [DTC](#)
- UInt_t [GTC](#)
- UInt_t [DIF_BCID](#)
- UInt_t [frame_BCID](#)
- UInt_t [timeStamp](#)
- ULong64_t [AbsoluteBCID](#)

3.2.1 Detailed Description

Definition at line 15 of file [ROOTtreeDest.h](#).

3.2.2 Member Data Documentation

3.2.2.1 AbsoluteBCID

```
ULong64_t ROOTtreeDest::DATA::AbsoluteBCID
```

Definition at line 20 of file [ROOTtreeDest.h](#).

3.2.2.2 ASICid

```
UInt_t ROOTtreeDest::DATA::ASICid
```

Definition at line 17 of file [ROOTtreeDest.h](#).

3.2.2.3 CHANNELid

```
UInt_t ROOTtreeDest::DATA::CHANNELid
```

Definition at line 17 of file [ROOTtreeDest.h](#).

3.2.2.4 DIF_BCID

```
UInt_t ROOTtreeDest::DATA::DIF_BCID
```

Definition at line 19 of file [ROOTtreeDest.h](#).

3.2.2.5 DIFid

```
UInt_t ROOTtreeDest::DATA::DIFid
```

Definition at line 17 of file [ROOTtreeDest.h](#).

3.2.2.6 DTC

```
UInt_t ROOTtreeDest::DATA::DTC
```

Definition at line 19 of file [ROOTtreeDest.h](#).

3.2.2.7 frame_BCID

```
UInt_t ROOTtreeDest::DATA::frame_BCID
```

Definition at line 19 of file [ROOTtreeDest.h](#).

3.2.2.8 GTC

```
UInt_t ROOTtreeDest::DATA::GTC
```

Definition at line 19 of file [ROOTtreeDest.h](#).

3.2.2.9 Thresh

```
UInt_t ROOTtreeDest::DATA::Thresh
```

Definition at line 18 of file [ROOTtreeDest.h](#).

3.2.2.10 timeStamp

UInt_t ROOTtreeDest::DATA::timeStamp

Definition at line 19 of file [ROOTtreeDest.h](#).

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

- [/home/runner/work/streamout/streamout/libs/interface/ROOT/include/ROOTtreeDest.h](#)

3.3 DIFPtr Class Reference

```
#include <DIFPtr.h>
```

Public Member Functions

- [DIFPtr](#) (unsigned char *p, const std::uint32_t &max_size)
- unsigned char * [getPtr](#) ()
- std::uint32_t [getGetFramePtrReturn](#) ()
- std::vector< unsigned char * > & [getFramesVector](#) ()
- std::vector< unsigned char * > & [getLinesVector](#) ()
- std::uint32_t [getID](#) ()
- std::uint32_t [getDTC](#) ()
- std::uint32_t [getGTC](#) ()
- std::uint64_t [getAbsoluteBCID](#) ()
- std::uint32_t [getBCID](#) ()
- std::uint32_t [getLines](#) ()
- bool [hasLine](#) (uint32_t line)
- std::uint32_t [getTASU1](#) ()
- std::uint32_t [getTASU2](#) ()
- std::uint32_t [getTDIF](#) ()
- float [getTemperatureDIF](#) ()
- float [getTemperatureASU1](#) ()
- float [getTemperatureASU2](#) ()
- bool [hasTemperature](#) ()
- bool [hasAnalogReadout](#) ()
- std::uint32_t [getNumberOfFrames](#) ()
- unsigned char * [getFramePtr](#) (uint32_t i)
- std::uint32_t [getFrameAsicHeader](#) (uint32_t i)
- std::uint32_t [getFrameBCID](#) (uint32_t i)
- std::uint32_t [getFrameTimeToTrigger](#) (uint32_t i)
- bool [getFrameLevel](#) (uint32_t i, uint32_t ipad, uint32_t ilevel)
- void [dumpDIFInfo](#) ()
- uint32_t [getDIFid](#) ()
- uint32_t [getASICid](#) (uint32_t i)
- uint32_t [getThresholdStatus](#) (uint32_t i, uint32_t ipad)

3.3.1 Detailed Description

Definition at line 11 of file [DIFPtr.h](#).

3.3.2 Constructor & Destructor Documentation

3.3.2.1 DIFPtr()

```
DIFPtr::DIFPtr (
    unsigned char * p,
    const std::uint32_t & max_size )
```

Definition at line 7 of file [DIFPtr.cc](#).

```
00007                                     : theDIF_(p), theSize_(max_size)
00008 {
00009     theFrames_.clear();
00010     theLines_.clear();
00011     try
00012     {
00013         theGetFramePtrReturn_ = DIFUnpacker::getFramePtr(theFrames_, theLines_, theSize_, theDIF_);
00014     }
00015     catch(std::string e)
00016     {
00017         std::cout << "DIF " << getID() << " T ? " << hasTemperature() << " " << e << std::endl;
00018     }
00019 }
```

3.3.3 Member Function Documentation

3.3.3.1 dumpDIFInfo()

```
void DIFPtr::dumpDIFInfo ( ) [inline]
```

Definition at line 40 of file [DIFPtr.h](#).

```
00041 {
00042     printf("DIF %d DTC %d GTC %d ABCID %lld BCID %d Lines %d Temperature %d \n", getID(), getDTC(),
00043         getGTC(), getAbsoluteBCID(), getBCID(), getLines(), hasTemperature());
00044     if(hasTemperature()) printf("T: ASU1 %d %f ASU2 %d %f DIF %d %f \n", getTASU1(),
00045         getTemperatureASU1(), getTASU2(), getTemperatureASU2(), getTDIF(), getTemperatureDIF());
00046     printf("Found %ld Lines and %ld Frames \n", theLines_.size(), theFrames_.size());
00047 }
```

3.3.3.2 getAbsoluteBCID()

```
std::uint64_t DIFPtr::getAbsoluteBCID ( ) [inline]
```

Definition at line 22 of file [DIFPtr.h](#).

```
00022 { return DIFUnpacker::getAbsoluteBCID(theDIF_); }
```

3.3.3.3 getASICid()

```
uint32_t DIFPtr::getASICid (
    uint32_t i ) [inline]
```

Definition at line 49 of file [DIFPtr.h](#).

```
00049 { return getFrameAsicHeader(i) & 0xFF; }
```

3.3.3.4 getBCID()

```
std::uint32_t DIFPtr::getBCID ( ) [inline]
```

Definition at line 23 of file [DIFPtr.h](#).

```
00023 { return DIFUnpacker::getBCID(theDIF_); }
```

3.3.3.5 getDIFid()

```
uint32_t DIFPtr::getDIFid ( ) [inline]
```

Definition at line 48 of file [DIFPtr.h](#).

```
00048 { return getID() & 0xFF; }
```

3.3.3.6 getDTC()

```
std::uint32_t DIFPtr::getDTC ( ) [inline]
```

Definition at line 20 of file [DIFPtr.h](#).

```
00020 { return DIFUnpacker::getDTC(theDIF_); }
```

3.3.3.7 getFrameAsicHeader()

```
std::uint32_t DIFPtr::getFrameAsicHeader (
    uint32_t i ) [inline]
```

Definition at line 36 of file [DIFPtr.h](#).

```
00036 { return DIFUnpacker::getFrameAsicHeader(theFrames_[i]); }
```

3.3.3.8 getFrameBCID()

```
std::uint32_t DIFPtr::getFrameBCID (
    uint32_t i ) [inline]
```

Definition at line 37 of file [DIFPtr.h](#).

```
00037 { return DIFUnpacker::getFrameBCID(theFrames_[i]); }
```

3.3.3.9 getFrameLevel()

```
bool DIFPtr::getFrameLevel (
    uint32_t i,
    uint32_t ipad,
    uint32_t ilevel ) [inline]
```

Definition at line 39 of file [DIFPtr.h](#).

```
00039 { return DIFUnpacker::getFrameLevel(theFrames_[i], ipad, ilevel); }
```

3.3.3.10 getFramePtr()

```
unsigned char * DIFPtr::getFramePtr (
    uint32_t i ) [inline]
```

Definition at line 35 of file [DIFPtr.h](#).

```
00035 { return theFrames_[i]; }
```

3.3.3.11 getFramesVector()

```
std::vector< unsigned char * > & DIFPtr::getFramesVector ( ) [inline]
```

Definition at line 17 of file [DIFPtr.h](#).

```
00017 { return theFrames_; }
```

3.3.3.12 getFrameTimeToTrigger()

```
std::uint32_t DIFPtr::getFrameTimeToTrigger (
    uint32_t i ) [inline]
```

Definition at line 38 of file [DIFPtr.h](#).

```
00038 { return getBCID() - getFrameBCID(i); }
```


3.3.3.13 getGetFramePtrReturn()

```
std::uint32_t DIFPtr::getGetFramePtrReturn ( ) [inline]
```

Definition at line 16 of file [DIFPtr.h](#).

```
00016 { return theGetFramePtrReturn_; }
```

3.3.3.14 getGTC()

```
std::uint32_t DIFPtr::getGTC ( ) [inline]
```

Definition at line 21 of file [DIFPtr.h](#).

```
00021 { return DIFUnpacker::getGTC(theDIF_); }
```

3.3.3.15 getID()

```
std::uint32_t DIFPtr::getID ( ) [inline]
```

Definition at line 19 of file [DIFPtr.h](#).

```
00019 { return DIFUnpacker::getID(theDIF_); }
```

3.3.3.16 getLines()

```
std::uint32_t DIFPtr::getLines ( ) [inline]
```

Definition at line 24 of file [DIFPtr.h](#).

```
00024 { return DIFUnpacker::getLines(theDIF_); }
```

3.3.3.17 getLinesVector()

```
std::vector< unsigned char * > & DIFPtr::getLinesVector ( ) [inline]
```

Definition at line 18 of file [DIFPtr.h](#).

```
00018 { return theLines_; }
```

3.3.3.18 getNumberOfFrames()

```
std::uint32_t DIFPtr::getNumberOfFrames ( ) [inline]
```

Definition at line 34 of file [DIFPtr.h](#).

```
00034 { return theFrames_.size(); }
```

3.3.3.19 getPtr()

```
unsigned char * DIFPtr::getPtr ( ) [inline]
```

Definition at line 15 of file [DIFPtr.h](#).

```
00015 { return theDIF_; }
```

3.3.3.20 getTASU1()

```
std::uint32_t DIFPtr::getTASU1 ( ) [inline]
```

Definition at line 26 of file [DIFPtr.h](#).

```
00026 { return DIFUnpacker::getTASU1(theDIF_); }
```

3.3.3.21 getTASU2()

```
std::uint32_t DIFPtr::getTASU2 ( ) [inline]
```

Definition at line 27 of file [DIFPtr.h](#).

```
00027 { return DIFUnpacker::getTASU2(theDIF_); }
```

3.3.3.22 getTDIF()

```
std::uint32_t DIFPtr::getTDIF ( ) [inline]
```

Definition at line 28 of file [DIFPtr.h](#).

```
00028 { return DIFUnpacker::getTDIF(theDIF_); }
```

3.3.3.23 getTemperatureASU1()

```
float DIFPtr::getTemperatureASU1 ( ) [inline]
```

Definition at line 30 of file [DIFPtr.h](#).

```
00030 { return (getTASU1() » 3) * 0.0625; }
```

3.3.3.24 getTemperatureASU2()

```
float DIFPtr::getTemperatureASU2 ( ) [inline]
```

Definition at line 31 of file [DIFPtr.h](#).

```
00031 { return (getTASU2() » 3) * 0.0625; }
```

3.3.3.25 getTemperatureDIF()

```
float DIFPtr::getTemperatureDIF ( ) [inline]
```

Definition at line 29 of file [DIFPtr.h](#).

```
00029 { return 0.508 * getTDIF() - 9.659; }
```

3.3.3.26 getThresholdStatus()

```
uint32_t DIFPtr::getThresholdStatus (
    uint32_t i,
    uint32_t ipad ) [inline]
```

Definition at line 50 of file [DIFPtr.h](#).

```
00050 { return (((uint32_t)getFrameLevel(i, ipad, 1)) < 1) | ((uint32_t)getFrameLevel(i, ipad, 0)); }
```

3.3.3.27 hasAnalogReadout()

```
bool DIFPtr::hasAnalogReadout ( ) [inline]
```

Definition at line 33 of file [DIFPtr.h](#).

```
00033 { return DIFUnpacker::hasAnalogReadout(theDIF_); }
```

3.3.3.28 hasLine()

```
bool DIFPtr::hasLine (
    uint32_t line ) [inline]
```

Definition at line 25 of file [DIFPtr.h](#).

```
00025 { return DIFUnpacker::hasLine(line, theDIF_); }
```

3.3.3.29 hasTemperature()

```
bool DIFPtr::hasTemperature ( ) [inline]
```

Definition at line 32 of file [DIFPtr.h](#).

```
00032 { return DIFUnpacker::hasTemperature(theDIF_); }
```

The documentation for this class was generated from the following files:

- [/home/runner/work/streamout/streamout/libs/core/include/DIFPtr.h](#)
- [/home/runner/work/streamout/streamout/libs/core/src/DIFPtr.cc](#)

3.4 DIFSlowControl Class Reference

Handler of DIF Slow Control info.

```
#include <DIFSlowControl.h>
```

Public Member Functions

- [DIFSlowControl](#) (const std::uint8_t &version, const std::uint8_t &DIFid, unsigned char *buf)
Constructor.
- std::uint8_t [getDIFid](#) ()
get DIF id
- std::map< int, std::map< std::string, int > > [getChipsMap](#) ()
Get chips map.
- std::map< std::string, int > [getChipSlowControl](#) (const int &asidid)
Get one chip map.
- int [getChipSlowControl](#) (const std::int8_t &asidid, const std::string ¶m)
Get one Chip value.
- void [Dump](#) ()
print out full map

3.4.1 Detailed Description

Handler of DIF Slow Control info.

Author

L.Mirabito

Date

March 2010

Version

1.0

Definition at line 20 of file [DIFSlowControl.h](#).

3.4.2 Constructor & Destructor Documentation

3.4.2.1 DIFSlowControl()

```
DIFSlowControl::DIFSlowControl (  
    const std::uint8_t & version,  
    const std::uint8_t & DIFid,  
    unsigned char * buf )
```

Constructor.

Parameters

<i>version</i>	Data format version
<i>DIFid</i>	DIF id
<i>buf</i>	Pointer to the Raw data buffer

Definition at line 10 of file [DIFSlowControl.cc](#).

```

00010      : m_Version(version), m_DIFid(DifId), m_AsicType(2)
00011 {
00012     if(cbuf[0] != 0xb1) return;
00013     int header_shift{6};
00014     if(m_Version < 8) m_NbrAsic = cbuf[5];
00015     else
00016     {
00017         m_DIFid      = cbuf[1];
00018         m_NbrAsic     = cbuf[2];
00019         header_shift = 3;
00020     }
00021     int size_hardroc1 = m_NbrAsic * 72 + header_shift + 1;
00022     if(cbuf[size_hardroc1 - 1] != 0xa1) size_hardroc1 = 0;
00023
00024     int size_hardroc2 = m_NbrAsic * 109 + header_shift + 1;
00025     if(cbuf[size_hardroc2 - 1] != 0xa1) size_hardroc2 = 0;
00026     if(size_hardroc1 != 0)
00027     {
00028         FillHR1(header_shift, cbuf);
00029         m_AsicType = 1;
00030     }
00031     else if(size_hardroc2 != 0)
00032         FillHR2(header_shift, cbuf);
00033     else
00034         return;
00035 }
```

3.4.3 Member Function Documentation

3.4.3.1 Dump()

```
void DIFSlowControl::Dump ( )
```

print out full map

Definition at line 45 of file [DIFSlowControl.cc](#).

```

00046 {
00047     for(std::map<int, std::map<std::string, int>::iterator it = m_MapSC.begin(); it != m_MapSC.end();
00048         it++)
00049     {
00049         std::cout << "ASIC " << it->first << std::endl;
00050         for(std::map<std::string, int>::iterator jt = (it->second).begin(); jt != (it->second).end();
00051             jt++) std::cout << jt->first << " : " << jt->second << std::endl;
00051     }
00052 }
```

3.4.3.2 getChipSlowControl() [1/2]

```
std::map< std::string, int > DIFSlowControl::getChipSlowControl (
    const int & asicid ) [inline]
```

Get one chip map.

Parameters

<i>asicid</i>	ASIC ID
---------------	---------

Returns

a map of <string (parameter name),int (parameter value) >

Definition at line 41 of file [DIFSlowControl.cc](#).

```
00041 { return m_MapSC[asicid]; }
```

3.4.3.3 getChipSlowControl() [2/2]

```
int DIFSlowControl::getChipSlowControl (
    const std::int8_t & asicid,
    const std::string & param ) [inline]
```

Get one Chip value.

Parameters

<i>asicid</i>	ASic ID
<i>param</i>	Parameter name

Definition at line 43 of file [DIFSlowControl.cc](#).

```
00043 { return getChipSlowControl(asicid)[param]; }
```

3.4.3.4 getChipsMap()

```
std::map< int, std::map< std::string, int > > DIFSlowControl::getChipsMap ( ) [inline]
```

Get chips map.

Returns

a map of < Asic Id, map of <string (parameter name),int (parameter value) >

Definition at line 39 of file [DIFSlowControl.cc](#).

```
00039 { return m_MapSC; }
```

3.4.3.5 getDIFId()

```
std::uint8_t DIFSlowControl::getDIFId ( ) [inline]
```

get DIF id

Definition at line 37 of file [DIFSlowControl.cc](#).

```
00037 { return m_DIFId; }
```

The documentation for this class was generated from the following files:

- [/home/runner/work/streamout/streamout/libs/core/include/DIFSlowControl.h](#)
- [/home/runner/work/streamout/streamout/libs/core/src/DIFSlowControl.cc](#)

3.5 DIFUnpacker Class Reference

```
#include <DIFUnpacker.h>
```

Static Public Member Functions

- static std::uint64_t [GrayToBin](#) (const std::uint64_t &n)
- static std::uint32_t [getStartOfDIF](#) (const unsigned char *cbuf, const std::uint32_t &size_buf, const std::uint32_t &start=92)
- static std::uint32_t [getID](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getDTC](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getGTC](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint64_t [getAbsoluteBCID](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getBCID](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getLines](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static bool [hasLine](#) (const std::uint32_t &line, const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getTASU1](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getTASU2](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getTDIF](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static bool [hasTemperature](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static bool [hasAnalogReadout](#) (const unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getFrameAsicHeader](#) (const unsigned char *framePtr)
- static std::uint32_t [getFrameBCID](#) (const unsigned char *framePtr)
- static bool [getFramePAD](#) (const unsigned char *framePtr, const std::uint32_t &ip)
- static bool [getFrameLevel](#) (const unsigned char *framePtr, const std::uint32_t &ip, const std::uint32_t &level)
- static std::uint32_t [getAnalogPtr](#) (std::vector< unsigned char * > &vLines, unsigned char *cb, const std::uint32_t &idx=0)
- static std::uint32_t [getFramePtr](#) (std::vector< unsigned char * > &vFrame, std::vector< unsigned char * > &vLines, const std::uint32_t &max_size, unsigned char *cb, const std::uint32_t &idx=0)
- static void [dumpFrameOld](#) (const unsigned char *buf)
- static std::uint32_t [swap_bytes](#) (const unsigned char *buf)

3.5.1 Detailed Description

Definition at line 11 of file [DIFUnpacker.h](#).

3.5.2 Member Function Documentation

3.5.2.1 dumpFrameOld()

```
void DIFUnpacker::dumpFrameOld (
    const unsigned char * buf ) [static]
```

Definition at line 140 of file [DIFUnpacker.cc](#).

```
00141 {
00142     bool          PAD[128];
00143     bool          10[64];
00144     bool          11[64];
00145     std::uint8_t  un{1};
00146     for(std::size_t ip = 0; ip < 128; ip++) { PAD[ip] = false; } // init PADs
00147     std::uint32_t idx1{4};
00148     for(int ik = 0; ik < 4; ik++)
00149     {
00150         std::uint32_t PadEtat{swap_bytes(&buf[idx1])};
00151         idx1 += 4;
00152         for(int e = 0; e < 32; e++)
00153         {
00154             PAD[((3 - ik) * 32) + (31 - e)] = PadEtat & un; // binary operation
00155             PadEtat = PadEtat » 1; // décalage des bit de 1
00156         }
00157     }
00158     // fill bool arrays
00159     for(int p = 0; p < 64; p++)
00160     {
00161         10[p] = static_cast<bool>(PAD[(2 * p)]); // _Lev0 (PAD paire)
00162         11[p] = static_cast<bool>(PAD[(2 * p) + 1]); // _Lev1 (PAD impaires)
00163     }
00164     std::bitset<64> bs0(0);
00165     std::bitset<64> bs1(0);
00166     for(std::uint32_t ip = 0; ip < 64; ip++)
00167     {
00168         bs0.set(ip, 10[ip]);
00169         bs1.set(ip, 11[ip]);
00170     }
00171     std::cout << "\t \t" << bs0 << std::endl;
00172     std::cout << "\t \t" << bs1 << std::endl;
00173 }
```

3.5.2.2 getAbsoluteBCID()

```
std::uint64_t DIFUnpacker::getAbsoluteBCID (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 47 of file [DIFUnpacker.cc](#).

```
00048 {
00049     std::uint64_t Shift{16777216ULL}; // to shift the value from the 24 first bits
00050     std::uint64_t pos{idx + DU::ABCID_SHIFT};
00051     std::uint64_t LBC = ((cb[pos] << 16) | (cb[pos + 1] << 8) | (cb[pos + 2])) * Shift + ((cb[pos + 3] <<
16) | (cb[pos + 4] << 8) | (cb[pos + 5]));
00052     return LBC;
00053 }
```


3.5.2.3 getAnalogPtr()

```
std::uint32_t DIFUnpacker::getAnalogPtr (
    std::vector< unsigned char * > & vLines,
    unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 86 of file [DIFUnpacker.cc](#).

```
00087 {
00088     std::uint32_t fshift{idx};
00089     if (cb[fshift] != DU::START_OF_LINES) return fshift;
00090     fshift++;
00091     while (cb[fshift] != DU::END_OF_LINES)
00092     {
00093         vLines.push_back(&cb[fshift]);
00094         std::uint32_t nchip{cb[fshift]};
00095         fshift += 1 + nchip * 64 * 2;
00096     }
00097     return fshift++;
00098 }
```

3.5.2.4 getBCID()

```
std::uint32_t DIFUnpacker::getBCID (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 55 of file [DIFUnpacker.cc](#).

```
00055 { return (cb[idx + DU::BCID_SHIFT] << 16) + (cb[idx + DU::BCID_SHIFT + 1] << 8) + cb[idx +
    DU::BCID_SHIFT + 2]; }
```

3.5.2.5 getDTC()

```
std::uint32_t DIFUnpacker::getDTC (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 43 of file [DIFUnpacker.cc](#).

```
00043 { return (cb[idx + DU::DTC_SHIFT] << 24) + (cb[idx + DU::DTC_SHIFT + 1] << 16) + (cb[idx + DU::DTC_SHIFT
    + 2] << 8) + cb[idx + DU::DTC_SHIFT + 3]; }
```

3.5.2.6 getFrameAsicHeader()

```
std::uint32_t DIFUnpacker::getFrameAsicHeader (
    const unsigned char * framePtr ) [static]
```

Definition at line 70 of file [DIFUnpacker.cc](#).

```
00070 { return (framePtr[DU::FRAME_ASIC_HEADER_SHIFT]); }
```

3.5.2.7 getFrameBCID()

```
std::uint32_t DIFUnpacker::getFrameBCID (
    const unsigned char * framePtr ) [static]
```

Definition at line 72 of file [DIFUnpacker.cc](#).

```
00073 {
00074     std::uint32_t igray = (framePtr[DU::FRAME_BCID_SHIFT] « 16) + (framePtr[DU::FRAME_BCID_SHIFT + 1] «
        8) + framePtr[DU::FRAME_BCID_SHIFT + 2];
00075     return DIFUnpacker::GrayToBin(igray);
00076 }
```

3.5.2.8 getFrameLevel()

```
bool DIFUnpacker::getFrameLevel (
    const unsigned char * framePtr,
    const std::uint32_t & ip,
    const std::uint32_t & level ) [static]
```

Definition at line 84 of file [DIFUnpacker.cc](#).

```
00084 { return ((framePtr[DU::FRAME_DATA_SHIFT + ((3 - ip / 16) * 4 + (ip % 16) / 4)] » (7 - (((ip % 16) %
    4) * 2 + level))) & 0x1); }
```

3.5.2.9 getFramePAD()

```
bool DIFUnpacker::getFramePAD (
    const unsigned char * framePtr,
    const std::uint32_t & ip ) [static]
```

Definition at line 78 of file [DIFUnpacker.cc](#).

```
00079 {
00080     std::uint32_t* iframe{(std::uint32_t*)&framePtr[DU::FRAME_DATA_SHIFT]};
00081     return ((iframe[3 - ip / 32] » (ip % 32)) & 0x1);
00082 }
```

3.5.2.10 getFramePtr()

```
std::uint32_t DIFUnpacker::getFramePtr (
    std::vector< unsigned char * > & vFrame,
    std::vector< unsigned char * > & vLines,
    const std::uint32_t & max_size,
    unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 100 of file [DIFUnpacker.cc](#).

```
00101 {
00102     std::uint32_t fshift{0};
00103     if(DATA_FORMAT_VERSION >= 13)
00104     {
00105         fshift = idx + DU::LINES_SHIFT + 1;
00106         if(DIFUnpacker::hasTemperature(cb, idx)) fshift = idx + DU::TDIF_SHIFT + 1;
        // jenlev 1
    }
```

```

00107     if(DIFUnpacker::hasAnalogReadout(cb, idx)) fshift = DIFUnpacker::getAnalogPtr(vLines, cb, fshift);
00108     // to be implemented
00109     else
00110         std::uint32_t fshift = idx + DU::BCID_SHIFT + 3;
00111     if(cb[fshift] != DU::START_OF_FRAME)
00112     {
00113         std::cout << "This is not a start of frame " << cb[fshift] << "\n";
00114         return fshift;
00115     }
00116     do {
00117         // printf("fshift %d and %d \n", fshift, max_size);
00118         if(cb[fshift] == DU::END_OF_DIF) return fshift;
00119         if(cb[fshift] == DU::START_OF_FRAME) fshift++;
00120         if(cb[fshift] == DU::END_OF_FRAME)
00121         {
00122             fshift++;
00123             continue;
00124         }
00125         std::uint32_t header = DIFUnpacker::getFrameAsicHeader(&cb[fshift]);
00126         if(header == DU::END_OF_FRAME) return (fshift + 2);
00127         // std::cout<<header<< " "<<fshift<<std::endl;
00128         if(header < 1 || header > 48) { throw header + " Header problem " + fshift; }
00129         vFrame.push_back(&cb[fshift]);
00130         fshift += DU::FRAME_SIZE;
00131         if(fshift > max_size)
00132         {
00133             std::cout << "fshift " << fshift << " exceed " << max_size << "\n";
00134             return fshift;
00135         }
00136         if(cb[fshift] == DU::END_OF_FRAME) fshift++;
00137     } while(true);
00138 }

```

3.5.2.11 getGTC()

```

std::uint32_t DIFUnpacker::getGTC (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]

```

Definition at line 45 of file [DIFUnpacker.cc](#).

```

00045 { return (cb[idx + DU::GTC_SHIFT] << 24) + (cb[idx + DU::GTC_SHIFT + 1] << 16) + (cb[idx + DU::GTC_SHIFT
+ 2] << 8) + cb[idx + DU::GTC_SHIFT + 3]; }

```

3.5.2.12 getID()

```

std::uint32_t DIFUnpacker::getID (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]

```

Definition at line 41 of file [DIFUnpacker.cc](#).

```

00041 { return cb[idx + DU::ID_SHIFT]; }

```

3.5.2.13 getLines()

```

std::uint32_t DIFUnpacker::getLines (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]

```

Definition at line 56 of file [DIFUnpacker.cc](#).

```

00056 { return (cb[idx + DU::LINES_SHIFT] >> 4) & 0x5; }

```

3.5.2.14 getStartOfDIF()

```
std::uint32_t DIFUnpacker::getStartOfDIF (
    const unsigned char * cbuf,
    const std::uint32_t & size_buf,
    const std::uint32_t & start = 92 ) [static]
```

Definition at line 28 of file [DIFUnpacker.cc](#).

```
00029 {
00030     std::uint32_t id0{0};
00031     for(std::uint32_t i = start; i < size_buf; i++)
00032     {
00033         if(cbuf[i] != DU::START_OF_DIF && cbuf[i] != DU::START_OF_DIF_TEMP) continue;
00034         id0 = i;
00035         // if (cbuf[id0+DU::ID_SHIFT]>0xFF) continue;
00036         break;
00037     }
00038     return id0;
00039 }
```

3.5.2.15 getTASU1()

```
std::uint32_t DIFUnpacker::getTASU1 (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 60 of file [DIFUnpacker.cc](#).

```
00060 { return (cb[idx + DU::TASU1_SHIFT] << 24) + (cb[idx + DU::TASU1_SHIFT + 1] << 16) + (cb[idx +
    DU::TASU1_SHIFT + 2] << 8) + cb[idx + DU::TASU1_SHIFT + 3]; }
```

3.5.2.16 getTASU2()

```
std::uint32_t DIFUnpacker::getTASU2 (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 62 of file [DIFUnpacker.cc](#).

```
00062 { return (cb[idx + DU::TASU2_SHIFT] << 24) + (cb[idx + DU::TASU2_SHIFT + 1] << 16) + (cb[idx +
    DU::TASU2_SHIFT + 2] << 8) + cb[idx + DU::TASU2_SHIFT + 3]; }
```

3.5.2.17 getTDIF()

```
std::uint32_t DIFUnpacker::getTDIF (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 64 of file [DIFUnpacker.cc](#).

```
00064 { return (cb[idx + DU::TDIF_SHIFT]); }
```

3.5.2.18 GrayToBin()

```
std::uint64_t DIFUnpacker::GrayToBin (
    const std::uint64_t & n ) [static]
```

Definition at line 13 of file [DIFUnpacker.cc](#).

```
00014 {
00015     std::uint64_t ish{1};
00016     std::uint64_t anss{n};
00017     std::uint64_t idiv{0};
00018     std::uint64_t ishmax{sizeof(std::uint64_t) * 8};
00019     while(true)
00020     {
00021         idiv = anss >> ish;
00022         anss ^= idiv;
00023         if(idiv <= 1 || ish == ishmax) return anss;
00024         ish <<= 1;
00025     }
00026 }
```

3.5.2.19 hasAnalogReadout()

```
bool DIFUnpacker::hasAnalogReadout (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 68 of file [DIFUnpacker.cc](#).

```
00068 { return (DIFUnpacker::getLines(cb, idx) != 0); }
```

3.5.2.20 hasLine()

```
bool DIFUnpacker::hasLine (
    const std::uint32_t & line,
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 58 of file [DIFUnpacker.cc](#).

```
00058 { return ((cb[idx + DU::LINES_SHIFT] >> line) & 0x1); }
```

3.5.2.21 hasTemperature()

```
bool DIFUnpacker::hasTemperature (
    const unsigned char * cb,
    const std::uint32_t & idx = 0 ) [static]
```

Definition at line 66 of file [DIFUnpacker.cc](#).

```
00066 { return (cb[idx] == DU::START_OF_DIF_TEMP); }
```

3.5.2.22 swap_bytes()

```
std::uint32_t DIFUnpacker::swap_bytes (
    const unsigned char * buf ) [static]
```

Definition at line 175 of file [DIFUnpacker.cc](#).

```
00176 {
00177     unsigned char Swapped[4];
00178     for(std::size_t i = 0; i < 4; i++) Swapped[i] = buf[4 - 1 - i];
00179     return *reinterpret_cast<std::uint32_t*>(&Swapped[0]);
00180 }
```

The documentation for this class was generated from the following files:

- [/home/runner/work/streamout/streamout/libs/core/include/DIFUnpacker.h](#)
- [/home/runner/work/streamout/streamout/libs/core/src/DIFUnpacker.cc](#)

3.6 DU Class Reference

```
#include <Words.h>
```

Static Public Attributes

- static const std::uint32_t [START_OF_DIF](#) {0xB0}
- static const std::uint32_t [START_OF_DIF_TEMP](#) {0xBB}
- static const std::uint32_t [END_OF_DIF](#) {0xA0}
- static const std::uint32_t [START_OF_LINES](#) {0xC4}
- static const std::uint32_t [END_OF_LINES](#) {0xD4}
- static const std::uint32_t [START_OF_FRAME](#) {0xB4}
- static const std::uint32_t [END_OF_FRAME](#) {0xA3}
- static const std::uint32_t [ID_SHIFT](#) {1}
- static const std::uint32_t [DTC_SHIFT](#) {2}
- static const std::uint32_t [GTC_SHIFT](#) {10}
- static const std::uint32_t [ABCID_SHIFT](#) {14}
- static const std::uint32_t [BCID_SHIFT](#) {20}
- static const std::uint32_t [LINES_SHIFT](#) {23}
- static const std::uint32_t [TASU1_SHIFT](#) {24}
- static const std::uint32_t [TASU2_SHIFT](#) {28}
- static const std::uint32_t [TDIF_SHIFT](#) {32}
- static const std::uint32_t [FRAME_ASIC_HEADER_SHIFT](#) {0}
- static const std::uint32_t [FRAME_BCID_SHIFT](#) {1}
- static const std::uint32_t [FRAME_DATA_SHIFT](#) {4}
- static const std::uint32_t [FRAME_SIZE](#) {20}

3.6.1 Detailed Description

Definition at line 7 of file [Words.h](#).

3.6.2 Member Data Documentation

3.6.2.1 ABCID_SHIFT

```
const std::uint32_t DU::ABCID_SHIFT {14} [static]
```

Definition at line 22 of file [Words.h](#).

3.6.2.2 BCID_SHIFT

```
const std::uint32_t DU::BCID_SHIFT {20} [static]
```

Definition at line 23 of file [Words.h](#).

3.6.2.3 DTC_SHIFT

```
const std::uint32_t DU::DTC_SHIFT {2} [static]
```

Definition at line 20 of file [Words.h](#).

3.6.2.4 END_OF_DIF

```
const std::uint32_t DU::END_OF_DIF {0xA0} [static]
```

Definition at line 12 of file [Words.h](#).

3.6.2.5 END_OF_FRAME

```
const std::uint32_t DU::END_OF_FRAME {0xA3} [static]
```

Definition at line 17 of file [Words.h](#).

3.6.2.6 END_OF_LINES

```
const std::uint32_t DU::END_OF_LINES {0xD4} [static]
```

Definition at line 14 of file [Words.h](#).

3.6.2.7 FRAME_ASIC_HEADER_SHIFT

```
const std::uint32_t DU::FRAME_ASIC_HEADER_SHIFT {0} [static]
```

Definition at line 29 of file [Words.h](#).

3.6.2.8 FRAME_BCID_SHIFT

```
const std::uint32_t DU::FRAME_BCID_SHIFT {1} [static]
```

Definition at line 30 of file [Words.h](#).

3.6.2.9 FRAME_DATA_SHIFT

```
const std::uint32_t DU::FRAME_DATA_SHIFT {4} [static]
```

Definition at line 31 of file [Words.h](#).

3.6.2.10 FRAME_SIZE

```
const std::uint32_t DU::FRAME_SIZE {20} [static]
```

Definition at line 32 of file [Words.h](#).

3.6.2.11 GTC_SHIFT

```
const std::uint32_t DU::GTC_SHIFT {10} [static]
```

Definition at line 21 of file [Words.h](#).

3.6.2.12 ID_SHIFT

```
const std::uint32_t DU::ID_SHIFT {1} [static]
```

Definition at line 19 of file [Words.h](#).

3.6.2.13 LINES_SHIFT

```
const std::uint32_t DU::LINES_SHIFT {23} [static]
```

Definition at line 24 of file [Words.h](#).

3.6.2.14 START_OF_DIF

```
const std::uint32_t DU::START_OF_DIF {0xB0} [static]
```

Definition at line 10 of file [Words.h](#).

3.6.2.15 START_OF_DIF_TEMP

```
const std::uint32_t DU::START_OF_DIF_TEMP {0xBB} [static]
```

Definition at line 11 of file [Words.h](#).

3.6.2.16 START_OF_FRAME

```
const std::uint32_t DU::START_OF_FRAME {0xB4} [static]
```

Definition at line 16 of file [Words.h](#).

3.6.2.17 START_OF_LINES

```
const std::uint32_t DU::START_OF_LINES {0xC4} [static]
```

Definition at line 13 of file [Words.h](#).

3.6.2.18 TASU1_SHIFT

```
const std::uint32_t DU::TASU1_SHIFT {24} [static]
```

Definition at line 25 of file [Words.h](#).

3.6.2.19 TASU2_SHIFT

```
const std::uint32_t DU::TASU2_SHIFT {28} [static]
```

Definition at line 26 of file [Words.h](#).

3.6.2.20 TDIF_SHIFT

```
const std::uint32_t DU::TDIF_SHIFT {32} [static]
```

Definition at line 27 of file [Words.h](#).

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

- [/home/runner/work/streamout/streamout/libs/core/include/Words.h](#)

3.7 RawdataReader Class Reference

```
#include <RawdataReader.h>
```

Public Member Functions

- [RawdataReader](#) (const char *fileName)
- float [getFileSize](#) ()
- void [openFile](#) (const char *fileName)
- void [closeFile](#) ()
- bool [nextEvent](#) ()
- bool [nextDIFbuffer](#) ()
- [Buffer](#) [getSDHCALBuffer](#) ()
- virtual [~RawdataReader](#) ()

Static Public Member Functions

- static void [setDefaultBufferSize](#) (const std::size_t &size)

3.7.1 Detailed Description

Definition at line 16 of file [RawdataReader.h](#).

3.7.2 Constructor & Destructor Documentation

3.7.2.1 RawdataReader()

```
RawdataReader::RawdataReader (
    const char * fileName ) [explicit]
```

Definition at line 14 of file [RawdataReader.cc](#).

```
00015 {
00016     m_buf.reserve(m_BufferSize);
00017     openFile(fileName);
00018 }
```

3.7.2.2 ~RawdataReader()

```
virtual RawdataReader::~~RawdataReader ( ) [inline], [virtual]
```

Definition at line 26 of file [RawdataReader.h](#).

```
00026 { closeFile(); }
```

3.7.3 Member Function Documentation

3.7.3.1 closeFile()

```
void RawdataReader::closeFile ( )
```

Definition at line 31 of file [RawdataReader.cc](#).

```
00032 {
00033     m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00034     if(m_FileStream.is_open()) m_FileStream.close();
00035 }
```

3.7.3.2 getFileSize()

```
float RawdataReader::getFileSize ( )
```

Definition at line 89 of file [RawdataReader.cc](#).

```
00089 { return m_FileSize; }
```

3.7.3.3 getSDHCALBuffer()

```
Buffer RawdataReader::getSDHCALBuffer ( )
```

Definition at line 85 of file [RawdataReader.cc](#).

```
00085 { return m_Buffer; }
```

3.7.3.4 nextDIFbuffer()

```
bool RawdataReader::nextDIFbuffer ( )
```

Definition at line 62 of file [RawdataReader.cc](#).

```
00063 {
00064     static int DIF_processed{0};
00065     if(DIF_processed >= m_NumberOfDIF)
00066     {
00067         DIF_processed = 0;
00068         std::cout << "=====" << std::endl;
00069         return false;
00070     }
00071     else
00072     {
00073         std::cout << "DIF number : " << DIF_processed << std::endl;
00074         std::uint32_t bsize{0};
00075         DIF_processed++;
00076         m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));
00077         std::cout << "Compresses size : " << bsize << " Bytes " << std::endl;
00078         if(!m_FileStream) return false;
00079         m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);
00080         if(!m_FileStream) return false;
00081         return true;
00082     }
00083 }
```

3.7.3.5 nextEvent()

```
bool RawdataReader::nextEvent ( )
```

Definition at line 50 of file [RawdataReader.cc](#).

```
00051 {
00052     m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));
00053     if(!m_FileStream) return false;
00054     m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));
00055     if(!m_FileStream) return false;
00056     std::cout << "==== Event *====" << std::endl;
00057     std::cout << "Number : " << m_EventNumber << std::endl;
00058     std::cout << "Number of DIFs : " << m_NumberOfDIF << std::endl;
00059     return true;
00060 }
```

3.7.3.6 openFile()

```
void RawdataReader::openFile (
    const char * fileName )
```

Definition at line 37 of file [RawdataReader.cc](#).

```
00038 {
00039     m_FileStream.rdbuf()->pubsetbuf(0, 0);
00040     m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00041     m_FileStream.open(fileName, std::ios::in | std::ios::binary | std::ios::ate); // Start at the end
    to directly calculate the size of the file then come back to beginning
00042     m_FileStream.rdbuf()->pubsetbuf(0, 0);
00043     if(m_FileStream.is_open())
00044     {
00045         setFileSize(m_FileStream.tellg());
00046         m_FileStream.seekg(0, std::ios::beg);
00047     }
00048 }
```

3.7.3.7 setDefaultBufferSize()

```
void RawdataReader::setDefaultBufferSize (
    const std::size_t & size ) [static]
```

Definition at line 12 of file [RawdataReader.cc](#).

```
00012 { m_BufferSize = size; }
```

The documentation for this class was generated from the following files:

- [/home/runner/work/streamout/streamout/libs/interface/RawDataReader/include/RawdataReader.h](#)
- [/home/runner/work/streamout/streamout/libs/interface/RawDataReader/src/RawdataReader.cc](#)

3.8 ROOTtreeDest Class Reference

```
#include <ROOTtreeDest.h>
```

Classes

- struct [DATA](#)

Public Member Functions

- [ROOTtreeDest](#) ()
- void [start](#) ()
- void [processDIF](#) (DIFPtr *)
- void [processFrame](#) (DIFPtr *, uint32_t frameIndex)
- void [processPadInFrame](#) (DIFPtr *, uint32_t frameIndex, uint32_t channelIndex)
- void [processSlowControl](#) (const SDHCAL_buffer &)
- void [end](#) ()

3.8.1 Detailed Description

Definition at line 12 of file [ROOTtreeDest.h](#).

3.8.2 Constructor & Destructor Documentation

3.8.2.1 ROOTtreeDest()

```
ROOTtreeDest::ROOTtreeDest ( )
```

Definition at line 8 of file [ROOTtreeDest.cc](#).

```
00009 {
00010     dataReset();
00011     _tree = new TTree("RawData", "Raw SDHCAL data tree");
00012     _tree->Branch("data", &_data,
        "DIFid/i:ASICid:CHANNELid:Thresh:DTC:GTC:DIF_BCID:frame_BCID:timeStamp:AbsoluteBCID/1");
00013 }
```

3.8.3 Member Function Documentation

3.8.3.1 end()

```
void ROOTtreeDest::end ( ) [inline]
```

Definition at line 30 of file [ROOTtreeDest.h](#).

```
00030 { ; }
```

3.8.3.2 processDIF()

```
void ROOTtreeDest::processDIF (
    DIFPtr * d )
```

Definition at line 25 of file [ROOTtreeDest.cc](#).

```
00026 {
00027     _data.DIFid      = d->getDIFid();
00028     _data.DTC        = d->getDTC();
00029     _data.GTC        = d->getGTC();
00030     _data.DIF_BCID   = d->getBCID();
00031     _data.AbsoluteBCID = d->getAbsoluteBCID();
00032 }
```

3.8.3.3 processFrame()

```
void ROOTtreeDest::processFrame (
    DIFPtr * d,
    uint32_t frameIndex )
```

Definition at line 34 of file [ROOTtreeDest.cc](#).

```
00035 {
00036     _data.ASICid      = d->getASICid(frameIndex);
00037     _data.frame_BCID  = d->getFrameBCID(frameIndex);
00038     _data.timeStamp   = d->getFrameTimeToTrigger(frameIndex);
00039 }
```

3.8.3.4 processPadInFrame()

```
void ROOTtreeDest::processPadInFrame (
    DIFPtr * d,
    uint32_t frameIndex,
    uint32_t channelIndex )
```

Definition at line 41 of file [ROOTtreeDest.cc](#).

```
00042 {
00043     _data.CHANNELid   = channelIndex;
00044     _data.Thresh      = d->getThresholdStatus(frameIndex, channelIndex);
00045     if(_data.Thresh != 0) _tree->Fill();
00046 }
```

3.8.3.5 processSlowControl()

```
void ROOTtreeDest::processSlowControl (
    const SDHCAL_buffer & ) [inline]
```

Definition at line 29 of file [ROOTtreeDest.h](#).

```
00029 { ; }
```

3.8.3.6 start()

```
void ROOTtreeDest::start ( )
```

Definition at line 23 of file [ROOTtreeDest.cc](#).

```
00023 { dataReset(); }
```

The documentation for this class was generated from the following files:

- [/home/runner/work/streamout/streamout/libs/interface/ROOT/include/ROOTtreeDest.h](#)
- [/home/runner/work/streamout/streamout/libs/interface/ROOT/src/ROOTtreeDest.cc](#)

3.9 SDHCAL_buffer_loop< SOURCE, DESTINATION > Class Template Reference

```
#include <SDHCAL_buffer_loop.h>
```

Public Member Functions

- [SDHCAL_buffer_loop](#) (SOURCE &source, DESTINATION &dest, bool debug=false, std::ostream &out=std::cout, bool verbose=false, std::ostream &verbose_out=std::cout)
- void [loop](#) (const std::int32_t &m_NbrEventsToProcess=0)
- void [printAllCounters](#) ()

3.9.1 Detailed Description

```
template<typename SOURCE, typename DESTINATION>
class SDHCAL_buffer_loop< SOURCE, DESTINATION >
```

Definition at line 28 of file [SDHCAL_buffer_loop.h](#).

3.9.2 Constructor & Destructor Documentation

3.9.2.1 SDHCAL_buffer_loop()

```
template<typename SOURCE , typename DESTINATION >
SDHCAL_buffer_loop< SOURCE, DESTINATION >::SDHCAL_buffer_loop (
    SOURCE & source,
    DESTINATION & dest,
    bool debug = false,
    std::ostream & out = std::cout,
    bool verbose = false,
    std::ostream & verbose_out = std::cout ) [inline]
```

Definition at line 31 of file [SDHCAL_buffer_loop.h](#).

```
00031
00032         :
00033         m_Source(source), m_Destination(dest), m_Debug(debug), m_DebugOut(out), m_Verbose(verbose),
00034         m_VerboseOut(verbose_out)
00035     {
00036     }
```

3.9.3 Member Function Documentation

3.9.3.1 loop()

```
template<typename SOURCE , typename DESTINATION >
void SDHCAL_buffer_loop< SOURCE, DESTINATION >::loop (
    const std::int32_t & m_NbrEventsToProcess = 0 ) [inline]
```

Definition at line 35 of file [SDHCAL_buffer_loop.h](#).

```
00036     {
00037         m_Destination.start();
00038         while(m_Source.nextEvent() && (m_NbrEventsToProcess == 0 || m_NbrEventsToProcess >= m_NbrEvents))
00039         {
00040             while(m_Source.nextDIFbuffer())
00041             {
00042                 Buffer buffer = m_Source.getSDHCALBuffer();
00043                 unsigned char* debug_variable_1 = buffer.end();
00044                 SDHCAL_RawBuffer_Navigator bufferNavigator(buffer);
00045                 unsigned char* debug_variable_2 = bufferNavigator.getDIFBuffer().end();
00046                 if(m_Verbose) m_VerboseOut << "DIF BUFFER END " << (unsigned int*)debug_variable_1 << " " <<
00047                 (unsigned int*)debug_variable_2 << std::endl;
00048                 if(m_Debug) assert(debug_variable_1 == debug_variable_2);
00049                 uint32_t idstart = bufferNavigator.getStartOfDIF();
00050                 if(m_Debug && idstart == 0) buffer.printBuffer();
00051                 c.DIFStarter[idstart]++;
00052                 if(!bufferNavigator.validBuffer()) continue;
00053                 DIFPtr* d = bufferNavigator.getDIFPtr();
00054                 if(m_Debug) assert(d != NULL);
00055                 if(d != NULL)
00056                 {
00057                     c.DIFPtrValueAtReturnedPos[bufferNavigator.getDIFBufferStart() [d->getGetFramePtrReturn()]]++;
00058                     if(m_Debug) assert(bufferNavigator.getDIFBufferStart() [d->getGetFramePtrReturn()] == 0xa0);
00059                 }
00060                 c.SizeAfterDIFPtr[bufferNavigator.getSizeAfterDIFPtr() ]++;
00061                 m_Destination.processDIF(d);
00062                 for(uint32_t i = 0; i < d->getNumberOfFrames(); i++)
00063                 {
00064                     m_Destination.processFrame(d, i);
00065                     for(uint32_t j = 0; j < 64; j++) m_Destination.processPadInFrame(d, i, j);
00066                 }
00067                 bool processSC = false;
00068                 if(bufferNavigator.hasSlowControlData())
00069                 {
00070                     c.hasSlowControl++;
00071                     processSC = true;
00072                 }
00073             }
00074         }
00075     }
```



```

00073         if(bufferNavigator.badSCData())
00074         {
00075             c.hasBadSlowControl++;
00076             processSC = false;
00077         }
00078         if(processSC) { m_Destination.processSlowControl(bufferNavigator.getSCBuffer()); }
00079
00080         Buffer eod = bufferNavigator.getEndOfAllData();
00081         c.SizeAfterAllData[eod.size()]++;
00082         unsigned char* debug_variable_3 = eod.end();
00083         if(m_Verbose) m_VerboseOut << "END DATA BUFFER END " << (unsigned int*)debug_variable_1 << " " <<
(unsigned int*)debug_variable_3 << std::endl;
00084         if(m_Debug) assert(debug_variable_1 == debug_variable_3);
00085         if(m_Verbose)
00086         {
00087             m_VerboseOut << "End of Data remaining stuff : ";
00088             eod.printBuffer();
00089         }
00090
00091         int nonzeroCount = 0;
00092         for(unsigned char* it = eod.begin(); it != eod.end(); it++)
00093             if(static_cast<int>(*it) != 0) nonzeroCount++;
00094         c.NonZeroValusAtEndOfData[nonzeroCount]++;
00095     } // end of DIF while loop
00096     m_NbrEvents++;
00097 } // end of event while loop
00098 m_Destination.end();
00099 }

```

3.9.3.2 printAllCounters()

```

template<typename SOURCE , typename DESTINATION >
void SDHCAL_buffer_loop< SOURCE, DESTINATION >::printAllCounters ( ) [inline]

```

Definition at line 100 of file [SDHCAL_buffer_loop.h](#).

```
00100 { c.printAllCounters(m_DebugOut); }
```

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

- [/home/runner/work/streamout/streamout/libs/core/include/SDHCAL_buffer_loop.h](#)

3.10 SDHCAL_buffer_LoopCounter Struct Reference

```
#include <SDHCAL_buffer_LoopCounter.h>
```

Public Member Functions

- void [printCounter](#) (const std::string &description, const std::map< int, int > &m, std::ostream &out=std::cout)
- void [printAllCounters](#) (std::ostream &out=std::cout)

Public Attributes

- int [hasSlowControl](#) = 0
- int [hasBadSlowControl](#) = 0
- std::map< int, int > [DIFStarter](#)
- std::map< int, int > [DIFPtrValueAtReturnedPos](#)
- std::map< int, int > [SizeAfterDIFPtr](#)
- std::map< int, int > [SizeAfterAllData](#)
- std::map< int, int > [NonZeroValusAtEndOfData](#)

3.10.1 Detailed Description

Definition at line 11 of file [SDHCAL_buffer_LoopCounter.h](#).

3.10.2 Member Function Documentation

3.10.2.1 printAllCounters()

```
void SDHCAL_buffer_LoopCounter::printAllCounters (
    std::ostream & out = std::cout )
```

Definition at line 7 of file [SDHCAL_buffer_LoopCounter.cc](#).

```
00008 {
00009     out << "BUFFER LOOP FINAL STATISTICS : " << std::endl;
00010     printCounter("Start of DIF header", DIFStarter, out);
00011     printCounter("Value after DIF data are processed", DIFPtrValueAtReturnedPos, out);
00012     printCounter("Size remaining in buffer after end of DIF data", SizeAfterDIFPtr, out);
00013     out << "Number of Slow Control found " << hasSlowControl << " out of which " << hasBadSlowControl << "
are bad" << std::endl;
00014     printCounter("Size remaining after all of data have been processed", SizeAfterAllData, out);
00015     printCounter("Number on non zero values in end of data buffer", NonZeroValusAtEndOfData, out);
00016 }
```

3.10.2.2 printCounter()

```
void SDHCAL_buffer_LoopCounter::printCounter (
    const std::string & description,
    const std::map< int, int > & m,
    std::ostream & out = std::cout )
```

Definition at line 18 of file [SDHCAL_buffer_LoopCounter.cc](#).

```
00019 {
00020     out << " statistics for " << description << " : ";
00021     for(std::map<int, int>::const_iterator it = m.begin(); it != m.end(); it++)
00022     {
00023         if(it != m.begin()) out << ",";
00024         out << " [" << it->first << "]= " << it->second;
00025     }
00026     out << std::endl;
00027 }
```

3.10.3 Member Data Documentation

3.10.3.1 DIFPtrValueAtReturnedPos

```
std::map<int, int> SDHCAL_buffer_LoopCounter::DIFPtrValueAtReturnedPos
```

Definition at line 17 of file [SDHCAL_buffer_LoopCounter.h](#).

3.10.3.2 DIFStarter

```
std::map<int, int> SDHCAL_buffer_LoopCounter::DIFStarter
```

Definition at line 16 of file [SDHCAL_buffer_LoopCounter.h](#).

3.10.3.3 hasBadSlowControl

```
int SDHCAL_buffer_LoopCounter::hasBadSlowControl = 0
```

Definition at line 15 of file [SDHCAL_buffer_LoopCounter.h](#).

3.10.3.4 hasSlowControl

```
int SDHCAL_buffer_LoopCounter::hasSlowControl = 0
```

Definition at line 14 of file [SDHCAL_buffer_LoopCounter.h](#).

3.10.3.5 NonZeroValusAtEndOfData

```
std::map<int, int> SDHCAL_buffer_LoopCounter::NonZeroValusAtEndOfData
```

Definition at line 20 of file [SDHCAL_buffer_LoopCounter.h](#).

3.10.3.6 SizeAfterAllData

```
std::map<int, int> SDHCAL_buffer_LoopCounter::SizeAfterAllData
```

Definition at line 19 of file [SDHCAL_buffer_LoopCounter.h](#).

3.10.3.7 SizeAfterDIFPtr

```
std::map<int, int> SDHCAL_buffer_LoopCounter::SizeAfterDIFPtr
```

Definition at line 18 of file [SDHCAL_buffer_LoopCounter.h](#).

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

- [/home/runner/work/streamout/streamout/libs/core/include/SDHCAL_buffer_LoopCounter.h](#)
- [/home/runner/work/streamout/streamout/libs/core/src/SDHCAL_buffer_LoopCounter.cc](#)

3.11 SDHCAL_RawBuffer_Navigator Class Reference

```
#include <SDHCAL_RawBuffer_Navigator.h>
```

Public Member Functions

- [SDHCAL_RawBuffer_Navigator](#) (const [Buffer](#) &b, const int &start=-1)
- [~SDHCAL_RawBuffer_Navigator](#) ()
- bool [validBuffer](#) ()
- std::uint32_t [getStartOfDIF](#) ()
- unsigned char * [getDIFBufferStart](#) ()
- std::uint32_t [getDIFBufferSize](#) ()
- [Buffer](#) [getDIFBuffer](#) ()
- [DIFPtr](#) * [getDIFPtr](#) ()
- std::uint32_t [getEndOfDIFData](#) ()
- std::uint32_t [getSizeAfterDIFPtr](#) ()
- std::uint32_t [getDIF_CRC](#) ()
- bool [hasSlowControlData](#) ()
- [Buffer](#) [getSCBuffer](#) ()
- bool [badSCData](#) ()
- [Buffer](#) [getEndOfAllData](#) ()

Static Public Member Functions

- static void [StartAt](#) (const int &start)

3.11.1 Detailed Description

Definition at line 12 of file [SDHCAL_RawBuffer_Navigator.h](#).

3.11.2 Constructor & Destructor Documentation

3.11.2.1 SDHCAL_RawBuffer_Navigator()

```
SDHCAL_RawBuffer_Navigator::SDHCAL_RawBuffer_Navigator (
    const Buffer & b,
    const int & start = -1 ) [explicit]
```

Definition at line 14 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00014                                                                 : m_Buffer(b)
00015 {
00016     StartAt(start);
00017     m_DIFstartIndex = DIFUnpacker::getStartOfDIF(m_Buffer.begin(), m_Buffer.size(), m_Start);
00018 }
```

3.11.2.2 ~SDHCAL_RawBuffer_Navigator()

SDHCAL_RawBuffer_Navigator::~~SDHCAL_RawBuffer_Navigator ()

Definition at line 20 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00021 {
00022     if(m_TheDIFPtr != nullptr) delete m_TheDIFPtr;
00023 }
```

3.11.3 Member Function Documentation

3.11.3.1 badSCData()

bool SDHCAL_RawBuffer_Navigator::badSCData ()

Definition at line 62 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00063 {
00064     setSCBuffer();
00065     return m_BadSCdata;
00066 }
```

3.11.3.2 getDIF_CRC()

uint32_t SDHCAL_RawBuffer_Navigator::getDIF_CRC ()

Definition at line 45 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00046 {
00047     uint32_t i{getEndOfDIFData()};
00048     uint32_t ret{0};
00049     ret |= (m_Buffer.begin()[i - 2]) << 8);
00050     ret |= m_Buffer.begin()[i - 1];
00051     return ret;
00052 }
```

3.11.3.3 getDIFBuffer()

Buffer SDHCAL_RawBuffer_Navigator::getDIFBuffer ()

Definition at line 33 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00033 { return Buffer(getDIFBufferStart(), getDIFBufferSize()); }
```

3.11.3.4 getDIFBufferSize()

std::uint32_t SDHCAL_RawBuffer_Navigator::getDIFBufferSize ()

Definition at line 31 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00031 { return m_Buffer.size() - m_DIFstartIndex; }
```

3.11.3.5 getDIFBufferStart()

```
unsigned char * SDHCAL_RawBuffer_Navigator::getDIFBufferStart ( )
```

Definition at line 29 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00029 { return &(m_Buffer.begin())[m_DIFstartIndex]; }
```

3.11.3.6 getDIFPtr()

```
DIFPtr * SDHCAL_RawBuffer_Navigator::getDIFPtr ( )
```

Definition at line 35 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00036 {
00037     if(m_TheDIFPtr == nullptr) m_TheDIFPtr = new DIFPtr(getDIFBufferStart(), getDIFBufferSize());
00038     return m_TheDIFPtr;
00039 }
```

3.11.3.7 getEndOfAllData()

```
Buffer SDHCAL_RawBuffer_Navigator::getEndOfAllData ( )
```

Definition at line 101 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00102 {
00103     setSCBuffer();
00104     if(hasSlowControlData() && !m_BadSCdata) { return Buffer(&(m_SCbuffer.begin())[m_SCbuffer.size()],
00105         getSizeAfterDIFPtr() - 3 - m_SCbuffer.size()); }
00105     else
00106         return Buffer(&(getDIFBufferStart()[getEndOfDIFData()]), getSizeAfterDIFPtr() - 3); // remove the
00107         2 bytes for CRC and the DIF trailer
00107 }
```

3.11.3.8 getEndOfDIFData()

```
std::uint32_t SDHCAL_RawBuffer_Navigator::getEndOfDIFData ( )
```

Definition at line 41 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00041 { return getDIFPtr()->getGetFramePtrReturn() + 3; }
```

3.11.3.9 getSCBuffer()

```
Buffer SDHCAL_RawBuffer_Navigator::getSCBuffer ( )
```

Definition at line 56 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00057 {
00058     setSCBuffer();
00059     return m_SCbuffer;
00060 }
```

3.11.3.10 getSizeAfterDIFPtr()

```
std::uint32_t SDHCAL_RawBuffer_Navigator::getSizeAfterDIFPtr ( )
```

Definition at line 43 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00043 { return getDIFBufferSize() - getDIFPtr()->getGetFramePtrReturn(); }
```

3.11.3.11 getStartOfDIF()

```
std::uint32_t SDHCAL_RawBuffer_Navigator::getStartOfDIF ( )
```

Definition at line 27 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00027 { return m_DIFstartIndex; }
```

3.11.3.12 hasSlowControlData()

```
bool SDHCAL_RawBuffer_Navigator::hasSlowControlData ( )
```

Definition at line 54 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00054 { return getDIFBufferStart()[getEndOfDIFData()] == 0xb1; }
```

3.11.3.13 StartAt()

```
void SDHCAL_RawBuffer_Navigator::StartAt (
    const int & start ) [static]
```

Definition at line 9 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00010 {
00011     if(start >= 0) m_Start = start;
00012 }
```

3.11.3.14 validBuffer()

```
bool SDHCAL_RawBuffer_Navigator::validBuffer ( )
```

Definition at line 25 of file [SDHCAL_RawBuffer_Navigator.cc](#).

```
00025 { return m_DIFstartIndex != 0; }
```

The documentation for this class was generated from the following files:

- [/home/runner/work/streamout/streamout/libs/core/include/SDHCAL_RawBuffer_Navigator.h](#)
- [/home/runner/work/streamout/streamout/libs/core/src/SDHCAL_RawBuffer_Navigator.cc](#)

3.12 textDump Class Reference

```
#include <textDump.h>
```

Public Member Functions

- [textDump](#) (std::ostream &out=std::cout)
- void [start](#) ()
- void [processDIF](#) (DIFPtr *)
- void [processFrame](#) (DIFPtr *, uint32_t frameIndex)
- void [processPadInFrame](#) (DIFPtr *, uint32_t frameIndex, uint32_t channelIndex)
- void [processSlowControl](#) (Buffer)
- void [end](#) ()

3.12.1 Detailed Description

Definition at line 13 of file [textDump.h](#).

3.12.2 Constructor & Destructor Documentation

3.12.2.1 textDump()

```
textDump::textDump (
    std::ostream & out = std::cout ) [inline], [explicit]
```

Definition at line 16 of file [textDump.h](#).

```
00016 : _out(out) { ; }
```

3.12.3 Member Function Documentation

3.12.3.1 end()

```
void textDump::end ( )
```

Definition at line 38 of file [textDump.cc](#).

```
00038 { _out << "textDump end of report" << std::endl; }
```


3.12.3.2 processDIF()

```
void textDump::processDIF (
    DIFPtr * d )
```

Definition at line 11 of file [textDump.cc](#).

```
00012 {
00013     if(NULL == d) return;
00014     _out << "DIF number is " << d->getDIFid() << std::endl;
00015     _out << " DTC value is " << d->getDTC() << std::endl;
00016     _out << " GTC value is " << d->getGTC() << std::endl;
00017     _out << " DIF BCID is " << d->getBCID() << std::endl;
00018     _out << " Absolute BCID is " << d->getAbsoluteBCID() << std::endl;
00019     _out << " The number of frame is " << d->getNumberOfFrames() << std::endl;
00020 }
```

3.12.3.3 processFrame()

```
void textDump::processFrame (
    DIFPtr * d,
    uint32_t frameIndex )
```

Definition at line 22 of file [textDump.cc](#).

```
00023 {
00024     _out << " Displaying frame number " << frameIndex << std::endl;
00025     _out << " ASIC ID is " << d->getASICid(frameIndex) << std::endl;
00026     _out << " Frame BCID is " << d->getFrameBCID(frameIndex) << std::endl;
00027     _out << " Frame Time To Trigger (a.k.a timestamp) is " << d->getFrameTimeToTrigger(frameIndex) <<
        std::endl;
00028 }
```

3.12.3.4 processPadInFrame()

```
void textDump::processPadInFrame (
    DIFPtr * d,
    uint32_t frameIndex,
    uint32_t channelIndex )
```

Definition at line 30 of file [textDump.cc](#).

```
00031 {
00032     _out << " Displaying channel number " << channelIndex << std::endl;
00033     _out << " Threshold status is " << d->getThresholdStatus(frameIndex, channelIndex) << std::endl;
00034 }
```

3.12.3.5 processSlowControl()

```
void textDump::processSlowControl (
    Buffer )
```

Definition at line 36 of file [textDump.cc](#).

```
00036 { _out << "textDump::processSlowControl not implemented yet." << std::endl; }
```

3.12.3.6 start()

```
void textDump::start ( )
```

Definition at line 9 of file [textDump.cc](#).

```
00009 { _out << "Will dump bunch of DIF data" << std::endl; }
```

The documentation for this class was generated from the following files:

- [/home/runner/work/streamout/streamout/libs/interface/Dump/include/textDump.h](#)
- [/home/runner/work/streamout/streamout/libs/interface/Dump/src/textDump.cc](#)

Chapter 4

File Documentation

4.1 /home/runner/work/streamout/streamout/libs/core/include/Bits.h File Reference

```
#include <cstdint>
#include <iosfwd>
```

Typedefs

- using [bit8_t](#) = std::uint8_t

Functions

- std::ostream & [operator<<](#) (std::ostream &os, const [bit8_t](#) &c)
Stream operator to print bit8_t aka std::uint8_t and not char or unsigned char.

4.1.1 Detailed Description

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Definition in file [Bits.h](#).

4.1.2 Typedef Documentation

4.1.2.1 bit8_t

```
using bit8_t = std::uint8_t
```

Definition at line 10 of file [Bits.h](#).

4.1.3 Function Documentation

4.1.3.1 operator<<()

```
std::ostream & operator<< (  
    std::ostream & os,  
    const bit8_t & c )
```

Stream operator to print bit8_t aka std::uint8_t and not char or unsigned char.

Definition at line 10 of file [Bits.cc](#).

```
00010 { return os << c + 0; }
```

4.2 Bits.h

[Go to the documentation of this file.](#)

```
00001  
00005 #pragma once  
00006  
00007 #include <cstdint>  
00008 #include <iosfwd>  
00009  
00010 using bit8_t = std::uint8_t; /*<! type to represent 8bits words (1 byte) */  
00011  
00013 std::ostream& operator<<(std::ostream& os, const bit8_t& c);
```

4.3 /home/runner/work/streamout/streamout/libs/core/include/Buffer.h File Reference

```
#include "Bits.h"  
#include <array>  
#include <iostream>  
#include <vector>
```

Classes

- class [Buffer](#)

4.4 Buffer.h

[Go to the documentation of this file.](#)

```

00001
00006 #pragma once
00007
00008 #include "Bits.h"
00009
00010 #include <array>
00011 #include <iostream>
00012 #include <vector>
00013
00014 class Buffer
00015 {
00016 public:
00017     Buffer() : m_Buffer(nullptr), m_Size(0), m_Capacity(0) {}
00018     Buffer(const bit8_t b[], const std::size_t& i) : m_Buffer(const_cast<bit8_t*>(&b[0])), m_Size(i),
m_Capacity(i) {}
00019     Buffer(const char b[], const std::size_t& i) : m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const
bit8_t*>(&b[0])), m_Size(i), m_Capacity(i) {}
00020     template<typename T> Buffer(const std::vector<T>& rawdata) :
m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(rawdata.data()))), m_Size(rawdata.size()
* sizeof(T)), m_Capacity(rawdata.capacity() * sizeof(T)) {}
00021     template<typename T, std::size_t N> Buffer(const std::array<T, N>& rawdata) :
m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(rawdata.data()))), m_Size(rawdata.size()
* sizeof(T)), m_Capacity(rawdata.size() * sizeof(T)) {}
00022
00023     std::size_t size() const { return m_Size; }
00024     std::size_t capacity() const { return m_Capacity; }
00025
00026     void set(unsigned char* b) { m_Buffer = b; }
00027     bit8_t* begin() { return m_Buffer; }
00028     bit8_t* end() { return m_Buffer + m_Size; }
00029     bit8_t& operator[](const std::size_t& pos) { return m_Buffer[pos]; }
00030
00031     void setSize(const std::size_t& size) { m_Size = size; }
00032     void printBuffer(uint32_t start, uint32_t stop, std::ostream& flux = std::cout);
00033     void printBuffer(uint32_t start = 0, std::ostream& flux = std::cout) { printBuffer(start, size()); }
00034     virtual ~Buffer();
00035
00036 private:
00037     bit8_t* m_Buffer{nullptr};
00038     std::size_t m_Size{0};
00039     std::size_t m_Capacity{0};
00040 };

```

4.5 /home/runner/work/streamout/streamout/libs/core/include/DIFPtr.h File Reference

```

#include "DIFUnpacker.h"
#include <iostream>
#include <vector>

```

Classes

- class [DIFPtr](#)

4.5.1 Detailed Description

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Definition in file [DIFPtr.h](#).

4.6 DIFPtr.h

[Go to the documentation of this file.](#)

```

00001
00005 #pragma once
00006 #include "DIFUnpacker.h"
00007
00008 #include <iostream>
00009 #include <vector>
00010
00011 class DIFPtr
00012 {
00013 public:
00014     DIFPtr(unsigned char* p, const std::uint32_t& max_size);
00015     inline unsigned char* getPtr() { return theDIF_; }
00016     inline std::uint32_t getGetFramePtrReturn() { return theGetFramePtrReturn_; }
00017     inline std::vector<unsigned char*> getFramesVector() { return theFrames_; }
00018     inline std::vector<unsigned char*> getLinesVector() { return theLines_; }
00019     inline std::uint32_t getID() { return DIFUnpacker::getID(theDIF_); }
00020     inline std::uint32_t getDTC() { return DIFUnpacker::getDTC(theDIF_); }
00021     inline std::uint32_t getGTC() { return DIFUnpacker::getGTC(theDIF_); }
00022     inline std::uint64_t getAbsoluteBCID() { return
DIFUnpacker::getAbsoluteBCID(theDIF_); }
00023     inline std::uint32_t getBCID() { return DIFUnpacker::getBCID(theDIF_); }
00024     inline std::uint32_t getLines() { return DIFUnpacker::getLines(theDIF_); }
00025     inline bool hasLine(uint32_t line) { return DIFUnpacker::hasLine(line,
theDIF_); }
00026     inline std::uint32_t getTASU1() { return DIFUnpacker::getTASU1(theDIF_); }
00027     inline std::uint32_t getTASU2() { return DIFUnpacker::getTASU2(theDIF_); }
00028     inline std::uint32_t getTDIF() { return DIFUnpacker::getTDIF(theDIF_); }
00029     inline float getTemperatureDIF() { return 0.508 * getTDIF() - 9.659; }
00030     inline float getTemperatureASU1() { return (getTASU1() >> 3) * 0.0625; }
00031     inline float getTemperatureASU2() { return (getTASU2() >> 3) * 0.0625; }
00032     inline bool hasTemperature() { return DIFUnpacker::hasTemperature(theDIF_); }
00033     inline bool hasAnalogReadout() { return
DIFUnpacker::hasAnalogReadout(theDIF_); }
00034     inline std::uint32_t getNumberOfFrames() { return theFrames_.size(); }
00035     inline unsigned char* getFramePtr(uint32_t i) { return theFrames_[i]; }
00036     inline std::uint32_t getFrameAsicHeader(uint32_t i) { return
DIFUnpacker::getFrameAsicHeader(theFrames_[i]); }
00037     inline std::uint32_t getFrameBCID(uint32_t i) { return
DIFUnpacker::getFrameBCID(theFrames_[i]); }
00038     inline std::uint32_t getFrameTimeToTrigger(uint32_t i) { return getBCID() -
getFrameBCID(i); }
00039     inline bool getFrameLevel(uint32_t i, uint32_t ipad, uint32_t ilevel) {
return DIFUnpacker::getFrameLevel(theFrames_[i], ipad, ilevel); }
00040     void dumpDIFInfo()
00041     {
00042         printf("DIF %d DTC %d GTC %d ABCID %lld BCID %d Lines %d Temperature %d \n", getID(), getDTC(),
getGTC(), getAbsoluteBCID(), getBCID(), getLines(), hasTemperature());
00043
00044         if(hasTemperature()) printf("T: ASU1 %d %f ASU2 %d %f DIF %d %f \n", getTASU1(),
getTemperatureASU1(), getTASU2(), getTemperatureASU2(), getTDIF(), getTemperatureDIF());
00045         printf("Found %ld Lines and %ld Frames \n", theLines_.size(), theFrames_.size());
00046     }
00047     // Addition by GG
00048     inline uint32_t getDIFid() { return getID() & 0xFF; }
00049     inline uint32_t getASICid(uint32_t i) { return getFrameAsicHeader(i) & 0xFF; }
00050     inline uint32_t getThresholdStatus(uint32_t i, uint32_t ipad) { return (((uint32_t)getFrameLevel(i,
ipad, 1)) << 1) | ((uint32_t)getFrameLevel(i, ipad, 0))); }
00051
00052 private:
00053     std::uint32_t theSize_;
00054     std::uint32_t theGetFramePtrReturn_;
00055     unsigned char* theDIF_;
00056     std::vector<unsigned char*> theFrames_;
00057     std::vector<unsigned char*> theLines_;
00058 };

```

4.7 /home/runner/work/streamout/streamout/libs/core/include/DIFSlowControl.h File Reference

```

#include <bitset>
#include <cstdint>
#include <iostream>

```

```
#include <map>
#include <string>
```

Classes

- class [DIFSlowControl](#)
Handler of DIF Slow Control info.

4.7.1 Detailed Description

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Definition in file [DIFSlowControl.h](#).

4.8 DIFSlowControl.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <bitset>
00008 #include <cstdint>
00009 #include <iostream>
00010 #include <map>
00011 #include <string>
00020 class DIFSlowControl
00021 {
00022 public:
00024
00029 DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIFid, unsigned char* buf);
00030
00032 inline std::uint8_t getDIFid();
00033
00035
00038 inline std::map<int, std::map<std::string, int>> getChipsMap();
00039
00041
00045 inline std::map<std::string, int> getChipSlowControl(const int& asicid);
00046
00048
00052 inline int getChipSlowControl(const std::int8_t& asicid, const std::string& param);
00053
00055 void Dump();
00056
00057 private:
00059 DIFSlowControl() = delete;
00061 void FillHR1(const int& header_shift, unsigned char* cbuf);
00063 void FillHR2(const int& header_shift, unsigned char* cbuf);
00065 void FillAsicHR1(const std::bitset<72 * 8>& bs);
00067 void FillAsicHR2(const std::bitset<109 * 8>& bs);
00068
00069 unsigned int m_DIFid{0};
00070 unsigned int m_Version{0};
00071 unsigned int m_AsicType{0}; // asicType_
00072 unsigned int m_NbrAsic{0};
00073 std::map<int, std::map<std::string, int>> m_MapSC;
00074 };
```

4.9 /home/runner/work/streamout/streamout/libs/core/include/↵ DIFUnpacker.h File Reference

```
#include <cstdint>
#include <iostream>
#include <vector>
```

Classes

- class [DIFUnpacker](#)

4.9.1 Detailed Description

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Definition in file [DIFUnpacker.h](#).

4.10 DIFUnpacker.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <cstdint>
00008 #include <iostream>
00009 #include <vector>
00010
00011 class DIFUnpacker
00012 {
00013 public:
00014     static std::uint64_t GrayToBin(const std::uint64_t& n);
00015     static std::uint32_t getStartOfDIF(const unsigned char* cbuf, const std::uint32_t& size_buf, const
std::uint32_t& start = 92);
00016     static std::uint32_t getID(const unsigned char* cb, const std::uint32_t& idx = 0);
00017     static std::uint32_t getDTC(const unsigned char* cb, const std::uint32_t& idx = 0);
00018     static std::uint32_t getGTC(const unsigned char* cb, const std::uint32_t& idx = 0);
00019     static std::uint64_t getAbsoluteBCID(const unsigned char* cb, const std::uint32_t& idx = 0);
00020     static std::uint32_t getBCID(const unsigned char* cb, const std::uint32_t& idx = 0);
00021     static std::uint32_t getLines(const unsigned char* cb, const std::uint32_t& idx = 0);
00022     static bool hasLine(const std::uint32_t& line, const unsigned char* cb, const
std::uint32_t& idx = 0);
00023     static std::uint32_t getTASU1(const unsigned char* cb, const std::uint32_t& idx = 0);
00024     static std::uint32_t getTASU2(const unsigned char* cb, const std::uint32_t& idx = 0);
00025     static std::uint32_t getTDIF(const unsigned char* cb, const std::uint32_t& idx = 0);
00026     static bool hasTemperature(const unsigned char* cb, const std::uint32_t& idx = 0);
00027     static bool hasAnalogReadout(const unsigned char* cb, const std::uint32_t& idx = 0);
00028
00029     static std::uint32_t getFrameAsicHeader(const unsigned char* framePtr);
00030     static std::uint32_t getFrameBCID(const unsigned char* framePtr);
00031
00032     static bool getFramePAD(const unsigned char* framePtr, const std::uint32_t& ip);
00033     static bool getFrameLevel(const unsigned char* framePtr, const std::uint32_t& ip, const
std::uint32_t& level);
00034
00035     static std::uint32_t getAnalogPtr(std::vector<unsigned char*>& vLines, unsigned char* cb, const
std::uint32_t& idx = 0);
00036     static std::uint32_t getFramePtr(std::vector<unsigned char*>& vFrame, std::vector<unsigned char*>&
vLines, const std::uint32_t& max_size, unsigned char* cb, const std::uint32_t& idx = 0);
00037     static void dumpFrameOld(const unsigned char* buf);
00038     static std::uint32_t swap_bytes(const unsigned char* buf); // Stolen from DCBufferReader
00039 };
```


4.11 /home/runner/work/streamout/streamout/libs/core/include/SDHCAL_buffer_loop.h File Reference

```
#include "Buffer.h"
#include "SDHCAL_RawBuffer_Navigator.h"
#include "SDHCAL_buffer_LoopCounter.h"
#include <cassert>
#include <iostream>
#include <ostream>
```

Classes

- class [SDHCAL_buffer_loop< SOURCE, DESTINATION >](#)

4.11.1 Detailed Description

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Definition in file [SDHCAL_buffer_loop.h](#).

4.12 SDHCAL_buffer_loop.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include "Buffer.h"
00008 #include "SDHCAL_RawBuffer_Navigator.h"
00009 #include "SDHCAL_buffer_LoopCounter.h"
00010
00011 #include <cassert>
00012 #include <iostream>
00013 #include <ostream>
00014 // function to loop on buffers
00015 //
00016 // template class should implement
00017 // bool SOURCE::next();
00018 // SDHCAL_buffer SOURCE::getSDHCALBuffer();
00019 //
00020 // void DESTINATION::start();
00021 // void DESTINATION::processDIF(DIFPtr*);
00022 // void DESTINATION::processFrame(DIFPtr*,uint32_t frameIndex);
00023 // void DESTINATION::processPadInFrame(DIFPtr*,uint32_t frameIndex, uint32_t channelIndex);
00024 // void DESTINATION::processSlowControl(SDHCAL_buffer);
00025 // void DESTINATION::end();
00026 //
00027
00028 template<typename SOURCE, typename DESTINATION> class SDHCAL_buffer_loop
00029 {
00030 public:
00031     SDHCAL_buffer_loop(SOURCE& source, DESTINATION& dest, bool debug = false, std::ostream& out =
std::cout, bool verbose = false, std::ostream& verbose_out = std::cout) :
00032         m_Source(source), m_Destination(dest), m_Debug(debug), m_DebugOut(out), m_Verbose(verbose),
m_VerboseOut(verbose_out)
00033     {
00034     }
00035     void loop(const std::int32_t& m_NbrEventsToProcess = 0)
00036     {
00037         m_Destination.start();
00038         while(m_Source.nextEvent() && (m_NbrEventsToProcess == 0 || m_NbrEventsToProcess >= m_NbrEvents))
```

```

00039     {
00040         while(m_Source.nextDIFbuffer())
00041         {
00042             Buffer                buffer                = m_Source.getSDHCALBuffer();
00043             unsigned char*        debug_variable_1 = buffer.end();
00044             SDHCAL_RawBuffer_Navigator bufferNavigator(buffer);
00045             unsigned char*        debug_variable_2 = bufferNavigator.getDIFBuffer().end();
00046             if(m_Verbose) m_VerboseOut << "DIF BUFFER END " << (unsigned int*)debug_variable_1 << " " <<
(unsigned int*)debug_variable_2 << std::endl;
00047             if(m_Debug) assert(debug_variable_1 == debug_variable_2);
00048             uint32_t idstart = bufferNavigator.getStartOfDIF();
00049             if(m_Debug && idstart == 0) buffer.printBuffer();
00050             c.DIFStarter[idstart]++;
00051             if(!bufferNavigator.validBuffer()) continue;
00052             DIFPtr* d = bufferNavigator.getDIFPtr();
00053             if(m_Debug) assert(d != NULL);
00054             if(d != NULL)
00055             {
00056                 c.DIFPtrValueAtReturnedPos[bufferNavigator.getDIFBufferStart() [d->getGetFramePtrReturn()]]++;
00057                 if(m_Debug) assert(bufferNavigator.getDIFBufferStart() [d->getGetFramePtrReturn()] == 0xa0);
00058             }
00059             c.SizeAfterDIFPtr[bufferNavigator.getSizeAfterDIFPtr() ]++;
00060             m_Destination.processDIF(d);
00061             for(uint32_t i = 0; i < d->getNumberOfFrames(); i++)
00062             {
00063                 m_Destination.processFrame(d, i);
00064                 for(uint32_t j = 0; j < 64; j++) m_Destination.processPadInFrame(d, i, j);
00065             }
00066
00067             bool processSC = false;
00068             if(bufferNavigator.hasSlowControlData())
00069             {
00070                 c.hasSlowControl++;
00071                 processSC = true;
00072             }
00073             if(bufferNavigator.badSCData())
00074             {
00075                 c.hasBadSlowControl++;
00076                 processSC = false;
00077             }
00078             if(processSC) { m_Destination.processSlowControl(bufferNavigator.getSCBuffer()); }
00079
00080             Buffer eod = bufferNavigator.getEndOfAllData();
00081             c.SizeAfterAllData[eod.size() ]++;
00082             unsigned char* debug_variable_3 = eod.end();
00083             if(m_Verbose) m_VerboseOut << "END DATA BUFFER END " << (unsigned int*)debug_variable_1 << " " <<
(unsigned int*)debug_variable_3 << std::endl;
00084             if(m_Debug) assert(debug_variable_1 == debug_variable_3);
00085             if(m_Verbose)
00086             {
00087                 m_VerboseOut << "End of Data remaining stuff : ";
00088                 eod.printBuffer();
00089             }
00090
00091             int nonzeroCount = 0;
00092             for(unsigned char* it = eod.begin(); it != eod.end(); it++)
00093                 if(static_cast<int>(*it) != 0) nonzeroCount++;
00094             c.NonZeroValusAtEndOfData[nonzeroCount]++;
00095             } // end of DIF while loop
00096             m_NbrEvents++;
00097             } // end of event while loop
00098             m_Destination.end();
00099         }
00100     void printAllCounters() { c.printAllCounters(m_DebugOut); }
00101
00102 private:
00103     SDHCAL_buffer_LoopCounter c;
00104     SOURCE&                    m_Source;
00105     DESTINATION&               m_Destination;
00106     bool                       m_Debug{false};
00107     std::ostream&              m_DebugOut{std::cout};
00108     bool                       m_Verbose{false};
00109     std::ostream&              m_VerboseOut{std::cout};
00110     std::uint32_t              m_NbrEvents{1};
00111 };

```

4.13 /home/runner/work/streamout/streamout/libs/core/include/↵ SDHCAL_buffer_LoopCounter.h File Reference

```
#include <iostream>
#include <map>
#include <string>
```

Classes

- struct [SDHCAL_buffer_LoopCounter](#)

4.13.1 Detailed Description

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Definition in file [SDHCAL_buffer_LoopCounter.h](#).

4.14 SDHCAL_buffer_LoopCounter.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <iostream>
00008 #include <map>
00009 #include <string>
00010
00011 struct SDHCAL_buffer_LoopCounter
00012 {
00013 public:
00014     int             hasSlowControl      = 0;
00015     int             hasBadSlowControl   = 0;
00016     std::map<int, int> DIFStarter;
00017     std::map<int, int> DIFPtrValueAtReturnedPos;
00018     std::map<int, int> SizeAfterDIFPtr;
00019     std::map<int, int> SizeAfterAllData;
00020     std::map<int, int> NonZeroValusAtEndOfData;
00021
00022     void printCounter(const std::string& description, const std::map<int, int>& m, std::ostream& out =
std::cout);
00023     void printAllCounters(std::ostream& out = std::cout);
00024 };
```

4.15 /home/runner/work/streamout/streamout/libs/core/include/↵ SDHCAL_RawBuffer_Navigator.h File Reference

```
#include "Buffer.h"
#include "DIFPtr.h"
#include <iostream>
```

Classes

- class [SDHCAL_RawBuffer_Navigator](#)

4.15.1 Detailed Description

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Definition in file [SDHCAL_RawBuffer_Navigator.h](#).

4.16 SDHCAL_RawBuffer_Navigator.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include "Buffer.h"
00008 #include "DIFPtr.h"
00009
00010 #include <iostream>
00011 // class to navigate in the raw data buffer
00012 class SDHCAL_RawBuffer_Navigator
00013 {
00014 public:
00015     explicit SDHCAL_RawBuffer_Navigator(const Buffer& b, const int& start = -1);
00016     ~SDHCAL_RawBuffer_Navigator();
00017     bool        validBuffer();
00018     std::uint32_t getStartOfDIF();
00019     unsigned char* getDIFBufferStart();
00020     std::uint32_t getDIFBufferSize();
00021     Buffer        getDIFBuffer();
00022     DIFPtr*       getDIFPtr();
00023     std::uint32_t getEndOfDIFData();
00024     std::uint32_t getSizeAfterDIFPtr();
00025     std::uint32_t getDIF_CRC();
00026     bool        hasSlowControlData();
00027     Buffer        getSCBuffer();
00028     bool        badSCData();
00029     Buffer        getEndOfAllData();
00030     static void  StartAt(const int& start);
00031
00032 private:
00033     void        setSCBuffer();
00034     Buffer        m_Buffer;
00035     Buffer        m_SCbuffer;
00036     std::uint32_t m_DIFstartIndex{0};
00037     DIFPtr*       m_TheDIFPtr{nullptr};
00038     bool        m_BadSCdata{false};
00039     static int    m_Start;
00040 };
```

4.17 /home/runner/work/streamout/streamout/libs/core/include/Words.h

File Reference

Classes

- class [DU](#)

4.17.1 Detailed Description

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Definition in file [Words.h](#).

4.18 Words.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 class DU
00008 {
00009 public:
00010     static const std::uint32_t START_OF_DIF{0xB0};
00011     static const std::uint32_t START_OF_DIF_TEMP{0xBB};
00012     static const std::uint32_t END_OF_DIF{0xA0};
00013     static const std::uint32_t START_OF_LINES{0xC4};
00014     static const std::uint32_t END_OF_LINES{0xD4};
00015
00016     static const std::uint32_t START_OF_FRAME{0xB4};
00017     static const std::uint32_t END_OF_FRAME{0xA3};
00018
00019     static const std::uint32_t ID_SHIFT{1};
00020     static const std::uint32_t DTC_SHIFT{2};
00021     static const std::uint32_t GTC_SHIFT{10};
00022     static const std::uint32_t ABCID_SHIFT{14};
00023     static const std::uint32_t BCID_SHIFT{20};
00024     static const std::uint32_t LINES_SHIFT{23};
00025     static const std::uint32_t TASU1_SHIFT{24};
00026     static const std::uint32_t TASU2_SHIFT{28};
00027     static const std::uint32_t TDIF_SHIFT{32};
00028
00029     static const std::uint32_t FRAME_ASIC_HEADER_SHIFT{0};
00030     static const std::uint32_t FRAME_BCID_SHIFT{1};
00031     static const std::uint32_t FRAME_DATA_SHIFT{4};
00032     static const std::uint32_t FRAME_SIZE{20};
00033 };
```

4.19 /home/runner/work/streamout/streamout/libs/core/src/Bits.cc File Reference

```
#include "Bits.h"
#include <iostream>
```

Functions

- `std::ostream & operator<< (std::ostream &os, const bit8_t &c)`
Stream operator to print `bit8_t` aka `std::uint8_t` and not `char` or `unsigned char`.

4.19.1 Detailed Description

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Definition in file [Bits.cc](#).

4.19.2 Function Documentation

4.19.2.1 operator<<()

```
std::ostream & operator<< (
    std::ostream & os,
    const bit8_t & c )
```

Stream operator to print bit8_t aka std::uint8_t and not char or unsigned char.

Definition at line 10 of file [Bits.cc](#).

```
00010 { return os << c + 0; }
```

4.20 Bits.cc

[Go to the documentation of this file.](#)

```
00001
00006 #include "Bits.h"
00007
00008 #include <iostream>
00009
00010 std::ostream& operator<<(std::ostream& os, const bit8_t& c) { return os << c + 0; }
```

4.21 /home/runner/work/streamout/streamout/libs/core/src/Buffer.cc File Reference

```
#include "Buffer.h"
```

4.22 Buffer.cc

[Go to the documentation of this file.](#)

```
00001
00006 #include "Buffer.h"
00007
00008 void Buffer::printBuffer(unsigned int start, unsigned int stop, std::ostream& flux)
00009 {
00010     flux << std::hex;
00011     for(unsigned int k = start; k < stop; k++) flux << (unsigned int)(m_Buffer[k]) << " - ";
00012     flux << std::dec << std::endl;
00013 }
00014
00015 Buffer::~Buffer() { std::cout << "SDHCAL_buffer destructor called" << std::endl; }
```

4.23 /home/runner/work/streamout/streamout/libs/core/src/DIFPtr.cc File Reference

```
#include "DIFPtr.h"
```

4.24 DIFPtr.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "DIFPtr.h"
00006
00007 DIFPtr::DIFPtr(unsigned char* p, const std::uint32_t& max_size) : theDIF_(p), theSize_(max_size)
00008 {
00009     theFrames_.clear();
00010     theLines_.clear();
00011     try
00012     {
00013         theGetFramePtrReturn_ = DIFUnpacker::getFramePtr(theFrames_, theLines_, theSize_, theDIF_);
00014     }
00015     catch(std::string e)
00016     {
00017         std::cout << "DIF " << getID() << " T ? " << hasTemperature() << " " << e << std::endl;
00018     }
00019 }
```

4.25 /home/runner/work/streamout/streamout/libs/core/src/DIFSlowControl.cc File Reference

```
#include "DIFSlowControl.h"
#include <cstdint>
#include <iostream>
```

4.25.1 Detailed Description

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Definition in file [DIFSlowControl.cc](#).

4.26 DIFSlowControl.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "DIFSlowControl.h"
00006
00007 #include <cstdint>
00008 #include <iostream>
00009
00010 DIFSlowControl::DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIFId, unsigned char*
00011     cbuf) : m_Version(version), m_DIFId(DIFId), m_AsicType(2)
00012 {
00013     if(cbuf[0] != 0xb1) return;
00014     int header_shift{6};
00015     if(m_Version < 8) m_NbrAsic = cbuf[5];
00016     else
00017     {
00018         m_DIFId = cbuf[1];
00019         m_NbrAsic = cbuf[2];
00020         header_shift = 3;
00021     }
00022     int size_hardroc1 = m_NbrAsic * 72 + header_shift + 1;
00023     if(cbuf[size_hardroc1 - 1] != 0xal) size_hardroc1 = 0;
00024     int size_hardroc2 = m_NbrAsic * 109 + header_shift + 1;
00025     if(cbuf[size_hardroc2 - 1] != 0xal) size_hardroc2 = 0;
00026     if(size_hardroc1 != 0)
```

```

00027 {
00028     FillHR1(header_shift, cbuf);
00029     m_AsicType = 1;
00030 }
00031 else if(size_hardroc2 != 0)
00032     FillHR2(header_shift, cbuf);
00033 else
00034     return;
00035 }
00036
00037 inline std::uint8_t DIFSlowControl::getDIFId() { return m_DIFId; }
00038
00039 inline std::map<int, std::map<std::string, int> DIFSlowControl::getChipsMap() { return m_MapSC; }
00040
00041 inline std::map<std::string, int> DIFSlowControl::getChipSlowControl(const int& asicid) { return
    m_MapSC[asicid]; }
00042
00043 inline int DIFSlowControl::getChipSlowControl(const std::int8_t& asicid, const std::string& param) {
    return getChipSlowControl(asicid)[param]; }
00044
00045 void DIFSlowControl::Dump()
00046 {
00047     for(std::map<int, std::map<std::string, int>::iterator it = m_MapSC.begin(); it != m_MapSC.end();
        it++)
00048     {
00049         std::cout << "ASIC " << it->first << std::endl;
00050         for(std::map<std::string, int>::iterator jt = (it->second).begin(); jt != (it->second).end();
            jt++) std::cout << jt->first << " : " << jt->second << std::endl;
00051     }
00052 }
00053
00054 void DIFSlowControl::FillHR1(const int& header_shift, unsigned char* cbuf)
00055 {
00056     int nasic{cbuf[header_shift - 1]};
00057     int idx{header_shift};
00058     for(int k = 0; k < nasic; k++)
00059     {
00060         std::bitset<72 * 8> bs;
00061         // printf("%x %x \n",cbuf[idx+k*72+69],cbuf[idx+k*72+70]);
00062         for(int l = 71; l >= 0; l--)
00063         {
00064             // printf("%d %x : %d -->",l,cbuf[idx+k*72+1],(71-l)*8);
00065             for(int m = 0; m < 8; m++)
00066             {
00067                 if(((1 < m) & cbuf[idx + k * 72 + 1]) != 0) bs.set((71 - l) * 8 + m, 1);
00068                 else
00069                     bs.set((71 - l) * 8 + m, 0);
00070                 // printf("%d", (int) bs[(71-l)*8+m]);
00071             }
00072             // printf("\n");
00073         }
00074         FillAsicHR1(bs);
00075     }
00076 }
00077
00078 void DIFSlowControl::FillHR2(const int& header_shift, unsigned char* cbuf)
00079 {
00080     // int scsizer=cbuf[header_shift-1]*109+(header_shift-1)+2;
00081     int nasic{cbuf[header_shift - 1]};
00082     int idx{header_shift};
00083     // std::cout<<" DIFSlowControl::FillHR nasic "<<nasic<<std::endl;
00084     for(int k = 0; k < nasic; k++)
00085     {
00086         std::bitset<109 * 8> bs;
00087         // printf("%x %x \n",cbuf[idx+k*109+69],cbuf[idx+k*109+70]);
00088         for(int l = 108; l >= 0; l--)
00089         {
00090             // printf("%d %x : %d -->",l,cbuf[idx+k*109+1],(71-l)*8);
00091             for(int m = 0; m < 8; m++)
00092             {
00093                 if(((1 < m) & cbuf[idx + k * 109 + 1]) != 0) bs.set((108 - l) * 8 + m, 1);
00094                 else
00095                     bs.set((108 - l) * 8 + m, 0);
00096                 // printf("%d", (int) bs[(71-l)*8+m]);
00097             }
00098             // printf("\n");
00099         }
00100         FillAsicHR2(bs);
00101     }
00102 }
00103
00104 void DIFSlowControl::FillAsicHR1(const std::bitset<72 * 8>& bs)
00105 {
00106     // Asic Id
00107     int asicid{0};
00108     for(int j = 0; j < 8; j++)
00109         if(bs[j + 9] != 0) asicid += (1 << (7 - j));

```



```

00110     std::map<std::string, int> mAsic;
00111     // Slow Control
00112     mAsic["SSC0"] = static_cast<int>(bs[575]);
00113     mAsic["SSC1"] = static_cast<int>(bs[574]);
00114     mAsic["SSC2"] = static_cast<int>(bs[573]);
00115     mAsic["Choix_caisson"] = static_cast<int>(bs[572]);
00116     mAsic["SW_50k"] = static_cast<int>(bs[571]);
00117     mAsic["SW_100k"] = static_cast<int>(bs[570]);
00118     mAsic["SW_100f"] = static_cast<int>(bs[569]);
00119     mAsic["SW_50f"] = static_cast<int>(bs[568]);
00120
00121     mAsic["Valid_DC"] = static_cast<int>(bs[567]);
00122     mAsic["ON_Discr"] = static_cast<int>(bs[566]);
00123     mAsic["ON_Fsb"] = static_cast<int>(bs[565]);
00124     mAsic["ON_Otaq"] = static_cast<int>(bs[564]);
00125     mAsic["ON_W"] = static_cast<int>(bs[563]);
00126     mAsic["ON_Ss"] = static_cast<int>(bs[562]);
00127     mAsic["ON_Buf"] = static_cast<int>(bs[561]);
00128     mAsic["ON_Paf"] = static_cast<int>(bs[560]);
00129     // Gain
00130     for(int i = 0; i < 64; i++)
00131     {
00132         int gain{0};
00133         for(int j = 0; j < 6; j++)
00134             if(bs[176 + i * 6 + j] != 0) gain += (1 << j);
00135         mAsic["Channel_" + std::to_string(i) + "_" + "Gain"] = gain;
00136         mAsic["Channel_" + std::to_string(i) + "_" + "cTest"] = bs[112 + i];
00137         mAsic["Channel_" + std::to_string(i) + "_" + "Valid_trig"] = static_cast<int>(bs[25 + i]);
00138     }
00139
00140     mAsic["ON_Otabg"] = static_cast<int>(bs[111]);
00141     mAsic["ON_Dac"] = static_cast<int>(bs[110]);
00142     mAsic["ON_Otadac"] = static_cast<int>(bs[109]);
00143     // DAC
00144     int dac1{0};
00145     for(int j = 0; j < 10; j++)
00146         if(bs[j + 99] != 0) dac1 += (1 << j);
00147     mAsic["DAC1"] = dac1;
00148     int dac0{0};
00149     for(int j = 0; j < 10; j++)
00150         if(bs[j + 89] != 0) dac0 += (1 << j);
00151     mAsic["DAC0"] = dac0;
00152     mAsic["EN_Raz_Ext"] = static_cast<int>(bs[23]);
00153     mAsic["EN_Raz_Int"] = static_cast<int>(bs[22]);
00154     mAsic["EN_Out_Raz_Int"] = static_cast<int>(bs[21]);
00155     mAsic["EN_Trig_Ext"] = static_cast<int>(bs[20]);
00156     mAsic["EN_Trig_Int"] = static_cast<int>(bs[19]);
00157     mAsic["EN_Out_Trig_Int"] = static_cast<int>(bs[18]);
00158     mAsic["Bypass_Chip"] = static_cast<int>(bs[17]);
00159     mAsic["HardrocHeader"] = static_cast<int>(asicid);
00160     mAsic["EN_Out_Discr"] = static_cast<int>(bs[8]);
00161     mAsic["EN_Transmit_On"] = static_cast<int>(bs[7]);
00162     mAsic["EN_Dout"] = static_cast<int>(bs[6]);
00163     mAsic["EN_RamFull"] = static_cast<int>(bs[5]);
00164     m_MapSC[asicid] = mAsic;
00165 }
00166
00167 void DIFSlowControl::FillAsicHR2(const std::bitset<109 * 8>& bs)
00168 {
00169     int asicid{0};
00170     for(int j = 0; j < 8; j++)
00171         if(bs[j + (108 - 7) * 8 + 2] != 0) asicid += (1 << (7 - j));
00172     std::map<std::string, int> mAsic;
00173     for(int i = 0; i < 64; i++)
00174     {
00175         int gain{0};
00176         int mask{0};
00177         mAsic["Channel_" + std::to_string(i) + "_" + "cTest"] = bs[i];
00178         for(int j = 0; j < 8; j++)
00179             if(bs[64 + i * 8 + j] != 0) gain += (1 << j);
00180         mAsic["Channel_" + std::to_string(i) + "_" + "Gain"] = gain;
00181         for(int j = 0; j < 3; j++)
00182             if(bs[8 * 77 + 2 + i * 3 + j] != 0) mask += (1 << j);
00183         mAsic["Channel_" + std::to_string(i) + "_" + "Mask"] = mask;
00184     }
00185     mAsic["PwrOnPA"] = static_cast<int>(bs[8 * 72]);
00186     mAsic["Cmdb3SS"] = static_cast<int>(bs[8 * 72 + 1]);
00187     mAsic["Cmdb2SS"] = static_cast<int>(bs[8 * 72 + 2]);
00188     mAsic["Cmdb1SS"] = static_cast<int>(bs[8 * 72 + 3]);
00189     mAsic["Cmdb0SS"] = static_cast<int>(bs[8 * 72 + 4]);
00190     mAsic["SwSsc0"] = static_cast<int>(bs[8 * 72 + 5]);
00191     mAsic["SwSsc1"] = static_cast<int>(bs[8 * 72 + 6]);
00192     mAsic["SwSsc2"] = static_cast<int>(bs[8 * 72 + 7]);
00193
00194     mAsic["PwrOnBuff"] = static_cast<int>(bs[8 * 73]);
00195     mAsic["PwrOnSS"] = static_cast<int>(bs[8 * 73 + 1]);
00196     mAsic["PwrOnW"] = static_cast<int>(bs[8 * 73 + 2]);

```

```

00197 mAsic["Cmdb3Fsb2"] = static_cast<int>(bs[8 * 73 + 3]);
00198 mAsic["Cmdb2Fsb2"] = static_cast<int>(bs[8 * 73 + 4]);
00199 mAsic["Cmdb1Fsb2"] = static_cast<int>(bs[8 * 73 + 5]);
00200 mAsic["Cmdb0Fsb2"] = static_cast<int>(bs[8 * 73 + 6]);
00201 mAsic["Sw50k2"] = static_cast<int>(bs[8 * 73 + 7]);
00202
00203 mAsic["Sw100k2"] = static_cast<int>(bs[8 * 74]);
00204 mAsic["Sw100f2"] = static_cast<int>(bs[8 * 74 + 1]);
00205 mAsic["Sw50f2"] = static_cast<int>(bs[8 * 74 + 2]);
00206 mAsic["Cmdb3Fsb1"] = static_cast<int>(bs[8 * 74 + 3]);
00207 mAsic["Cmdb2Fsb1"] = static_cast<int>(bs[8 * 74 + 4]);
00208 mAsic["Cmdb1Fsb1"] = static_cast<int>(bs[8 * 74 + 5]);
00209 mAsic["Cmdb0Fsb1"] = static_cast<int>(bs[8 * 74 + 6]);
00210 mAsic["Sw50k1"] = static_cast<int>(bs[8 * 74 + 7]);
00211
00212 mAsic["Sw100k1"] = static_cast<int>(bs[8 * 75]);
00213 mAsic["Sw100f1"] = static_cast<int>(bs[8 * 75 + 1]);
00214 mAsic["Sw50f1"] = static_cast<int>(bs[8 * 75 + 2]);
00215 mAsic["Sel0"] = static_cast<int>(bs[8 * 75 + 3]);
00216 mAsic["Sel1"] = static_cast<int>(bs[8 * 75 + 4]);
00217 mAsic["PwrOnFsb"] = static_cast<int>(bs[8 * 75 + 5]);
00218 mAsic["PwrOnFsb1"] = static_cast<int>(bs[8 * 75 + 6]);
00219 mAsic["PwrOnFsb2"] = static_cast<int>(bs[8 * 75 + 7]);
00220
00221 mAsic["Sw50k0"] = static_cast<int>(bs[8 * 76]);
00222 mAsic["Sw100k0"] = static_cast<int>(bs[8 * 76 + 1]);
00223 mAsic["Sw100f0"] = static_cast<int>(bs[8 * 76 + 2]);
00224 mAsic["Sw50f0"] = static_cast<int>(bs[8 * 76 + 3]);
00225 mAsic["EnOtaQ"] = static_cast<int>(bs[8 * 76 + 4]);
00226 mAsic["OtaQ_PwrADC"] = static_cast<int>(bs[8 * 76 + 5]);
00227 mAsic["Discri_PwrA"] = static_cast<int>(bs[8 * 76 + 6]);
00228 mAsic["Discri2"] = static_cast<int>(bs[8 * 76 + 7]);
00229
00230 mAsic["Discri1"] = static_cast<int>(bs[8 * 77]);
00231 mAsic["RS_or_Discri"] = static_cast<int>(bs[8 * 77 + 1]);
00232
00233 mAsic["Header"] = asicid;
00234 for(int i = 0; i < 3; i++)
00235 {
00236     int B = 0;
00237     for(int j = 0; j < 10; j++)
00238         if(bs[8 * 102 + 2 + i * 10 + j] != 0) B += (1 << j);
00239     mAsic["B" + std::to_string(i)] = B;
00240 }
00241
00242 mAsic["Smallldac"] = static_cast<int>(bs[8 * 106]);
00243 mAsic["DacSw"] = static_cast<int>(bs[8 * 106 + 1]);
00244 mAsic["OtagBgSw"] = static_cast<int>(bs[8 * 106 + 2]);
00245 mAsic["Trig2b"] = static_cast<int>(bs[8 * 106 + 3]);
00246 mAsic["Trig1b"] = static_cast<int>(bs[8 * 106 + 4]);
00247 mAsic["Trig0b"] = static_cast<int>(bs[8 * 106 + 5]);
00248 mAsic["EnTrigOut"] = static_cast<int>(bs[8 * 106 + 6]);
00249 mAsic["DiscrOrOr"] = static_cast<int>(bs[8 * 106 + 7]);
00250
00251 mAsic["TrigExtVal"] = static_cast<int>(bs[8 * 107]);
00252 mAsic["RazChnIntVal"] = static_cast<int>(bs[8 * 107 + 1]);
00253 mAsic["RazChnExtVal"] = static_cast<int>(bs[8 * 107 + 2]);
00254 mAsic["ScOn"] = static_cast<int>(bs[8 * 107 + 3]);
00255 mAsic["CLKMux"] = static_cast<int>(bs[8 * 107 + 4]);
00256
00257 // EnOCDout1b EnOCDout2b EnOCTransmitOn1b EnOCTransmitOn2b EnOCChipsatb SelStartReadout
SelEndReadout
00258 mAsic["SelEndReadout"] = static_cast<int>(bs[8 * 108 + 1]);
00259 mAsic["SelStartReadout"] = static_cast<int>(bs[8 * 108 + 2]);
00260 mAsic["EnOCChipsatb"] = static_cast<int>(bs[8 * 108 + 3]);
00261 mAsic["EnOCTransmitOn2b"] = static_cast<int>(bs[8 * 108 + 4]);
00262 mAsic["EnOCTransmitOn1b"] = static_cast<int>(bs[8 * 108 + 5]);
00263 mAsic["EnOCDout2b"] = static_cast<int>(bs[8 * 108 + 6]);
00264 mAsic["EnOCDout1b"] = static_cast<int>(bs[8 * 108 + 7]);
00265 m_MapSC[asicid] = mAsic;
00266 }

```

4.27 /home/runner/work/streamout/streamout/libs/core/src/↵ DIFUnpacker.cc File Reference

```

#include "DIFUnpacker.h"
#include "Words.h"
#include <bitset>
#include <cstdint>

```

```
#include <iostream>
```

4.27.1 Detailed Description

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Definition in file [DIFUnpacker.cc](#).

4.28 DIFUnpacker.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "DIFUnpacker.h"
00006
00007 #include "Words.h"
00008
00009 #include <bitset>
00010 #include <cstdint>
00011 #include <iostream>
00012
00013 std::uint64_t DIFUnpacker::GrayToBin(const std::uint64_t& n)
00014 {
00015     std::uint64_t ish{1};
00016     std::uint64_t anss{n};
00017     std::uint64_t idiv{0};
00018     std::uint64_t ishmax{sizeof(std::uint64_t) * 8};
00019     while(true)
00020     {
00021         idiv = anss » ish;
00022         anss ^= idiv;
00023         if(idiv <= 1 || ish == ishmax) return anss;
00024         ish «= 1;
00025     }
00026 }
00027
00028 std::uint32_t DIFUnpacker::getStartOfDIF(const unsigned char* cbuf, const std::uint32_t& size_buf,
00029     const std::uint32_t& start)
00030 {
00031     std::uint32_t id0{0};
00032     for(std::uint32_t i = start; i < size_buf; i++)
00033     {
00034         if(cbuf[i] != DU::START_OF_DIF && cbuf[i] != DU::START_OF_DIF_TEMP) continue;
00035         id0 = i;
00036         // if (cbuf[id0+DU::ID_SHIFT]>0xFF) continue;
00037         break;
00038     }
00039     return id0;
00040 }
00041
00042 std::uint32_t DIFUnpacker::getID(const unsigned char* cb, const std::uint32_t& idx) { return cb[idx +
00043     DU::ID_SHIFT]; }
00044
00045 std::uint32_t DIFUnpacker::getDTC(const unsigned char* cb, const std::uint32_t& idx) { return (cb[idx
00046     + DU::DTC_SHIFT] « 24) + (cb[idx + DU::DTC_SHIFT + 1] « 16) + (cb[idx + DU::DTC_SHIFT + 2] « 8) +
00047     cb[idx + DU::DTC_SHIFT + 3]; }
00048
00049 std::uint32_t DIFUnpacker::getGTC(const unsigned char* cb, const std::uint32_t& idx) { return (cb[idx
00050     + DU::GTC_SHIFT] « 24) + (cb[idx + DU::GTC_SHIFT + 1] « 16) + (cb[idx + DU::GTC_SHIFT + 2] « 8) +
00051     cb[idx + DU::GTC_SHIFT + 3]; }
00052
00053 std::uint64_t DIFUnpacker::getAbsoluteBCID(const unsigned char* cb, const std::uint32_t& idx)
00054 {
00055     std::uint64_t Shift{16777216ULL}; // to shift the value from the 24 first bits
00056     std::uint64_t pos{idx + DU::ABCID_SHIFT};
00057     std::uint64_t LBC = ((cb[pos] « 16) | (cb[pos + 1] « 8) | (cb[pos + 2])) * Shift + ((cb[pos + 3] «
00058     16) | (cb[pos + 4] « 8) | (cb[pos + 5]));
00059     return LBC;
00060 }
```

```

00055 std::uint32_t DIFUnpacker::getBCID(const unsigned char* cb, const std::uint32_t& idx) { return (cb[idx
+ DU::BCID_SHIFT] << 16) + (cb[idx + DU::BCID_SHIFT + 1] << 8) + cb[idx + DU::BCID_SHIFT + 2]; }
00056 std::uint32_t DIFUnpacker::getLines(const unsigned char* cb, const std::uint32_t& idx) { return
(cb[idx + DU::LINES_SHIFT] >> 4) & 0x5; }
00057
00058 bool DIFUnpacker::hasLine(const std::uint32_t& line, const unsigned char* cb, const std::uint32_t&
idx) { return ((cb[idx + DU::LINES_SHIFT] >> line) & 0x1); }
00059
00060 std::uint32_t DIFUnpacker::getTASU1(const unsigned char* cb, const std::uint32_t& idx) { return
(cb[idx + DU::TASU1_SHIFT] << 24) + (cb[idx + DU::TASU1_SHIFT + 1] << 16) + (cb[idx + DU::TASU1_SHIFT +
2] << 8) + cb[idx + DU::TASU1_SHIFT + 3]; }
00061
00062 std::uint32_t DIFUnpacker::getTASU2(const unsigned char* cb, const std::uint32_t& idx) { return
(cb[idx + DU::TASU2_SHIFT] << 24) + (cb[idx + DU::TASU2_SHIFT + 1] << 16) + (cb[idx + DU::TASU2_SHIFT +
2] << 8) + cb[idx + DU::TASU2_SHIFT + 3]; }
00063
00064 std::uint32_t DIFUnpacker::getTDIF(const unsigned char* cb, const std::uint32_t& idx) { return (cb[idx
+ DU::TDIF_SHIFT]); }
00065
00066 bool DIFUnpacker::hasTemperature(const unsigned char* cb, const std::uint32_t& idx) { return (cb[idx]
== DU::START_OF_DIF_TEMP); }
00067
00068 bool DIFUnpacker::hasAnalogReadout(const unsigned char* cb, const std::uint32_t& idx) { return
(DIFUnpacker::getLines(cb, idx) != 0); }
00069
00070 std::uint32_t DIFUnpacker::getFrameAsicHeader(const unsigned char* framePtr) { return
(framePtr[DU::FRAME_ASIC_HEADER_SHIFT]); }
00071
00072 std::uint32_t DIFUnpacker::getFrameBCID(const unsigned char* framePtr)
00073 {
00074     std::uint32_t igray = (framePtr[DU::FRAME_BCID_SHIFT] << 16) + (framePtr[DU::FRAME_BCID_SHIFT + 1] <<
8) + framePtr[DU::FRAME_BCID_SHIFT + 2];
00075     return DIFUnpacker::GrayToBin(igray);
00076 }
00077
00078 bool DIFUnpacker::getFramePAD(const unsigned char* framePtr, const std::uint32_t& ip)
00079 {
00080     std::uint32_t* iframe{(std::uint32_t*)&framePtr[DU::FRAME_DATA_SHIFT]};
00081     return ((iframe[3 - ip / 32] >> (ip % 32)) & 0x1);
00082 }
00083
00084 bool DIFUnpacker::getFrameLevel(const unsigned char* framePtr, const std::uint32_t& ip, const
std::uint32_t& level) { return ((framePtr[DU::FRAME_DATA_SHIFT + ((3 - ip / 16) * 4 + (ip % 16) / 4)]
>> (7 - (((ip % 16) % 4) * 2 + level))) & 0x1); }
00085
00086 std::uint32_t DIFUnpacker::getAnalogPtr(std::vector<unsigned char*>& vLines, unsigned char* cb, const
std::uint32_t& idx)
00087 {
00088     std::uint32_t fshift{idx};
00089     if(cb[fshift] != DU::START_OF_LINES) return fshift;
00090     fshift++;
00091     while(cb[fshift] != DU::END_OF_LINES)
00092     {
00093         vLines.push_back(&cb[fshift]);
00094         std::uint32_t nchip{cb[fshift]};
00095         fshift += 1 + nchip * 64 * 2;
00096     }
00097     return fshift++;
00098 }
00099
00100 std::uint32_t DIFUnpacker::getFramePtr(std::vector<unsigned char*>& vFrame, std::vector<unsigned
char*>& vLines, const std::uint32_t& max_size, unsigned char* cb, const std::uint32_t& idx)
00101 {
00102     std::uint32_t fshift{0};
00103     if(DATA_FORMAT_VERSION >= 13)
00104     {
00105         fshift = idx + DU::LINES_SHIFT + 1;
00106         if(DIFUnpacker::hasTemperature(cb, idx)) fshift = idx + DU::TDIF_SHIFT + 1;
00107         // jenlev 1
00108         if(DIFUnpacker::hasAnalogReadout(cb, idx)) fshift = DIFUnpacker::getAnalogPtr(vLines, cb, fshift);
00109         // to be implemented
00110     }
00111     else
00112     {
00113         std::uint32_t fshift = idx + DU::BCID_SHIFT + 3;
00114         if(cb[fshift] != DU::START_OF_FRAME)
00115         {
00116             std::cout << "This is not a start of frame " << cb[fshift] << "\n";
00117             return fshift;
00118         }
00119         do {
00120             // printf("fshift %d and %d \n", fshift, max_size);
00121             if(cb[fshift] == DU::END_OF_DIF) return fshift;
00122             if(cb[fshift] == DU::START_OF_FRAME) fshift++;
00123             if(cb[fshift] == DU::END_OF_FRAME)
00124             {
00125                 fshift++;
00126                 continue;
00127             }
00128         } while(fshift < max_size);
00129     }
00130 }

```

```

00124     }
00125     std::uint32_t header = DIFUnpacker::getFrameAsicHeader(&cb[fshift]);
00126     if(header == DU::END_OF_FRAME) return (fshift + 2);
00127     // std::cout<<header<<" " <<fshift<<std::endl;
00128     if(header < 1 || header > 48) { throw header + " Header problem " + fshift; }
00129     vFrame.push_back(&cb[fshift]);
00130     fshift += DU::FRAME_SIZE;
00131     if(fshift > max_size)
00132     {
00133         std::cout << "fshift " << fshift << " exceed " << max_size << "\n";
00134         return fshift;
00135     }
00136     if(cb[fshift] == DU::END_OF_FRAME) fshift++;
00137 } while(true);
00138 }
00139
00140 void DIFUnpacker::dumpFrameOld(const unsigned char* buf)
00141 {
00142     bool PAD[128];
00143     bool l0[64];
00144     bool l1[64];
00145     std::uint8_t un{1};
00146     for(std::size_t ip = 0; ip < 128; ip++) { PAD[ip] = false; } // init PADs
00147     std::uint32_t idx1{4};
00148     for(int ik = 0; ik < 4; ik++)
00149     {
00150         std::uint32_t PadEtat{swap_bytes(&buf[idx1])};
00151         idx1 += 4;
00152         for(int e = 0; e < 32; e++)
00153         {
00154             PAD[(3 - ik) * 32 + (31 - e)] = PadEtat & un; // binary operation
00155             PadEtat = PadEtat >> 1; // décalage des bit de 1
00156         }
00157     }
00158     // fill bool arrays
00159     for(int p = 0; p < 64; p++)
00160     {
00161         l0[p] = static_cast<bool>(PAD[(2 * p)]); // _Lev0 (PAD paire)
00162         l1[p] = static_cast<bool>(PAD[(2 * p) + 1]); // _Lev1 (PAD impaires)
00163     }
00164     std::bitset<64> bs0(0);
00165     std::bitset<64> bs1(0);
00166     for(std::uint32_t ip = 0; ip < 64; ip++)
00167     {
00168         bs0.set(ip, l0[ip]);
00169         bs1.set(ip, l1[ip]);
00170     }
00171     std::cout << "\t \t" << bs0 << std::endl;
00172     std::cout << "\t \t" << bs1 << std::endl;
00173 }
00174
00175 std::uint32_t DIFUnpacker::swap_bytes(const unsigned char* buf)
00176 {
00177     unsigned char Swapped[4];
00178     for(std::size_t i = 0; i < 4; i++) Swapped[i] = buf[4 - 1 - i];
00179     return *reinterpret_cast<std::uint32_t*>(&Swapped[0]);
00180 }

```

4.29 /home/runner/work/streamout/streamout/libs/core/src/SDHCAL_buffer_LoopCounter.cc File Reference

```
#include "SDHCAL_buffer_LoopCounter.h"
```

4.29.1 Detailed Description

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Definition in file [SDHCAL_buffer_LoopCounter.cc](#).

4.30 SDHCAL_buffer_LoopCounter.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "SDHCAL_buffer_LoopCounter.h"
00006
00007 void SDHCAL_buffer_LoopCounter::printAllCounters(std::ostream& out)
00008 {
00009     out << "BUFFER LOOP FINAL STATISTICS : " << std::endl;
00010     printCounter("Start of DIF header", DIFStarter, out);
00011     printCounter("Value after DIF data are processed", DIFPtrValueAtReturnedPos, out);
00012     printCounter("Size remaining in buffer after end of DIF data", SizeAfterDIFPtr, out);
00013     out << "Number of Slow Control found " << hasSlowControl << " out of which " << hasBadSlowControl << "
are bad" << std::endl;
00014     printCounter("Size remaining after all of data have been processed", SizeAfterAllData, out);
00015     printCounter("Number on non zero values in end of data buffer", NonZeroValusAtEndOfData, out);
00016 }
00017
00018 void SDHCAL_buffer_LoopCounter::printCounter(const std::string& description, const std::map<int, int>&
m, std::ostream& out)
00019 {
00020     out << " statistics for " << description << " : ";
00021     for(std::map<int, int>::const_iterator it = m.begin(); it != m.end(); it++)
00022     {
00023         if(it != m.begin()) out << ",";
00024         out << " [" << it->first << "]= " << it->second;
00025     }
00026     out << std::endl;
00027 }
```

4.31 /home/runner/work/streamout/streamout/libs/core/src/SDHCAL_RawBuffer_Navigator.cc File Reference

```
#include "SDHCAL_RawBuffer_Navigator.h"
```

4.31.1 Detailed Description

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Definition in file [SDHCAL_RawBuffer_Navigator.cc](#).

4.32 SDHCAL_RawBuffer_Navigator.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "SDHCAL_RawBuffer_Navigator.h"
00006
00007 int SDHCAL_RawBuffer_Navigator::m_Start = 92;
00008
00009 void SDHCAL_RawBuffer_Navigator::StartAt(const int& start)
00010 {
00011     if(start >= 0) m_Start = start;
00012 }
00013
00014 SDHCAL_RawBuffer_Navigator::SDHCAL_RawBuffer_Navigator(const Buffer& b, const int& start) :
m_Buffer(b)
00015 {
00016     StartAt(start);
00017     m_DIFstartIndex = DIFUnpacker::getStartOfDIF(m_Buffer.begin(), m_Buffer.size(), m_Start);
00018 }
00019
```

```

00020 SDHCAL_RawBuffer_Navigator::~SDHCAL_RawBuffer_Navigator()
00021 {
00022     if(m_TheDIFPtr != nullptr) delete m_TheDIFPtr;
00023 }
00024
00025 bool SDHCAL_RawBuffer_Navigator::validBuffer() { return m_DIFstartIndex != 0; }
00026
00027 std::uint32_t SDHCAL_RawBuffer_Navigator::getStartOfDIF() { return m_DIFstartIndex; }
00028
00029 unsigned char* SDHCAL_RawBuffer_Navigator::getDIFBufferStart() { return
    &(m_Buffer.begin()[m_DIFstartIndex]); }
00030
00031 std::uint32_t SDHCAL_RawBuffer_Navigator::getDIFBufferSize() { return m_Buffer.size() -
    m_DIFstartIndex; }
00032
00033 Buffer SDHCAL_RawBuffer_Navigator::getDIFBuffer() { return Buffer(getDIFBufferStart(),
    getDIFBufferSize()); }
00034
00035 DIFPtr* SDHCAL_RawBuffer_Navigator::getDIFPtr()
00036 {
00037     if(m_TheDIFPtr == nullptr) m_TheDIFPtr = new DIFPtr(getDIFBufferStart(), getDIFBufferSize());
00038     return m_TheDIFPtr;
00039 }
00040
00041 std::uint32_t SDHCAL_RawBuffer_Navigator::getEndOfDIFData() { return
    getDIFPtr()->getGetFramePtrReturn() + 3; }
00042
00043 std::uint32_t SDHCAL_RawBuffer_Navigator::getSizeAfterDIFPtr() { return getDIFBufferSize() -
    getDIFPtr()->getGetFramePtrReturn(); }
00044
00045 uint32_t SDHCAL_RawBuffer_Navigator::getDIF_CRC()
00046 {
00047     uint32_t i{getEndOfDIFData()};
00048     uint32_t ret{0};
00049     ret |= (m_Buffer.begin()[i - 2]) << 8;
00050     ret |= m_Buffer.begin()[i - 1];
00051     return ret;
00052 }
00053
00054 bool SDHCAL_RawBuffer_Navigator::hasSlowControlData() { return getDIFBufferStart()[getEndOfDIFData()]
    == 0xb1; }
00055
00056 Buffer SDHCAL_RawBuffer_Navigator::getSCBuffer()
00057 {
00058     setSCBuffer();
00059     return m_SCbuffer;
00060 }
00061
00062 bool SDHCAL_RawBuffer_Navigator::badSCData()
00063 {
00064     setSCBuffer();
00065     return m_BadSCdata;
00066 }
00067
00068 void SDHCAL_RawBuffer_Navigator::setSCBuffer()
00069 {
00070     if(!hasSlowControlData()) return;
00071     if(m_SCbuffer.size() != 0) return; // deja fait
00072     if(m_BadSCdata) return;
00073     m_SCbuffer.set(&(getDIFBufferStart()[getEndOfDIFData()]));
00074     // compute Slow Control size
00075     std::size_t maxsize{m_Buffer.size() - m_DIFstartIndex - getEndOfDIFData() + 1}; // should I +1 here
    ?
00076     uint32_t k{1}; // SC Header
00077     uint32_t dif_ID{m_SCbuffer[1]};
00078     uint32_t chipSize{m_SCbuffer[3]};
00079     while((dif_ID != 0x01 && m_SCbuffer[k] != 0x01 && k < maxsize) || (dif_ID == 0x01 && m_SCbuffer[k +
    2] == chipSize && k < maxsize))
    {
00080     {
00081         k += 2; // DIF ID + ASIC Header
00082         uint32_t scsize = m_SCbuffer[k];
00083         if(scsize != 74 && scsize != 109)
00084         {
00085             std::cout << "PROBLEM WITH SC SIZE " << scsize << std::endl;
00086             k = 0;
00087             m_BadSCdata = true;
00088             break;
00089         }
00090         k++; // skip size bit
00091         k += scsize; // skip the data
00092     }
00093     if(m_SCbuffer[k] == 0x01 && !m_BadSCdata) m_SCbuffer.setSize(k + 1); // add the trailer
00094     else
00095     {
00096         m_BadSCdata = true;
00097         std::cout << "PROBLEM SC TRAILER NOT FOUND " << std::endl;
00098     }
    }

```

```

00099 }
00100
00101 Buffer SDHCAL_RawBuffer_Navigator::getEndOfAllData()
00102 {
00103     setSCBuffer();
00104     if(hasSlowControlData() && !m_BadSCdata) { return Buffer(&(m_SCbuffer.begin()[m_SCbuffer.size()]),
00105         getSizeAfterDIFPtr() - 3 - m_SCbuffer.size()); }
00106     else
00107         return Buffer(&(getDIFBufferStart()[getEndOfDIFData()]), getSizeAfterDIFPtr() - 3); // remove the
00108         2 bytes for CRC and the DIF trailer
00109 }

```

4.33 /home/runner/work/streamout/streamout/libs/interface/↵ Dump/include/textDump.h File Reference

```

#include "Buffer.h"
#include "DIFPtr.h"
#include <iostream>
#include <ostream>

```

Classes

- class [textDump](#)

4.33.1 Detailed Description

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Definition in file [textDump.h](#).

4.34 textDump.h

[Go to the documentation of this file.](#)

```

00001
00005 #pragma once
00006
00007 #include "Buffer.h"
00008 #include "DIFPtr.h"
00009
00010 #include <iostream>
00011 #include <ostream>
00012
00013 class textDump
00014 {
00015 public:
00016     explicit textDump(std::ostream& out = std::cout) : _out(out) { ; }
00017     void start();
00018     void processDIF(DIFPtr*);
00019     void processFrame(DIFPtr*, uint32_t frameIndex);
00020     void processPadInFrame(DIFPtr*, uint32_t frameIndex, uint32_t channelIndex);
00021     void processSlowControl(Buffer);
00022     void end();
00023
00024 private:
00025     std::ostream& _out;
00026 };

```


4.35 /home/runner/work/streamout/streamout/libs/interface/↵ Dump/src/textDump.cc File Reference

```
#include "textDump.h"
#include <iostream>
```

4.35.1 Detailed Description

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Definition in file [textDump.cc](#).

4.36 textDump.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "textDump.h"
00006
00007 #include <iostream>
00008
00009 void textDump::start() { _out << "Will dump bunch of DIF data" << std::endl; }
00010
00011 void textDump::processDIF(DIFPtr* d)
00012 {
00013     if(NULL == d) return;
00014     _out << "DIF number is " << d->getDIFid() << std::endl;
00015     _out << " DTC value is " << d->getDTC() << std::endl;
00016     _out << " GTC value is " << d->getGTC() << std::endl;
00017     _out << " DIF BCID is " << d->getBCID() << std::endl;
00018     _out << " Absolute BCID is " << d->getAbsoluteBCID() << std::endl;
00019     _out << " The number of frame is " << d->getNumberOfFrames() << std::endl;
00020 }
00021
00022 void textDump::processFrame(DIFPtr* d, uint32_t frameIndex)
00023 {
00024     _out << " Displaying frame number " << frameIndex << std::endl;
00025     _out << " ASIC ID is " << d->getASICid(frameIndex) << std::endl;
00026     _out << " Frame BCID is " << d->getFrameBCID(frameIndex) << std::endl;
00027     _out << " Frame Time To Trigger (a.k.a timestamp) is " << d->getFrameTimeToTrigger(frameIndex) <<
std::endl;
00028 }
00029
00030 void textDump::processPadInFrame(DIFPtr* d, uint32_t frameIndex, uint32_t channelIndex)
00031 {
00032     _out << " Displaying channel number " << channelIndex << std::endl;
00033     _out << " Threshold status is " << d->getThresholdStatus(frameIndex, channelIndex) << std::endl;
00034 }
00035
00036 void textDump::processSlowControl(Buffer) { _out << "textDump::processSlowControl not implemented yet."
<< std::endl; }
00037
00038 void textDump::end() { _out << "textDump end of report" << std::endl; }
```

4.37 /home/runner/work/streamout/streamout/libs/interface/RawData/↵ Reader/include/RawdataReader.h File Reference

```
#include "Buffer.h"
#include <array>
#include <cstdint>
#include <fstream>
#include <vector>
```

Classes

- class [RawdataReader](#)

4.37.1 Detailed Description

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Definition in file [RawdataReader.h](#).

4.38 RawdataReader.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include "Buffer.h"
00008
00009 #include <array>
00010 #include <cstdint>
00011 #include <fstream>
00012 #include <vector>
00013
00014 class Buffer;
00015
00016 class RawdataReader
00017 {
00018 public:
00019     explicit RawdataReader(const char* fileName);
00020     float getFileSize();
00021     void openFile(const char* fileName);
00022     void closeFile();
00023     bool nextEvent();
00024     bool nextDIFbuffer();
00025     Buffer getSDHCALBuffer();
00026     virtual ~RawdataReader() { closeFile(); }
00027     static void setDefaultBufferSize(const std::size_t& size);
00028
00029 private:
00030     void uncompress();
00031     std::ifstream m_FileStream;
00032     void setFileSize(const std::size_t& size);
00033     static std::size_t m_BufferSize;
00034     std::size_t m_FileSize{0};
00035     std::uint32_t m_NumberOfDIF{0};
00036     std::uint32_t m_EventNumber{0};
00037     std::vector<bit8_t> m_buf;
00038     Buffer m_Buffer;
00039 };
```

4.39 /home/runner/work/streamout/streamout/libs/interface/RawDataReader/src/RawdataReader.cc File Reference

```
#include "RawdataReader.h"
#include <cstring>
#include <stdexcept>
#include <zlib.h>
```

4.39.1 Detailed Description

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Definition in file [RawdataReader.cc](#).

4.40 RawdataReader.cc

[Go to the documentation of this file.](#)

```

00001
00004 #include "RawdataReader.h"
00005
00006 #include <cstring>
00007 #include <stdexcept>
00008 #include <zlib.h>
00010 std::size_t RawdataReader::m_BufferSize = 0x100000;
00011
00012 void RawdataReader::setDefaultBufferSize(const std::size_t& size) { m_BufferSize = size; }
00013
00014 RawdataReader::RawdataReader(const char* fileName)
00015 {
00016     m_buf.reserve(m_BufferSize);
00017     openFile(fileName);
00018 }
00019
00020 void RawdataReader::uncompress()
00021 {
00022     // static const std::size_t size_buffer{0x20000};
00023     /*std::size_t shift{3*sizeof(uint32_t)+sizeof(uint64_t)};
00024     static bit8_t obuf[size_buffer];
00025     std::size_t size_buffer_end;
00026     int rc=:uncompress(obuf,&size_buffer_end,
00027 &m_Buffer.at<bit8_t>(shift),m_Buffer.size<bit8_t>()-shift);
00028 memcpy(&m_Buffer.at<bit8_t>(shift),obuf,size_buffer_end);
00029 m_Buffer.setSize(size_buffer_end+shift);*/
00029 }
00030
00031 void RawdataReader::closeFile()
00032 {
00033     m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00034     if(m_FileStream.is_open()) m_FileStream.close();
00035 }
00036
00037 void RawdataReader::openFile(const char* fileName)
00038 {
00039     m_FileStream.rdbuf()->pubsetbuf(0, 0);
00040     m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00041     m_FileStream.open(fileName, std::ios::in | std::ios::binary | std::ios::ate); // Start at the end
00042     // to directly calculate the size of the file then come back to beginning
00043     m_FileStream.rdbuf()->pubsetbuf(0, 0);
00044     if(m_FileStream.is_open())
00045     {
00046         setFileSize(m_FileStream.tellg());
00047         m_FileStream.seekg(0, std::ios::beg);
00048     }
00049 }
00050 bool RawdataReader::nextEvent()
00051 {
00052     m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));
00053     if(!m_FileStream) return false;
00054     m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));
00055     if(!m_FileStream) return false;
00056     std::cout << "==== Event *====" << std::endl;
00057     std::cout << "Number : " << m_EventNumber << std::endl;
00058     std::cout << "Number of DIFs : " << m_NumberOfDIF << std::endl;
00059     return true;
00060 }
00061
00062 bool RawdataReader::nextDIFbuffer()
00063 {
00064     static int DIF_processed{0};
00065     if(DIF_processed >= m_NumberOfDIF)
00066     {
00067         DIF_processed = 0;

```

```

00068     std::cout << "=====" << std::endl;
00069     return false;
00070 }
00071 else
00072 {
00073     std::cout << "DIF number : " << DIF_processed << std::endl;
00074     std::uint32_t bsize{0};
00075     DIF_processed++;
00076     m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));
00077     std::cout << "Compresses size : " << bsize << " Bytes " << std::endl;
00078     if(!m_FileStream) return false;
00079     m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);
00080     if(!m_FileStream) return false;
00081     return true;
00082 }
00083 }
00084
00085 Buffer RawdataReader::getSDHCALBuffer() { return m_Buffer; }
00086
00087 void RawdataReader::setFileSize(const std::size_t& size) { m_FileSize = size; }
00088
00089 float RawdataReader::getFileSize() { return m_FileSize; }

```

4.41 /home/runner/work/streamout/streamout/libs/interface/ ROOT/include/ROOTtreeDest.h File Reference

```

#include "DIFPtr.h"
#include "SDHCAL_buffer.h"
#include "TTree.h"

```

Classes

- class [ROOTtreeDest](#)
- struct [ROOTtreeDest::DATA](#)

4.41.1 Detailed Description

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Definition in file [ROOTtreeDest.h](#).

4.42 ROOTtreeDest.h

[Go to the documentation of this file.](#)

```

00001
00006 #pragma once
00007
00008 #include "DIFPtr.h"
00009 #include "SDHCAL_buffer.h"
00010 #include "TTree.h"
00011
00012 class ROOTtreeDest
00013 {
00014 public:
00015     typedef struct
00016     {
00017         UInt_t    DIFid, ASICid, CHANNELid;
00018         UInt_t    Thresh;

```

```

00019     UInt_t      DTC, GTC, DIF_BCID, frame_BCID, timeStamp;
00020     ULong64_t   AbsoluteBCID;
00021 } DATA;
00022
00023 ROOTtreeDest();
00024
00025 void start();
00026 void processDIF(DIFPtr*);
00027 void processFrame(DIFPtr*, uint32_t frameIndex);
00028 void processPadInFrame(DIFPtr*, uint32_t frameIndex, uint32_t channelIndex);
00029 void processSlowControl(const SDHCAL_buffer&) { ; }
00030 void end() { ; }
00031
00032 private:
00033     DATA _data;
00034     TTree* _tree;
00035     void dataReset();
00036 };

```

4.43 /home/runner/work/streamout/streamout/libs/interface/ROOT/src/ROOTtreeDest.cc File Reference

```
#include "ROOTtreeDest.h"
```

4.43.1 Detailed Description

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Definition in file [ROOTtreeDest.cc](#).

4.44 ROOTtreeDest.cc

[Go to the documentation of this file.](#)

```

00001
00006 #include "ROOTtreeDest.h"
00007
00008 ROOTtreeDest::ROOTtreeDest()
00009 {
00010     dataReset();
00011     _tree = new TTree("RawData", "Raw SDHCAL data tree");
00012     _tree->Branch("data", &_data,
00013         "DIFid/i:ASICid:CHANNELid:Thresh:DTC:GTC:DIF_BCID:frame_BCID:timeStamp:AbsoluteBCID/1");
00014 }
00015 void ROOTtreeDest::dataReset()
00016 {
00017     _data.DIFid = _data.ASICid = _data.CHANNELid = 0;
00018     _data.Thresh = 0;
00019     _data.DTC = _data.GTC = _data.DIF_BCID = _data.frame_BCID = _data.timeStamp = 0;
00020     _data.AbsoluteBCID = 0;
00021 }
00022
00023 void ROOTtreeDest::start() { dataReset(); }
00024
00025 void ROOTtreeDest::processDIF(DIFPtr* d)
00026 {
00027     _data.DIFid = d->getDIFid();
00028     _data.DTC = d->getDTC();
00029     _data.GTC = d->getGTC();
00030     _data.DIF_BCID = d->getBCID();
00031     _data.AbsoluteBCID = d->getAbsoluteBCID();
00032 }
00033

```

```
00034 void ROOTtreeDest::processFrame(DIFPtr* d, uint32_t frameIndex)
00035 {
00036     _data.ASICId      = d->getASICId(frameIndex);
00037     _data.frame_BCID  = d->getFrameBCID(frameIndex);
00038     _data.timeStamp   = d->getFrameTimeToTrigger(frameIndex);
00039 }
00040
00041 void ROOTtreeDest::processPadInFrame(DIFPtr* d, uint32_t frameIndex, uint32_t channelIndex)
00042 {
00043     _data.CHANNELId = channelIndex;
00044     _data.Thresh     = d->getThresholdStatus(frameIndex, channelIndex);
00045     if(_data.Thresh != 0) _tree->Fill();
00046 }
```