

streamout

Generated by Doxygen 1.9.2

1 Hierarchical Index	1
1.1 Class Hierarchy	1
2 Class Index	3
2.1 Class List	3
3 File Index	5
3.1 File List	5
4 Class Documentation	7
4.1 Buffer Class Reference	7
4.1.1 Detailed Description	7
4.1.2 Constructor & Destructor Documentation	7
4.1.2.1 Buffer() [1/5]	8
4.1.2.2 ~Buffer()	8
4.1.2.3 Buffer() [2/5]	8
4.1.2.4 Buffer() [3/5]	8
4.1.2.5 Buffer() [4/5]	8
4.1.2.6 Buffer() [5/5]	9
4.1.3 Member Function Documentation	9
4.1.3.1 begin()	9
4.1.3.2 capacity()	9
4.1.3.3 end()	9
4.1.3.4 operator[]() [1/2]	9
4.1.3.5 operator[]() [2/2]	10
4.1.3.6 set()	10
4.1.3.7 setSize()	10
4.1.3.8 size()	10
4.2 BufferLooper< SOURCE, DESTINATION > Class Template Reference	10
4.2.1 Detailed Description	11
4.2.2 Constructor & Destructor Documentation	11
4.2.2.1 BufferLooper()	11
4.2.3 Member Function Documentation	11
4.2.3.1 addSink()	11
4.2.3.2 log()	12
4.2.3.3 loop()	12
4.2.3.4 printAllCounters()	13
4.2.3.5 setDetectorIDs()	13
4.3 BufferLooperCounter Struct Reference	13
4.3.1 Detailed Description	14
4.3.2 Member Function Documentation	14
4.3.2.1 printAllCounters()	14
4.3.2.2 printCounter()	14

4.3.3 Member Data Documentation	14
4.3.3.1 DIFPtrValueAtReturnedPos	15
4.3.3.2 DIFStarter	15
4.3.3.3 hasBadSlowControl	15
4.3.3.4 hasSlowControl	15
4.3.3.5 NonZeroValusAtEndOfData	15
4.3.3.6 SizeAfterAllData	15
4.3.3.7 SizeAfterDIFPtr	16
4.4 ROOTtreeDest::DATA Struct Reference	16
4.4.1 Detailed Description	16
4.4.2 Member Data Documentation	16
4.4.2.1 AbsoluteBCID	16
4.4.2.2 ASICid	17
4.4.2.3 CHANNELid	17
4.4.2.4 DIF_BCID	17
4.4.2.5 DIFid	17
4.4.2.6 DTC	17
4.4.2.7 frame_BCID	17
4.4.2.8 GTC	18
4.4.2.9 Thresh	18
4.4.2.10 timeStamp	18
4.5 DIFPtr Class Reference	18
4.5.1 Detailed Description	19
4.5.2 Member Function Documentation	19
4.5.2.1 getAbsoluteBCID()	19
4.5.2.2 getASICid()	19
4.5.2.3 getBCID()	19
4.5.2.4 getDIFid()	20
4.5.2.5 getDTC()	20
4.5.2.6 getFrameAsicHeader()	20
4.5.2.7 getFrameBCID()	20
4.5.2.8 getFrameLevel()	20
4.5.2.9 getFramePtr()	21
4.5.2.10 getFramesVector()	21
4.5.2.11 getFrameTimeToTrigger()	21
4.5.2.12 getGetFramePtrReturn()	21
4.5.2.13 getGTC()	21
4.5.2.14 getID()	22
4.5.2.15 getLines()	22
4.5.2.16 getLinesVector()	22
4.5.2.17 getNumberOfFrames()	22
4.5.2.18 getPtr()	22

4.5.2.19 getTASU1()	22
4.5.2.20 getTASU2()	23
4.5.2.21 getTDIF()	23
4.5.2.22 getTemperatureASU1()	23
4.5.2.23 getTemperatureASU2()	23
4.5.2.24 getTemperatureDIF()	23
4.5.2.25 getThresholdStatus()	23
4.5.2.26 hasAnalogReadout()	24
4.5.2.27 hasLine()	24
4.5.2.28 hasTemperature()	24
4.5.2.29 setBuffer()	24
4.6 DIFSlowControl Class Reference	25
4.6.1 Detailed Description	25
4.6.2 Constructor & Destructor Documentation	25
4.6.2.1 DIFSlowControl()	25
4.6.3 Member Function Documentation	26
4.6.3.1 Dump()	26
4.6.3.2 getChipSlowControl() [1/2]	26
4.6.3.3 getChipSlowControl() [2/2]	27
4.6.3.4 getChipsMap()	27
4.6.3.5 getDIFId()	28
4.7 DIFUnpacker Class Reference	28
4.7.1 Detailed Description	28
4.7.2 Member Function Documentation	29
4.7.2.1 dumpFrameOld()	29
4.7.2.2 getAbsoluteBCID()	29
4.7.2.3 getAnalogPtr()	30
4.7.2.4 getBCID()	30
4.7.2.5 getDTC()	30
4.7.2.6 getFrameAsicHeader()	30
4.7.2.7 getFrameBCID()	31
4.7.2.8 getFrameLevel()	31
4.7.2.9 getFramePAD()	31
4.7.2.10 getFramePtr()	31
4.7.2.11 getGTC()	32
4.7.2.12 getID()	32
4.7.2.13 getLines()	32
4.7.2.14 getStartOfDIF()	33
4.7.2.15 getTASU1()	33
4.7.2.16 getTASU2()	33
4.7.2.17 getTDIF()	33
4.7.2.18 GrayToBin()	34

4.7.2.19 hasAnalogReadout()	34
4.7.2.20 hasLine()	34
4.7.2.21 hasTemperature()	34
4.7.2.22 swap_bytes()	35
4.8 Interface Class Reference	35
4.8.1 Detailed Description	35
4.8.2 Constructor & Destructor Documentation	36
4.8.2.1 Interface()	36
4.8.2.2 ~Interface()	36
4.8.3 Member Function Documentation	36
4.8.3.1 log()	36
4.8.3.2 setLogger()	36
4.9 RawBufferNavigator Class Reference	36
4.9.1 Detailed Description	37
4.9.2 Constructor & Destructor Documentation	37
4.9.2.1 RawBufferNavigator() [1/2]	37
4.9.2.2 ~RawBufferNavigator()	37
4.9.2.3 RawBufferNavigator() [2/2]	38
4.9.3 Member Function Documentation	38
4.9.3.1 badSCData()	38
4.9.3.2 getDetectorID()	38
4.9.3.3 getDIF_CRC()	38
4.9.3.4 getDIFBuffer()	38
4.9.3.5 getDIFBufferSize()	39
4.9.3.6 getDIFBufferStart()	39
4.9.3.7 getDIFPtr()	39
4.9.3.8 getEndOfAllData()	39
4.9.3.9 getEndOfDIFData()	39
4.9.3.10 getSCBuffer()	40
4.9.3.11 getSizeAfterDIFPtr()	40
4.9.3.12 getStartOfDIF()	40
4.9.3.13 hasSlowControlData()	40
4.9.3.14 setBuffer()	40
4.9.3.15 StartAt()	41
4.9.3.16 validBuffer()	41
4.10 RawdataReader Class Reference	41
4.10.1 Detailed Description	42
4.10.2 Constructor & Destructor Documentation	42
4.10.2.1 RawdataReader()	42
4.10.2.2 ~RawdataReader()	42
4.10.3 Member Function Documentation	42
4.10.3.1 closeFile()	42

4.10.3.2 end()	43
4.10.3.3 getFileSize()	43
4.10.3.4 getSDHCALBuffer()	43
4.10.3.5 nextDIFbuffer()	43
4.10.3.6 nextEvent()	44
4.10.3.7 openFile()	44
4.10.3.8 setDefaultBufferSize()	44
4.10.3.9 start()	44
4.11 ROOTtreeDest Class Reference	45
4.11.1 Detailed Description	45
4.11.2 Constructor & Destructor Documentation	45
4.11.2.1 ROOTtreeDest()	45
4.11.3 Member Function Documentation	46
4.11.3.1 end()	46
4.11.3.2 processDIF()	46
4.11.3.3 processFrame()	46
4.11.3.4 processPadInFrame()	46
4.11.3.5 processSlowControl()	47
4.11.3.6 start()	47
4.12 textDump Class Reference	47
4.12.1 Detailed Description	47
4.12.2 Constructor & Destructor Documentation	48
4.12.2.1 textDump()	48
4.12.3 Member Function Documentation	48
4.12.3.1 end()	48
4.12.3.2 print()	48
4.12.3.3 processDIF()	48
4.12.3.4 processFrame()	49
4.12.3.5 processPadInFrame()	49
4.12.3.6 processSlowControl()	49
4.12.3.7 setLevel()	49
4.12.3.8 start()	50
4.13 Timer Class Reference	50
4.13.1 Detailed Description	50
4.13.2 Member Function Documentation	50
4.13.2.1 getElapsedTime()	50
4.13.2.2 start()	50
4.13.2.3 stop()	50
5 File Documentation	51
5.1 /home/runner/work/streamout/streamout/libs/core/include/Bits.h File Reference	51
5.1.1 Detailed Description	51

5.1.2 Typedef Documentation	51
5.1.2.1 bit16_t	52
5.1.2.2 bit32_t	52
5.1.2.3 bit64_t	52
5.1.2.4 bit8_t	52
5.1.3 Function Documentation	52
5.1.3.1 operator<<()	52
5.2 Bits.h	53
5.3 /home/runner/work/streamout/streamout/libs/core/include/Buffer.h File Reference	53
5.3.1 Detailed Description	53
5.4 Buffer.h	53
5.5 /home/runner/work/streamout/streamout/libs/core/include/BufferLooper.h File Reference	54
5.5.1 Detailed Description	54
5.6 BufferLooper.h	55
5.7 /home/runner/work/streamout/streamout/libs/core/include/BufferLooperCounter.h File Reference	56
5.7.1 Detailed Description	56
5.8 BufferLooperCounter.h	57
5.9 /home/runner/work/streamout/streamout/libs/core/include/DetectorId.h File Reference	57
5.9.1 Detailed Description	57
5.9.2 Enumeration Type Documentation	57
5.9.2.1 DetectorID	57
5.10 DetectorId.h	58
5.11 /home/runner/work/streamout/streamout/libs/core/include/DIFPtr.h File Reference	58
5.11.1 Detailed Description	58
5.12 DIFPtr.h	59
5.13 /home/runner/work/streamout/streamout/libs/core/include/DIFSlowControl.h File Reference	60
5.13.1 Detailed Description	60
5.14 DIFSlowControl.h	61
5.15 /home/runner/work/streamout/streamout/libs/core/include/DIFUnpacker.h File Reference	61
5.15.1 Detailed Description	61
5.16 DIFUnpacker.h	62
5.17 /home/runner/work/streamout/streamout/libs/core/include/Formatters.h File Reference	62
5.17.1 Detailed Description	63
5.17.2 Function Documentation	63
5.17.2.1 to_bin() [1/5]	63
5.17.2.2 to_bin() [2/5]	63
5.17.2.3 to_bin() [3/5]	63
5.17.2.4 to_bin() [4/5]	64
5.17.2.5 to_bin() [5/5]	64
5.17.2.6 to_dec() [1/5]	64
5.17.2.7 to_dec() [2/5]	64
5.17.2.8 to_dec() [3/5]	65

5.17.2.9 to_dec() [4/5]	65
5.17.2.10 to_dec() [5/5]	65
5.17.2.11 to_hex() [1/5]	65
5.17.2.12 to_hex() [2/5]	66
5.17.2.13 to_hex() [3/5]	66
5.17.2.14 to_hex() [4/5]	66
5.17.2.15 to_hex() [5/5]	66
5.17.2.16 to_oct() [1/5]	67
5.17.2.17 to_oct() [2/5]	67
5.17.2.18 to_oct() [3/5]	67
5.17.2.19 to_oct() [4/5]	67
5.17.2.20 to_oct() [5/5]	67
5.18 Formatters.h	68
5.19 /home/runner/work/streamout/streamout/libs/core/include/Interface.h File Reference	68
5.19.1 Detailed Description	68
5.20 Interface.h	69
5.21 /home/runner/work/streamout/streamout/libs/core/include/RawBufferNavigator.h File Reference	69
5.21.1 Detailed Description	69
5.22 RawBufferNavigator.h	69
5.23 /home/runner/work/streamout/streamout/libs/core/include/Timer.h File Reference	70
5.23.1 Detailed Description	70
5.24 Timer.h	71
5.25 /home/runner/work/streamout/streamout/libs/core/include/Words.h File Reference	71
5.25.1 Detailed Description	71
5.25.2 Enumeration Type Documentation	71
5.25.2.1 DU	71
5.26 Words.h	72
5.27 /home/runner/work/streamout/streamout/libs/core/src/Bits.cc File Reference	73
5.27.1 Detailed Description	73
5.27.2 Function Documentation	73
5.27.2.1 operator<<()	73
5.28 Bits.cc	74
5.29 /home/runner/work/streamout/streamout/libs/core/src/Buffer.cc File Reference	74
5.30 Buffer.cc	74
5.31 /home/runner/work/streamout/streamout/libs/core/src/BufferLooperCounter.cc File Reference	74
5.32 BufferLooperCounter.cc	74
5.33 /home/runner/work/streamout/streamout/libs/core/src/DIFSlowControl.cc File Reference	75
5.33.1 Detailed Description	75
5.34 DIFSlowControl.cc	75
5.35 /home/runner/work/streamout/streamout/libs/core/src/DIFUnpacker.cc File Reference	78
5.35.1 Detailed Description	78
5.36 DIFUnpacker.cc	79

5.37 /home/runner/work/streamout/streamout/libs/core/src/Formatters.cc File Reference	81
5.37.1 Detailed Description	82
5.37.2 Function Documentation	82
5.37.2.1 to_bin() [1/5]	82
5.37.2.2 to_bin() [2/5]	82
5.37.2.3 to_bin() [3/5]	82
5.37.2.4 to_bin() [4/5]	83
5.37.2.5 to_bin() [5/5]	83
5.37.2.6 to_dec() [1/5]	83
5.37.2.7 to_dec() [2/5]	83
5.37.2.8 to_dec() [3/5]	84
5.37.2.9 to_dec() [4/5]	84
5.37.2.10 to_dec() [5/5]	84
5.37.2.11 to_hex() [1/5]	84
5.37.2.12 to_hex() [2/5]	85
5.37.2.13 to_hex() [3/5]	85
5.37.2.14 to_hex() [4/5]	85
5.37.2.15 to_hex() [5/5]	85
5.37.2.16 to_oct() [1/5]	86
5.37.2.17 to_oct() [2/5]	86
5.37.2.18 to_oct() [3/5]	86
5.37.2.19 to_oct() [4/5]	86
5.37.2.20 to_oct() [5/5]	86
5.38 Formatters.cc	87
5.39 /home/runner/work/streamout/streamout/libs/core/src/RawBufferNavigator.cc File Reference	88
5.39.1 Detailed Description	88
5.40 RawBufferNavigator.cc	88
5.41 /home/runner/work/streamout/streamout/libs/interface/Dump/include/textDump.h File Reference	89
5.41.1 Detailed Description	90
5.42 textDump.h	90
5.43 /home/runner/work/streamout/streamout/libs/interface/Dump/src/textDump.cc File Reference	90
5.43.1 Detailed Description	91
5.44 textDump.cc	91
5.45 /home/runner/work/streamout/streamout/libs/interface/LCIO/include/LCIOWriter.h File Reference	91
5.45.1 Detailed Description	91
5.46 LCIOWriter.h	91
5.47 /home/runner/work/streamout/streamout/libs/interface/LCIO/src/LCIOWriter.cc File Reference	92
5.47.1 Detailed Description	92
5.48 LCIOWriter.cc	92
5.49 /home/runner/work/streamout/streamout/libs/interface/RawDataReader/include/RawdataReader.h File Reference	92
5.49.1 Detailed Description	92

5.50 RawdataReader.h	93
5.51 /home/runner/work/streamout/streamout/libs/interface/RawDataReader/src/RawdataReader.cc File Reference	93
5.51.1 Detailed Description	93
5.52 RawdataReader.cc	94
5.53 /home/runner/work/streamout/streamout/libs/interface/ROOT/include/ROOTtreeDest.h File Reference	95
5.53.1 Detailed Description	95
5.54 ROOTtreeDest.h	96
5.55 /home/runner/work/streamout/streamout/libs/interface/ROOT/src/ROOTtreeDest.cc File Reference	96
5.55.1 Detailed Description	96
5.56 ROOTtreeDest.cc	96

Chapter 1

Hierarchical Index

1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Buffer	7
BufferLooper< SOURCE, DESTINATION >	10
BufferLooperCounter	13
ROOTtreeDest::DATA	16
DIFPtr	18
DIFSlowControl	25
DIFUnpacker	28
Interface	35
ROOTtreeDest	45
RawdataReader	41
textDump	47
RawBufferNavigator	36
Timer	50

Chapter 2

Class Index

2.1 Class List

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

Buffer	7
BufferLooper< SOURCE, DESTINATION >	10
BufferLooperCounter	13
ROOTtreeDest::DATA	16
DIFPtr	18
DIFSlowControl	
Handler of DIF Slow Control info	25
DIFUnpacker	28
Interface	
Template class should implement void SOURCE::start(); bool SOURCE::next(); void SOURCE↔ ::end(); const Buffer & SOURCE::getSDHCALBuffer();	35
RawBufferNavigator	36
RawdataReader	41
ROOTtreeDest	45
textDump	47
Timer	50

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

/home/runner/work/streamout/streamout/libs/core/include/Bits.h	51
/home/runner/work/streamout/streamout/libs/core/include/Buffer.h	53
/home/runner/work/streamout/streamout/libs/core/include/BufferLooper.h	54
/home/runner/work/streamout/streamout/libs/core/include/BufferLooperCounter.h	56
/home/runner/work/streamout/streamout/libs/core/include/DetectorId.h	57
/home/runner/work/streamout/streamout/libs/core/include/DIFPtr.h	58
/home/runner/work/streamout/streamout/libs/core/include/DIFSlowControl.h	60
/home/runner/work/streamout/streamout/libs/core/include/DIFUnpacker.h	61
/home/runner/work/streamout/streamout/libs/core/include/Formatters.h	62
/home/runner/work/streamout/streamout/libs/core/include/Interface.h	68
/home/runner/work/streamout/streamout/libs/core/include/RawBufferNavigator.h	69
/home/runner/work/streamout/streamout/libs/core/include/Timer.h	70
/home/runner/work/streamout/streamout/libs/core/include/Words.h	71
/home/runner/work/streamout/streamout/libs/core/src/Bits.cc	73
/home/runner/work/streamout/streamout/libs/core/src/Buffer.cc	74
/home/runner/work/streamout/streamout/libs/core/src/BufferLooperCounter.cc	74
/home/runner/work/streamout/streamout/libs/core/src/DIFSlowControl.cc	75
/home/runner/work/streamout/streamout/libs/core/src/DIFUnpacker.cc	78
/home/runner/work/streamout/streamout/libs/core/src/Formatters.cc	81
/home/runner/work/streamout/streamout/libs/core/src/RawBufferNavigator.cc	88
/home/runner/work/streamout/streamout/libs/interface/Dump/include/textDump.h	89
/home/runner/work/streamout/streamout/libs/interface/Dump/src/textDump.cc	90
/home/runner/work/streamout/streamout/libs/interface/LCIO/include/LCIOWriter.h	91
/home/runner/work/streamout/streamout/libs/interface/LCIO/src/LCIOWriter.cc	92
/home/runner/work/streamout/streamout/libs/interface/RawDataReader/include/RawdataReader.h	92
/home/runner/work/streamout/streamout/libs/interface/RawDataReader/src/RawdataReader.cc	93
/home/runner/work/streamout/streamout/libs/interface/ROOT/include/ROOTtreeDest.h	95
/home/runner/work/streamout/streamout/libs/interface/ROOT/src/ROOTtreeDest.cc	96

Chapter 4

Class Documentation

4.1 Buffer Class Reference

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

Public Member Functions

- [Buffer](#) ()
- virtual [~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](#) () const
- [bit8_t](#) * [end](#) () const
- [bit8_t](#) & [operator\[\]](#) (const std::size_t &pos)
- [bit8_t](#) & [operator\[\]](#) (const std::size_t &pos) const
- void [setSize](#) (const std::size_t &[size](#))

4.1.1 Detailed Description

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

4.1.2 Constructor & Destructor Documentation

4.1.2.1 Buffer() [1/5]

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

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

```
00016 : m_Buffer(nullptr), m_Size(0), m_Capacity(0) {}
```

4.1.2.2 ~Buffer()

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

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

```
00017 {}
```

4.1.2.3 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) {}
```

4.1.2.4 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 * sizeof(char)),
    m_Capacity(i * sizeof(char)) {}
```

4.1.2.5 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)) {}
```

4.1.2.6 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)) {}
```

4.1.3 Member Function Documentation

4.1.3.1 begin()

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

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

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

4.1.3.2 capacity()

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

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

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

4.1.3.3 end()

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

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

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

4.1.3.4 operator[]() [1/2]

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

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

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

4.1.3.5 operator[]() [2/2]

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

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

```
00030 { return m_Buffer[pos]; }
```

4.1.3.6 set()

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

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

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

4.1.3.7 setSize()

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

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

```
00032 { m_Size = size; }
```

4.1.3.8 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 file:

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

4.2 BufferLooper< SOURCE, DESTINATION > Class Template Reference

```
#include <BufferLooper.h>
```

Public Member Functions

- [BufferLooper](#) (SOURCE &source, DESTINATION &dest, bool debug=false)
- void [addSink](#) (const spdlog::sink_ptr &sink, const spdlog::level::level_enum &level=spdlog::get_level())
- void [loop](#) (const std::uint32_t &m_NbrEventsToProcess=0)
- void [printAllCounters](#) ()
- std::shared_ptr< spdlog::logger > [log](#) ()
- void [setDetectorIDs](#) (const std::vector< [DetectorID](#) > &detectorIDs)

4.2.1 Detailed Description

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

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

4.2.2 Constructor & Destructor Documentation

4.2.2.1 BufferLooper()

```
template<typename SOURCE , typename DESTINATION >
BufferLooper< SOURCE, DESTINATION >::BufferLooper (
    SOURCE & source,
    DESTINATION & dest,
    bool debug = false ) [inline]
```

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

```
00025                                     : m_Source(source),
    m_Destination(dest), m_Debug(debug)
00026 {
00027     m_Logger = spdlog::create<spdlog::sinks::null_sink_mt>("streamout");
00028     if(!spdlog::get("streamout")) { spdlog::register_logger(m_Logger); }
00029     m_Source.setLogger(m_Logger);
00030     m_Destination.setLogger(m_Logger);
00031 }
```

4.2.3 Member Function Documentation

4.2.3.1 addSink()

```
template<typename SOURCE , typename DESTINATION >
void BufferLooper< SOURCE, DESTINATION >::addSink (
    const spdlog::sink_ptr & sink,
    const spdlog::level::level_enum & level = spdlog::get_level() ) [inline]
```

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

```
00034 {
00035     sink->set_level(level);
00036     m_Sinks.push_back(sink);
00037     m_Logger = std::make_shared<spdlog::logger>("streamout", begin(m_Sinks), end(m_Sinks));
00038     m_Source.setLogger(m_Logger);
00039     m_Destination.setLogger(m_Logger);
00040 }
```

4.2.3.2 log()

```
template<typename SOURCE , typename DESTINATION >
std::shared_ptr< spdlog::logger > BufferLooper< SOURCE, DESTINATION >::log ( ) [inline]
```

Definition at line 121 of file [BufferLooper.h](#).

```
00121 { return m_Logger; }
```

4.2.3.3 loop()

```
template<typename SOURCE , typename DESTINATION >
void BufferLooper< SOURCE, DESTINATION >::loop (
    const std::uint32_t & m_NbrEventsToProcess = 0 ) [inline]
```

Definition at line 42 of file [BufferLooper.h](#).

```
00043 {
00044     Timer timer;
00045     timer.start();
00046     m_Source.start();
00047     m_Destination.start();
00048     RawBufferNavigator bufferNavigator;
00049     while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00050     {
00051         m_Logger->warn("====* Event number {} *====", m_NbrEvents);
00052         while(m_Source.nextDIFbuffer())
00053         {
00054             const Buffer& buffer = m_Source.getSDHCALBuffer();
00055             bufferNavigator.setBuffer(buffer);
00056
00057             bit8_t* debug_variable_1 = buffer.end();
00058             bit8_t* debug_variable_2 = bufferNavigator.getDIFBuffer().end();
00059             if(debug_variable_1 != debug_variable_2) m_Logger->info("DIF BUFFER END {} {}",
fmt::ptr(debug_variable_1), fmt::ptr(debug_variable_2));
00060             if(m_Debug) assert(debug_variable_1 == debug_variable_2);
00061
00062             if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00063             {
00064                 m_Logger->trace("{} ", bufferNavigator.getDetectorID());
00065                 continue;
00066             }
00067
00068             uint32_t idstart = bufferNavigator.getStartOfDIF();
00069             if(m_Debug && idstart == 0) m_Logger->info(to_hex(buffer));
00070             c.DIFStarter[idstart]++;
00071             if(!bufferNavigator.validBuffer())
00072             {
00073                 m_Logger->error("!bufferNavigator.validBuffer()");
00074                 continue;
00075             }
00076             DIFPtr& d = bufferNavigator.getDIFPtr();
00077             c.DIFPtrValueAtReturnedPos[bufferNavigator.getDIFBufferStart() [d.getGetFramePtrReturn()]]++;
00078             if(m_Debug) assert(bufferNavigator.getDIFBufferStart() [d.getGetFramePtrReturn()] == 0xa0);
00079             c.SizeAfterDIFPtr[bufferNavigator.getSizeAfterDIFPtr() ]++;
00080             m_Destination.processDIF(d);
00081             for(std::size_t i = 0; i < d.getNumberOfFrames(); i++)
00082             {
00083                 m_Destination.processFrame(d, i);
00084                 for(std::size_t j = 0; j < 64; j++) m_Destination.processPadInFrame(d, i, j);
00085             }
00086
00087             bool processSC = false;
00088             if(bufferNavigator.hasSlowControlData())
00089             {
00090                 c.hasSlowControl++;
00091                 processSC = true;
00092             }
00093             if(bufferNavigator.badSCData())
00094             {
00095                 c.hasBadSlowControl++;
00096                 processSC = false;
00097             }
00098             if(processSC) { m_Destination.processSlowControl(bufferNavigator.getSCBuffer()); }
00099 }
```



```

00100         Buffer eod = bufferNavigator.getEndOfAllData();
00101         c.SizeAfterAllData[eod.size()]++;
00102         bit8_t* debug_variable_3 = eod.end();
00103         if(debug_variable_1 != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {}",
fmt::ptr(debug_variable_1), fmt::ptr(debug_variable_3));
00104         if(m_Debug) assert(debug_variable_1 == debug_variable_3);
00105         if(eod.size() != 0) m_Logger->info("End of Data remaining stuff : {}", to_hex(eod));
00106
00107         int nonzeroCount = 0;
00108         for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00109             if(static_cast<int>(*it) != 0) nonzeroCount++;
00110         c.NonZeroValusAtEndOfData[nonzeroCount]++;
00111     } // end of DIF while loop
00112     m_Logger->warn("***** Event number {} *****", m_NbrEvents);
00113     m_NbrEvents++;
00114 } // end of event while loop
00115 m_Destination.end();
00116 m_Source.end();
00117 timer.stop();
00118 fmt::print("=== elapsed time {}ms ({}ms/event) ===\n", timer.getElapsedTime() / 1000,
timer.getElapsedTime() / (1000 * m_NbrEvents));
00119 }

```

4.2.3.4 printAllCounters()

```

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

```

Definition at line 120 of file [BufferLooper.h](#).

```
00120 { c.printAllCounters(); }
```

4.2.3.5 setDetectorIDs()

```

template<typename SOURCE , typename DESTINATION >
void BufferLooper< SOURCE, DESTINATION >::setDetectorIDs (
    const std::vector< DetectorID > & detectorIDs ) [inline]

```

Definition at line 123 of file [BufferLooper.h](#).

```
00123 { m_DetectorIDs = detectorIDs; }
```

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

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

4.3 BufferLooperCounter Struct Reference

```
#include <BufferLooperCounter.h>
```

Public Member Functions

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

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](#)

4.3.1 Detailed Description

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

4.3.2 Member Function Documentation

4.3.2.1 printAllCounters()

```
void BufferLooperCounter::printAllCounters ( )
```

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

```
00010 {
00011     fmt::print("BUFFER LOOP FINAL STATISTICS : \n");
00012     printCounter("Start of DIF header", DIFStarter);
00013     printCounter("Value after DIF data are processed", DIFPtrValueAtReturnedPos);
00014     printCounter("Size remaining in buffer after end of DIF data", SizeAfterDIFPtr);
00015     fmt::print("Number of Slow Control found {} out of which {} are bad\n", hasSlowControl,
hasBadSlowControl);
00016     printCounter("Size remaining after all of data have been processed", SizeAfterAllData);
00017     printCounter("Number on non zero values in end of data buffer", NonZeroValusAtEndOfData);
00018 }
```

4.3.2.2 printCounter()

```
void BufferLooperCounter::printCounter (
    const std::string & description,
    const std::map< int, int > & m )
```

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

```
00021 {
00022     std::string out{"statistics for " + description + " : \n"};
00023     for(std::map<int, int>::const_iterator it = m.begin(); it != m.end(); it++)
00024     {
00025         if(it != m.begin()) out += ",";
00026         out += " [" + std::to_string(it->first) + "]= " + std::to_string(it->second);
00027     }
00028     out += "\n";
00029     fmt::print(out);
00030 }
```

4.3.3 Member Data Documentation

4.3.3.1 DIFPtrValueAtReturnedPos

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

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

4.3.3.2 DIFStarter

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

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

4.3.3.3 hasBadSlowControl

```
int BufferLooperCounter::hasBadSlowControl = 0
```

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

4.3.3.4 hasSlowControl

```
int BufferLooperCounter::hasSlowControl = 0
```

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

4.3.3.5 NonZeroValusAtEndOfData

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

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

4.3.3.6 SizeAfterAllData

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

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

4.3.3.7 SizeAfterDIFPtr

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

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

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

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

4.4 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](#)

4.4.1 Detailed Description

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

4.4.2 Member Data Documentation

4.4.2.1 AbsoluteBCID

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

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

4.4.2.2 ASICid

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

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

4.4.2.3 CHANNELid

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

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

4.4.2.4 DIF_BCID

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

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

4.4.2.5 DIFid

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

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

4.4.2.6 DTC

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

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

4.4.2.7 frame_BCID

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

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

4.4.2.8 GTC

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

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

4.4.2.9 Thresh

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

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

4.4.2.10 timeStamp

```
UInt_t ROOTtreeDest::DATA::timeStamp
```

Definition at line 20 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](#)

4.5 DIFPtr Class Reference

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

Public Member Functions

- void [setBuffer](#) (unsigned char *p, const std::uint32_t &max_size)
- unsigned char * [getPtr](#) () const
- std::uint32_t [getGetFramePtrReturn](#) () const
- std::vector< unsigned char * > & [getFramesVector](#) ()
- std::vector< unsigned char * > & [getLinesVector](#) ()
- std::uint32_t [getID](#) () const
- std::uint32_t [getDTC](#) () const
- std::uint32_t [getGTC](#) () const
- std::uint64_t [getAbsoluteBCID](#) () const
- std::uint32_t [getBCID](#) () const
- std::uint32_t [getLines](#) () const
- bool [hasLine](#) (uint32_t line) const
- std::uint32_t [getTASU1](#) () const
- std::uint32_t [getTASU2](#) () const
- std::uint32_t [getTDIF](#) () const
- float [getTemperatureDIF](#) () const
- float [getTemperatureASU1](#) () const

- float [getTemperatureASU2](#) () const
- bool [hasTemperature](#) () const
- bool [hasAnalogReadout](#) () const
- std::uint32_t [getNumberOfFrames](#) () const
- unsigned char * [getFramePtr](#) (uint32_t i) const
- std::uint32_t [getFrameAsicHeader](#) (uint32_t i) const
- std::uint32_t [getFrameBCID](#) (uint32_t i) const
- std::uint32_t [getFrameTimeToTrigger](#) (uint32_t i) const
- bool [getFrameLevel](#) (uint32_t i, uint32_t ipad, uint32_t ilevel) const
- uint32_t [getDIFid](#) () const
- uint32_t [getASICid](#) (uint32_t i) const
- uint32_t [getThresholdStatus](#) (uint32_t i, uint32_t ipad) const

4.5.1 Detailed Description

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

4.5.2 Member Function Documentation

4.5.2.1 getAbsoluteBCID()

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

Definition at line 79 of file [DIFPtr.h](#).

```
00079 { return DIFUnpacker::getAbsoluteBCID(theDIF_); }
```

4.5.2.2 getASICid()

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

Definition at line 99 of file [DIFPtr.h](#).

```
00099 { return getFrameAsicHeader(i) & 0xFF; }
```

4.5.2.3 getBCID()

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

Definition at line 80 of file [DIFPtr.h](#).

```
00080 { return DIFUnpacker::getBCID(theDIF_); }
```

4.5.2.4 getDIFid()

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

Definition at line 98 of file [DIFPtr.h](#).

```
00098 { return getID() & 0xFF; }
```

4.5.2.5 getDTC()

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

Definition at line 77 of file [DIFPtr.h](#).

```
00077 { return DIFUnpacker::getDTC(theDIF_); }
```

4.5.2.6 getFrameAsicHeader()

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

Definition at line 93 of file [DIFPtr.h](#).

```
00093 { return DIFUnpacker::getFrameAsicHeader(theFrames_[i]); }
```

4.5.2.7 getFrameBCID()

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

Definition at line 94 of file [DIFPtr.h](#).

```
00094 { return DIFUnpacker::getFrameBCID(theFrames_[i]); }
```

4.5.2.8 getFrameLevel()

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

Definition at line 96 of file [DIFPtr.h](#).

```
00096 { return DIFUnpacker::getFrameLevel(theFrames_[i], ipad, ilevel); }
```


4.5.2.9 getFramePtr()

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

Definition at line 92 of file [DIFPtr.h](#).

```
00092 { return theFrames_[i]; }
```

4.5.2.10 getFramesVector()

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

Definition at line 74 of file [DIFPtr.h](#).

```
00074 { return theFrames_; }
```

4.5.2.11 getFrameTimeToTrigger()

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

Definition at line 95 of file [DIFPtr.h](#).

```
00095 { return getBCID() - getFrameBCID(i); }
```

4.5.2.12 getGetFramePtrReturn()

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

Definition at line 73 of file [DIFPtr.h](#).

```
00073 { return theGetFramePtrReturn_; }
```

4.5.2.13 getGTC()

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

Definition at line 78 of file [DIFPtr.h](#).

```
00078 { return DIFUnpacker::getGTC(theDIF_); }
```

4.5.2.14 getID()

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

Definition at line 76 of file [DIFPtr.h](#).

```
00076 { return DIFUnpacker::getID(theDIF_); }
```

4.5.2.15 getLines()

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

Definition at line 81 of file [DIFPtr.h](#).

```
00081 { return DIFUnpacker::getLines(theDIF_); }
```

4.5.2.16 getLinesVector()

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

Definition at line 75 of file [DIFPtr.h](#).

```
00075 { return theLines_; }
```

4.5.2.17 getNumberOfFrames()

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

Definition at line 91 of file [DIFPtr.h](#).

```
00091 { return theFrames_.size(); }
```

4.5.2.18 getPtr()

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

Definition at line 72 of file [DIFPtr.h](#).

```
00072 { return theDIF_; }
```

4.5.2.19 getTASU1()

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

Definition at line 83 of file [DIFPtr.h](#).

```
00083 { return DIFUnpacker::getTASU1(theDIF_); }
```

4.5.2.20 getTASU2()

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

Definition at line 84 of file [DIFPtr.h](#).

```
00084 { return DIFUnpacker::getTASU2(theDIF_); }
```

4.5.2.21 getTDIF()

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

Definition at line 85 of file [DIFPtr.h](#).

```
00085 { return DIFUnpacker::getTDIF(theDIF_); }
```

4.5.2.22 getTemperatureASU1()

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

Definition at line 87 of file [DIFPtr.h](#).

```
00087 { return (getTASU1() » 3) * 0.0625; }
```

4.5.2.23 getTemperatureASU2()

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

Definition at line 88 of file [DIFPtr.h](#).

```
00088 { return (getTASU2() » 3) * 0.0625; }
```

4.5.2.24 getTemperatureDIF()

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

Definition at line 86 of file [DIFPtr.h](#).

```
00086 { return 0.508 * getTDIF() - 9.659; }
```

4.5.2.25 getThresholdStatus()

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

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

```
00100 { return (((uint32_t)getFrameLevel(i, ipad, 1)) « 1) | ((uint32_t)getFrameLevel(i, ipad, 0)); }
```

4.5.2.26 hasAnalogReadout()

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

Definition at line 90 of file [DIFPtr.h](#).

```
00090 { return DIFUnpacker::hasAnalogReadout(theDIF_); }
```

4.5.2.27 hasLine()

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

Definition at line 82 of file [DIFPtr.h](#).

```
00082 { return DIFUnpacker::hasLine(line, theDIF_); }
```

4.5.2.28 hasTemperature()

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

Definition at line 89 of file [DIFPtr.h](#).

```
00089 { return DIFUnpacker::hasTemperature(theDIF_); }
```

4.5.2.29 setBuffer()

```
void DIFPtr::setBuffer (
    unsigned char * p,
    const std::uint32_t & max_size ) [inline]
```

Definition at line 56 of file [DIFPtr.h](#).

```
00057 {
00058     theFrames_.clear();
00059     theLines_.clear();
00060     theSize_ = max_size;
00061     theDIF_ = p;
00062     try
00063     {
00064         theGetFramePtrReturn_ = DIFUnpacker::getFramePtr(theFrames_, theLines_, theSize_, theDIF_);
00065     }
00066     catch(const std::string& e)
00067     {
00068         spdlog::get("streamout")->error(" DIF {} T ? {} {}", getID(), hasTemperature(), e);
00069     }
00070 }
```

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

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

4.6 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

4.6.1 Detailed Description

Handler of DIF Slow Control info.

Author

L.Mirabito

Date

March 2010

Version

1.0

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

4.6.2 Constructor & Destructor Documentation

4.6.2.1 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 }
```

4.6.3 Member Function Documentation

4.6.3.1 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 }
```

4.6.3.2 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]; }
```

4.6.3.3 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]; }
```

4.6.3.4 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; }
```

4.6.3.5 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](#)

4.7 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)

4.7.1 Detailed Description

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

4.7.2 Member Function Documentation

4.7.2.1 dumpFrameOld()

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

Definition at line 146 of file [DIFUnpacker.cc](#).

```
00147 {
00148     bool          PAD[128];
00149     bool          10[64];
00150     bool          11[64];
00151     std::uint8_t  un{1};
00152     for(std::size_t ip = 0; ip < 128; ip++) { PAD[ip] = false; } // init PADs
00153     std::uint32_t idx1{4};
00154     for(int ik = 0; ik < 4; ik++)
00155     {
00156         std::uint32_t PadEtat{swap_bytes(&buf[idx1])};
00157         idx1 += 4;
00158         for(int e = 0; e < 32; e++)
00159         {
00160             PAD[((3 - ik) * 32) + (31 - e)] = PadEtat & un; // binary operation
00161             PadEtat = PadEtat » 1; // décalage des bit de 1
00162         }
00163     }
00164     // fill bool arrays
00165     for(int p = 0; p < 64; p++)
00166     {
00167         10[p] = static_cast<bool>(PAD[(2 * p)]); // _Lev0 (PAD paire)
00168         11[p] = static_cast<bool>(PAD[(2 * p) + 1]); // _Lev1 (PAD impaires)
00169     }
00170     std::bitset<64> bs0(0);
00171     std::bitset<64> bs1(0);
00172     for(std::uint32_t ip = 0; ip < 64; ip++)
00173     {
00174         bs0.set(ip, 10[ip]);
00175         bs1.set(ip, 11[ip]);
00176     }
00177     std::cout << "\t \t" << bs0 << std::endl;
00178     std::cout << "\t \t" << bs1 << std::endl;
00179 }
```

4.7.2.2 getAbsoluteBCID()

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

Definition at line 53 of file [DIFUnpacker.cc](#).

```
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] <<
16) | (cb[pos + 4] << 8) | (cb[pos + 5]));
00058     return LBC;
00059 }
```

4.7.2.3 getAnalogPtr()

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

Definition at line 92 of file [DIFUnpacker.cc](#).

```
00093 {
00094     std::uint32_t fshift{idx};
00095     if (cb[fshift] != DU::START_OF_LINES) return fshift;
00096     fshift++;
00097     while (cb[fshift] != DU::END_OF_LINES)
00098     {
00099         vLines.push_back(&cb[fshift]);
00100         std::uint32_t nchip{cb[fshift]};
00101         fshift += 1 + nchip * 64 * 2;
00102     }
00103     return fshift++;
00104 }
```

4.7.2.4 getBCID()

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

Definition at line 61 of file [DIFUnpacker.cc](#).

```
00061 { return (cb[idx + DU::BCID_SHIFT] << 16) + (cb[idx + DU::BCID_SHIFT + 1] << 8) + cb[idx +
    DU::BCID_SHIFT + 2]; }
```

4.7.2.5 getDTC()

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

Definition at line 49 of file [DIFUnpacker.cc](#).

```
00049 { 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]; }
```

4.7.2.6 getFrameAsicHeader()

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

Definition at line 76 of file [DIFUnpacker.cc](#).

```
00076 { return (framePtr[DU::FRAME_ASIC_HEADER_SHIFT]); }
```

4.7.2.7 getFrameBCID()

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

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

```
00079 {
00080     std::uint32_t igray = (framePtr[DU::FRAME_BCID_SHIFT] « 16) + (framePtr[DU::FRAME_BCID_SHIFT + 1] «
        8) + framePtr[DU::FRAME_BCID_SHIFT + 2];
00081     return DIFUnpacker::GrayToBin(igray);
00082 }
```

4.7.2.8 getFrameLevel()

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

Definition at line 90 of file [DIFUnpacker.cc](#).

```
00090 { return ((framePtr[DU::FRAME_DATA_SHIFT + ((3 - ip / 16) * 4 + (ip % 16) / 4)] » (7 - ((ip % 16) %
    4) * 2 + level))) & 0x1); }
```

4.7.2.9 getFramePAD()

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

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

```
00085 {
00086     std::uint32_t* iframe{(std::uint32_t*)&framePtr[DU::FRAME_DATA_SHIFT]};
00087     return ((iframe[3 - ip / 32] » (ip % 32)) & 0x1);
00088 }
```

4.7.2.10 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 106 of file [DIFUnpacker.cc](#).

```
00107 {
00108     std::uint32_t fshift{0};
00109     if(DATA_FORMAT_VERSION >= 13)
00110     {
00111         fshift = idx + DU::LINES_SHIFT + 1;
00112         if(DIFUnpacker::hasTemperature(cb, idx)) fshift = idx + DU::TDIF_SHIFT + 1;
        // jenlev 1
    }
```

```

00113     if(DIFUnpacker::hasAnalogReadout(cb, idx)) fshift = DIFUnpacker::getAnalogPtr(vLines, cb, fshift);
00114     // to be implemented
00115 }
00116 else
00117     fshift = idx + DU::BCID_SHIFT + 3;
00118 if(cb[fshift] != DU::START_OF_FRAME)
00119 {
00120     std::cout << "This is not a start of frame " << to_hex(cb[fshift]) << " \n";
00121     return fshift;
00122 }
00123 do {
00124     // printf("fshift %d and %d \n", fshift, max_size);
00125     if(cb[fshift] == DU::END_OF_DIF) return fshift;
00126     if(cb[fshift] == DU::START_OF_FRAME) fshift++;
00127     if(cb[fshift] == DU::END_OF_FRAME)
00128     {
00129         fshift++;
00130         continue;
00131     }
00132     std::uint32_t header = DIFUnpacker::getFrameAsicHeader(&cb[fshift]);
00133     if(header == DU::END_OF_FRAME) return (fshift + 2);
00134     // std::cout<<header<< " "<<fshift<<std::endl;
00135     if(header < 1 || header > 48) { throw header + " Header problem " + fshift; }
00136     vFrame.push_back(&cb[fshift]);
00137     fshift += DU::FRAME_SIZE;
00138     if(fshift > max_size)
00139     {
00140         std::cout << "fshift " << fshift << " exceed " << max_size << "\n";
00141         return fshift;
00142     }
00143     if(cb[fshift] == DU::END_OF_FRAME) fshift++;
00144 } while(true);
00145 }

```

4.7.2.11 getGTC()

```

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

```

Definition at line 51 of file [DIFUnpacker.cc](#).

```

00051 { 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]; }

```

4.7.2.12 getID()

```

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

```

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

```

00047 { return cb[idx + DU::ID_SHIFT]; }

```

4.7.2.13 getLines()

```

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

```

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

```

00062 { return (cb[idx + DU::LINES_SHIFT] >> 4) & 0x5; }

```

4.7.2.14 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 30 of file [DIFUnpacker.cc](#).

```
00031 {
00032     std::uint32_t id0{0};
00033     for(std::uint32_t i = start; i < size_buf; i++)
00034     {
00035         if(cbuf[i] != DU::START_OF_DIF && cbuf[i] != DU::START_OF_DIF_TEMP) continue;
00036         else
00037         {
00038             id0 = i;
00039             break;
00040         }
00041         // if (cbuf[id0+DU::ID_SHIFT]>0xFF) continue;
00042     }
00043     // std::cout << "***** " << id0 << std::endl;
00044     return id0;
00045 }
```

4.7.2.15 getTASU1()

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

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

```
00066 { 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]; }
```

4.7.2.16 getTASU2()

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

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

```
00068 { 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]; }
```

4.7.2.17 getTDIF()

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

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

```
00070 { return (cb[idx + DU::TDIF_SHIFT]); }
```

4.7.2.18 GrayToBin()

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

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

```
00016 {
00017     std::uint64_t ish{1};
00018     std::uint64_t anss{n};
00019     std::uint64_t idiv{0};
00020     std::uint64_t ishmax{sizeof(std::uint64_t) * 8};
00021     while(true)
00022     {
00023         idiv = anss » ish;
00024         anss ^= idiv;
00025         if(idiv <= 1 || ish == ishmax) return anss;
00026         ish «= 1;
00027     }
00028 }
```

4.7.2.19 hasAnalogReadout()

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

Definition at line 74 of file [DIFUnpacker.cc](#).

```
00074 { return (DIFUnpacker::getLines(cb, idx) != 0); }
```

4.7.2.20 hasLine()

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

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

```
00064 { return ((cb[idx + DU::LINES_SHIFT] » line) & 0x1); }
```

4.7.2.21 hasTemperature()

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

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

```
00072 { return (cb[idx] == DU::START_OF_DIF_TEMP); }
```

4.7.2.22 swap_bytes()

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

Definition at line 181 of file [DIFUnpacker.cc](#).

```
00182 {
00183     unsigned char Swapped[4];
00184     for(std::size_t i = 0; i < 4; i++) Swapped[i] = buf[4 - 1 - i];
00185     return *reinterpret_cast<std::uint32_t*>(&Swapped[0]);
00186 }
```

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

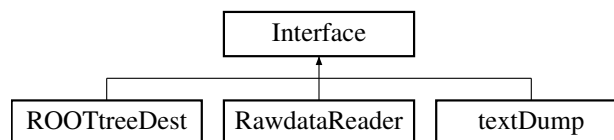
- [/home/runner/work/streamout/streamout/libs/core/include/DIFUnpacker.h](#)
- [/home/runner/work/streamout/streamout/libs/core/src/DIFUnpacker.cc](#)

4.8 Interface Class Reference

template class should implement void SOURCE::start(); bool SOURCE::next(); void SOURCE::end(); const Buffer& SOURCE::getSDHCALBuffer();

```
#include <Interface.h>
```

Inheritance diagram for Interface:



Public Member Functions

- [Interface](#) ()
- virtual [~Interface](#) ()
- std::shared_ptr< spdlog::logger > & [log](#) ()
- void [setLogger](#) (const std::shared_ptr< spdlog::logger > &logger)

4.8.1 Detailed Description

template class should implement void SOURCE::start(); bool SOURCE::next(); void SOURCE::end(); const Buffer& SOURCE::getSDHCALBuffer();

```
void DESTINATION::start(); void DESTINATION::processDIF(const DIFPtr&); void DESTINATION::processFrame(const DIFPtr&,const std::uint32_t& frameIndex); void DESTINATION::processPadInFrame(const DIFPtr&,const std::uint32_t& frameIndex,const std::uint32_t& channelIndex); void DESTINATION::processSlowControl(const Buffer&); void DESTINATION::end();
```

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

4.8.2 Constructor & Destructor Documentation

4.8.2.1 Interface()

```
Interface::Interface ( ) [inline]
```

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

```
00029 {}
```

4.8.2.2 ~Interface()

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

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

```
00030 {}
```

4.8.3 Member Function Documentation

4.8.3.1 log()

```
std::shared_ptr< spdlog::logger > & Interface::log ( ) [inline]
```

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

```
00031 { return m_Logger; }
```

4.8.3.2 setLogger()

```
void Interface::setLogger (
    const std::shared_ptr< spdlog::logger > & logger ) [inline]
```

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

```
00032 { m_Logger = logger; }
```

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

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

4.9 RawBufferNavigator Class Reference

```
#include <RawBufferNavigator.h>
```


Public Member Functions

- [RawBufferNavigator](#) ()=default
- [~RawBufferNavigator](#) ()=default
- [RawBufferNavigator](#) (const [Buffer](#) &b, const int &start=-1)
- void [setBuffer](#) (const [Buffer](#) &b, const int &start=-1)
- std::uint8_t [getDetectorID](#) ()
- 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)

4.9.1 Detailed Description

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

4.9.2 Constructor & Destructor Documentation

4.9.2.1 RawBufferNavigator() [1/2]

```
RawBufferNavigator::RawBufferNavigator ( ) [default]
```

4.9.2.2 ~RawBufferNavigator()

```
RawBufferNavigator::~RawBufferNavigator ( ) [default]
```

4.9.2.3 RawBufferNavigator() [2/2]

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

Definition at line 16 of file [RawBufferNavigator.cc](#).

```
00016 : m_Buffer(b) { setBuffer(b, start); }
```

4.9.3 Member Function Documentation

4.9.3.1 badSCData()

```
bool RawBufferNavigator::badSCData ( )
```

Definition at line 57 of file [RawBufferNavigator.cc](#).

```
00058 {
00059     setSCBuffer();
00060     return m_BadSCdata;
00061 }
```

4.9.3.2 getDetectorID()

```
std::uint8_t RawBufferNavigator::getDetectorID ( )
```

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

```
00018 { return m_Buffer[0]; }
```

4.9.3.3 getDIF_CRC()

```
std::uint32_t RawBufferNavigator::getDIF_CRC ( )
```

Definition at line 40 of file [RawBufferNavigator.cc](#).

```
00041 {
00042     uint32_t i{getEndOfDIFData()};
00043     uint32_t ret{0};
00044     ret |= (m_Buffer.begin()[i - 2]) << 8);
00045     ret |= m_Buffer.begin()[i - 1];
00046     return ret;
00047 }
```

4.9.3.4 getDIFBuffer()

```
Buffer RawBufferNavigator::getDIFBuffer ( )
```

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

```
00028 { return Buffer(getDIFBufferStart(), getDIFBufferSize()); }
```

4.9.3.5 getDIFBufferSize()

```
std::uint32_t RawBufferNavigator::getDIFBufferSize ( )
```

Definition at line 26 of file [RawBufferNavigator.cc](#).

```
00026 { return m_Buffer.size() - m_DIFstartIndex; }
```

4.9.3.6 getDIFBufferStart()

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

Definition at line 24 of file [RawBufferNavigator.cc](#).

```
00024 { return &(m_Buffer.begin())[m_DIFstartIndex]; }
```

4.9.3.7 getDIFPtr()

```
DIFPtr & RawBufferNavigator::getDIFPtr ( )
```

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

```
00031 {
00032     m_TheDIFPtr.setBuffer(getDIFBufferStart(), getDIFBufferSize());
00033     return m_TheDIFPtr;
00034 }
```

4.9.3.8 getEndOfAllData()

```
Buffer RawBufferNavigator::getEndOfAllData ( )
```

Definition at line 96 of file [RawBufferNavigator.cc](#).

```
00097 {
00098     setSCBuffer();
00099     if(hasSlowControlData() && !m_BadSCdata) { return Buffer(&(m_SCbuffer.begin())[m_SCbuffer.size()],
getSizedAfterDIFPtr() - 3 - m_SCbuffer.size()); }
00100     else
00101         return Buffer(&(getDIFBufferStart()[getEndOfDIFData()]), getSizeAfterDIFPtr() - 3); // remove the
2 bytes for CRC and the DIF trailer
00102 }
```

4.9.3.9 getEndOfDIFData()

```
std::uint32_t RawBufferNavigator::getEndOfDIFData ( )
```

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

```
00036 { return getDIFPtr().getGetFramePtrReturn() + 3; }
```

4.9.3.10 getSCBuffer()

`Buffer RawBufferNavigator::getSCBuffer ()`

Definition at line 51 of file [RawBufferNavigator.cc](#).

```
00052 {
00053     setSCBuffer();
00054     return m_SCbuffer;
00055 }
```

4.9.3.11 getSizeAfterDIFPtr()

`std::uint32_t RawBufferNavigator::getSizeAfterDIFPtr ()`

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

```
00038 { return getDIFBufferSize() - getDIFPtr().getGetFramePtrReturn(); }
```

4.9.3.12 getStartOfDIF()

`std::uint32_t RawBufferNavigator::getStartOfDIF ()`

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

```
00022 { return m_DIFstartIndex; }
```

4.9.3.13 hasSlowControlData()

`bool RawBufferNavigator::hasSlowControlData ()`

Definition at line 49 of file [RawBufferNavigator.cc](#).

```
00049 { return getDIFBufferStart()[getEndOfDIFData()] == 0xb1; }
```

4.9.3.14 setBuffer()

```
void RawBufferNavigator::setBuffer (
    const Buffer & b,
    const int & start = -1 ) [inline]
```

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

```
00019 {
00020     m_BadSCdata = false;
00021     m_Buffer     = b;
00022     StartAt(start);
00023     m_DIFstartIndex = DIFUnpacker::getStartOfDIF(m_Buffer.begin(), m_Buffer.size(), m_Start);
00024 }
```

4.9.3.15 StartAt()

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

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

```
00012 {
00013     if(start >= 0) m_Start = start;
00014 }
```

4.9.3.16 validBuffer()

```
bool RawBufferNavigator::validBuffer ( )
```

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

```
00020 { return m_DIFstartIndex != 0; }
```

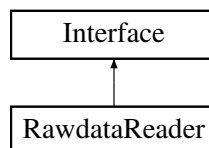
The documentation for this class was generated from the following files:

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

4.10 RawdataReader Class Reference

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

Inheritance diagram for RawdataReader:



Public Member Functions

- [RawdataReader](#) (const char *fileName)
- void [start](#) ()
- void [end](#) ()
- float [getFileSize](#) ()
- void [openFile](#) (const std::string &fileName)
- void [closeFile](#) ()
- bool [nextEvent](#) ()
- bool [nextDIFbuffer](#) ()
- const [Buffer](#) & [getSDHCALBuffer](#) ()
- virtual [~RawdataReader](#) ()

Static Public Member Functions

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

4.10.1 Detailed Description

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

4.10.2 Constructor & Destructor Documentation

4.10.2.1 RawdataReader()

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

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

```
00017 {
00018     m_buf.reserve(m_BufferSize);
00019     m_Filename = fileName;
00020 }
```

4.10.2.2 ~RawdataReader()

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

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

```
00029 { closeFile(); }
```

4.10.3 Member Function Documentation

4.10.3.1 closeFile()

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

Definition at line 42 of file [RawdataReader.cc](#).

```
00043 {
00044     try
00045     {
00046         if(m_FileStream.is_open()) m_FileStream.close();
00047     }
00048     catch(const std::ios_base::failure& e)
00049     {
00050         log()->error("Caught an ios_base::failure in closeFile : {} {}", e.what(), e.code().value());
00051         throw;
00052     }
00053 }
```

4.10.3.2 end()

```
void RawdataReader::end ( )
```

Definition at line 24 of file [RawdataReader.cc](#).

```
00024 { closeFile(); }
```

4.10.3.3 getFileSize()

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

Definition at line 124 of file [RawdataReader.cc](#).

```
00124 { return m_FileSize; }
```

4.10.3.4 getSDHCALBuffer()

```
const Buffer & RawdataReader::getSDHCALBuffer ( )
```

Definition at line 116 of file [RawdataReader.cc](#).

```
00117 {  
00118     uncompress();  
00119     return m_Buffer;  
00120 }
```

4.10.3.5 nextDIFbuffer()

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

Definition at line 90 of file [RawdataReader.cc](#).

```
00091 {  
00092     try  
00093     {  
00094         static int DIF_processed{0};  
00095         if(DIF_processed >= m_NumberOfDIF)  
00096         {  
00097             DIF_processed = 0;  
00098             return false;  
00099         }  
00100         else  
00101         {  
00102             DIF_processed++;  
00103             std::uint32_t bsize{0};  
00104             m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));  
00105             m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);  
00106             m_Buffer = Buffer(m_buf);  
00107         }  
00108     }  
00109     catch(const std::ios_base::failure& e)  
00110     {  
00111         return false;  
00112     }  
00113     return true;  
00114 }
```

4.10.3.6 nextEvent()

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

Definition at line 76 of file [RawdataReader.cc](#).

```
00077 {
00078     try
00079     {
00080         m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));
00081         m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));
00082     }
00083     catch(const std::ios_base::failure& e)
00084     {
00085         return false;
00086     }
00087     return true;
00088 }
```

4.10.3.7 openFile()

```
void RawdataReader::openFile (
    const std::string & fileName )
```

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

```
00056 {
00057     try
00058     {
00059         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00060         m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00061         m_FileStream.open(fileName.c_str(), 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
00062         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00063         if(m_FileStream.is_open())
00064         {
00065             setFileSize(m_FileStream.tellg());
00066             m_FileStream.seekg(0, std::ios::beg);
00067         }
00068     }
00069     catch(const std::ios_base::failure& e)
00070     {
00071         log()->error("Caught an ios_base::failure in openFile : {} {}", e.what(), e.code().value());
00072         throw;
00073     }
00074 }
```

4.10.3.8 setDefaultBufferSize()

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

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

```
00014 { m_BufferSize = size; }
```

4.10.3.9 start()

```
void RawdataReader::start ( )
```

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

```
00022 { openFile(m_Filename); }
```

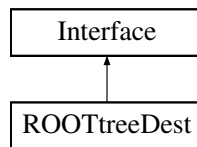
The documentation for this class was generated from the following files:

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

4.11 ROOTtreeDest Class Reference

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

Inheritance diagram for ROOTtreeDest:



Classes

- struct [DATA](#)

Public Member Functions

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

4.11.1 Detailed Description

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

4.11.2 Constructor & Destructor Documentation

4.11.2.1 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,
00013         "DIFid/i:ASICid:CHANNELid:Thresh:DTC:GTC:DIF_BCID:frame_BCID:timeStamp:AbsoluteBCID/1");
00013 }
```

4.11.3 Member Function Documentation

4.11.3.1 end()

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

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

```
00031 { ; }
```

4.11.3.2 processDIF()

```
void ROOTtreeDest::processDIF (
    const 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 }
```

4.11.3.3 processFrame()

```
void ROOTtreeDest::processFrame (
    const DIFPtr & d,
    const std::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 }
```

4.11.3.4 processPadInFrame()

```
void ROOTtreeDest::processPadInFrame (
    const DIFPtr & d,
    const std::uint32_t & frameIndex,
    const std::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 }
```

4.11.3.5 processSlowControl()

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

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

```
00030 { ; }
```

4.11.3.6 start()

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

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

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

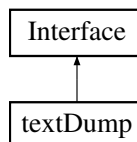
The documentation for this class was generated from the following files:

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

4.12 textDump Class Reference

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

Inheritance diagram for textDump:



Public Member Functions

- [textDump](#) ()
- void [start](#) ()
- void [processDIF](#) (const [DIFPtr](#) &)
- void [processFrame](#) (const [DIFPtr](#) &, uint32_t frameIndex)
- void [processPadInFrame](#) (const [DIFPtr](#) &, uint32_t frameIndex, uint32_t channelIndex)
- void [processSlowControl](#) ([Buffer](#))
- void [end](#) ()
- std::shared_ptr< spdlog::logger > & [print](#) ()
- void [setLevel](#) (const spdlog::level::level_enum &level)

4.12.1 Detailed Description

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

4.12.2 Constructor & Destructor Documentation

4.12.2.1 textDump()

```
textDump::textDump ( ) [inline]
```

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

```
00018 {
00019     m_InternalLogger = std::make_shared<spdlog::logger>("textDump",
        std::make_shared<spdlog::sinks::stdout_color_sink_mt>());
00020     m_InternalLogger->set_level(spdlog::level::trace);
00021 }
```

4.12.3 Member Function Documentation

4.12.3.1 end()

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

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

```
00025 { print()->info("textDump end of report"); }
```

4.12.3.2 print()

```
std::shared_ptr< spdlog::logger > & textDump::print ( ) [inline]
```

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

```
00028 { return m_InternalLogger; }
```

4.12.3.3 processDIF()

```
void textDump::processDIF (
    const DIFPtr & d )
```

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

```
00011 { print()->info("DIF_ID : {}, DTC : {}, GTC : {}, DIF BCID {}, Absolute BCID : {}, Nbr frames {}",
    d.getDIFid(), d.getDTC(), d.getGTC(), d.getBCID(), d.getAbsoluteBCID(), d.getNumberOfFrames()); }
```

4.12.3.4 processFrame()

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

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

```
00014 {
00015     print()->info("\tDisplaying frame number {} : ASIC ID {}, Frame BCID {}, Frame Time To Trigger
(a.k.a timestamp) is {}", frameIndex, d.getASICid(frameIndex), d.getFrameBCID(frameIndex),
d.getFrameTimeToTrigger(frameIndex));
00016 }
```

4.12.3.5 processPadInFrame()

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

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

```
00019 {
00020     if(d.getThresholdStatus(frameIndex, channelIndex) > 0) { print()->info("\t\tChannel {}, Threshold
{}", channelIndex, d.getThresholdStatus(frameIndex, channelIndex)); }
00021 }
```

4.12.3.6 processSlowControl()

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

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

```
00023 { print()->error("textDump::processSlowControl not implemented yet."); }
```

4.12.3.7 setLevel()

```
void textDump::setLevel (
    const spdlog::level::level_enum & level ) [inline]
```

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

```
00029 { m_InternalLogger->set_level(level); }
```

4.12.3.8 start()

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

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

```
00009 { print()->info("Will dump bunch of DIF data"); }
```

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](#)

4.13 Timer Class Reference

```
#include <Timer.h>
```

Public Member Functions

- void [start](#) ()
- void [stop](#) ()
- float [getElapsedTime](#) ()

4.13.1 Detailed Description

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

4.13.2 Member Function Documentation

4.13.2.1 getElapsedTime()

```
float Timer::getElapsedTime ( ) [inline]
```

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

```
00015 { return std::chrono::duration_cast<std::chrono::microseconds>(m_StopTime - m_StartTime).count(); }
```

4.13.2.2 start()

```
void Timer::start ( ) [inline]
```

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

```
00013 { m_StartTime = std::chrono::high_resolution_clock::now(); }
```

4.13.2.3 stop()

```
void Timer::stop ( ) [inline]
```

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

```
00014 { m_StopTime = std::chrono::high_resolution_clock::now(); }
```

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

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

Chapter 5

File Documentation

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

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

Typedefs

- using [bit8_t](#) = std::uint8_t
- using [bit16_t](#) = std::uint16_t
- using [bit32_t](#) = std::uint32_t
- using [bit64_t](#) = std::uint64_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.

5.1.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.1.2 Typedef Documentation

5.1.2.1 bit16_t

```
using bit16_t = std::uint16_t
```

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

5.1.2.2 bit32_t

```
using bit32_t = std::uint32_t
```

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

5.1.2.3 bit64_t

```
using bit64_t = std::uint64_t
```

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

5.1.2.4 bit8_t

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

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

5.1.3 Function Documentation

5.1.3.1 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 8 of file [Bits.cc](#).

```
00008 { return os << c + 0; }
```


5.2 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 using bit16_t = std::uint16_t; /*<! type to represent 16bits words (2 bytes) */
00012 using bit32_t = std::uint32_t; /*<! type to represent 32bits words (4 bytes) */
00013 using bit64_t = std::uint64_t; /*<! type to represent 64bits words (8 bytes) */
00014
00016 std::ostream& operator<<(std::ostream& os, const bit8_t& c);
```

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

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

Classes

- class [Buffer](#)

5.3.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde A.Pingault L.Mirabito

See also

<https://github.com/apingault/Trivent4HEP>

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

5.4 Buffer.h

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

```
00001
00006 #pragma once
00007
00008 #include "Bits.h"
00009
00010 #include <array>
00011 #include <vector>
00012
00013 class Buffer
00014 {
00015 public:
00016     Buffer() : m_Buffer(nullptr), m_Size(0), m_Capacity(0) {}
00017     virtual ~Buffer() {}
```

```

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 * sizeof(char)), m_Capacity(i * sizeof(char)) {}
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() const { return m_Buffer; }
00028   bit8_t* end() const { return m_Buffer + m_Size; }
00029   bit8_t& operator[](const std::size_t& pos) { return m_Buffer[pos]; }
00030   bit8_t& operator[](const std::size_t& pos) const { return m_Buffer[pos]; }
00031
00032   void setSize(const std::size_t& size) { m_Size = size; }
00033
00034 private:
00035   bit8_t* m_Buffer{nullptr};
00036   std::size_t m_Size{0};
00037   std::size_t m_Capacity{0};
00038 };

```

5.5 /home/runner/work/streamout/streamout/libs/core/include/Buffer← Looper.h File Reference

```

#include "Buffer.h"
#include "BufferLooperCounter.h"
#include "DetectorId.h"
#include "Formatters.h"
#include "RawBufferNavigator.h"
#include "Timer.h"
#include <algorithm>
#include <cassert>
#include <memory>
#include <spdlog/sinks/null_sink.h>
#include <spdlog/spdlog.h>
#include <vector>

```

Classes

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

5.5.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.6 BufferLooper.h

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

```

00001
00005 #pragma once
00006
00007 #include "Buffer.h"
00008 #include "BufferLooperCounter.h"
00009 #include "DetectorId.h"
00010 #include "Formatters.h"
00011 #include "RawBufferNavigator.h"
00012 #include "Timer.h"
00013
00014 #include <algorithm>
00015 #include <cassert>
00016 #include <memory>
00017 #include <spdlog/sinks/null_sink.h>
00018 #include <spdlog/spdlog.h>
00019 #include <vector>
00020 // function to loop on buffers
00021
00022 template<typename SOURCE, typename DESTINATION> class BufferLooper
00023 {
00024 public:
00025     BufferLooper(SOURCE& source, DESTINATION& dest, bool debug = false) : m_Source(source),
00026         m_Destination(dest), m_Debug(debug)
00027     {
00028         m_Logger = spdlog::create<spdlog::sinks::null_sink_mt>("streamout");
00029         if(!spdlog::get("streamout")) { spdlog::register_logger(m_Logger); }
00030         m_Source.setLogger(m_Logger);
00031         m_Destination.setLogger(m_Logger);
00032     }
00033     void addSink(const spdlog::sink_ptr& sink, const spdlog::level::level_enum& level =
00034         spdlog::get_level())
00035     {
00036         sink->set_level(level);
00037         m_Sinks.push_back(sink);
00038         m_Logger = std::make_shared<spdlog::logger>("streamout", begin(m_Sinks), end(m_Sinks));
00039         m_Source.setLogger(m_Logger);
00040         m_Destination.setLogger(m_Logger);
00041     }
00042     void loop(const std::uint32_t& m_NbrEventsToProcess = 0)
00043     {
00044         Timer timer;
00045         timer.start();
00046         m_Source.start();
00047         m_Destination.start();
00048         RawBufferNavigator bufferNavigator;
00049         while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00050         {
00051             m_Logger->warn("====* Event number {} *====", m_NbrEvents);
00052             while(m_Source.nextDIFbuffer())
00053             {
00054                 const Buffer& buffer = m_Source.getSDHCALBuffer();
00055                 bufferNavigator.setBuffer(buffer);
00056
00057                 bit8_t* debug_variable_1 = buffer.end();
00058                 bit8_t* debug_variable_2 = bufferNavigator.getDIFBuffer().end();
00059                 if(debug_variable_1 != debug_variable_2) m_Logger->info("DIF BUFFER END {} {}",
00060                     fmt::ptr(debug_variable_1), fmt::ptr(debug_variable_2));
00061                 if(m_Debug) assert(debug_variable_1 == debug_variable_2);
00062
00063                 if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
00064                     static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00065                 {
00066                     m_Logger->trace("{} ", bufferNavigator.getDetectorID());
00067                     continue;
00068                 }
00069
00070                 uint32_t idstart = bufferNavigator.getStartOfDIF();
00071                 if(m_Debug && idstart == 0) m_Logger->info(to_hex(buffer));
00072                 c.DIFStarter[idstart]++;
00073                 if(!bufferNavigator.validBuffer())
00074                 {
00075                     m_Logger->error("!bufferNavigator.validBuffer()");
00076                     continue;
00077                 }
00078                 DIFPtr d = bufferNavigator.getDIFPtr();
00079                 c.DIFPtrValueAtReturnedPos[bufferNavigator.getDIFBufferStart() [d.getGetFramePtrReturn()]]++;
00080                 if(m_Debug) assert(bufferNavigator.getDIFBufferStart() [d.getGetFramePtrReturn()] == 0xa0);
00081                 c.SizeAfterDIFPtr[bufferNavigator.getSizeAfterDIFPtr() ]++;
00082                 m_Destination.processDIF(d);
00083                 for(std::size_t i = 0; i < d.getNumberOfFrames(); i++)

```

```

00082     {
00083         m_Destination.processFrame(d, i);
00084         for(std::size_t j = 0; j < 64; j++) m_Destination.processPadInFrame(d, i, j);
00085     }
00086
00087     bool processSC = false;
00088     if(bufferNavigator.hasSlowControlData())
00089     {
00090         c.hasSlowControl++;
00091         processSC = true;
00092     }
00093     if(bufferNavigator.badSCData())
00094     {
00095         c.hasBadSlowControl++;
00096         processSC = false;
00097     }
00098     if(processSC) { m_Destination.processSlowControl(bufferNavigator.getSCBuffer()); }
00099
00100     Buffer eod = bufferNavigator.getEndOfAllData();
00101     c.SizeAfterAllData[eod.size()]++;
00102     bit8_t* debug_variable_3 = eod.end();
00103     if(debug_variable_1 != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {}",
00104         fmt::ptr(debug_variable_1), fmt::ptr(debug_variable_3));
00105     if(m_Debug) assert(debug_variable_1 == debug_variable_3);
00106     if(eod.size() != 0) m_Logger->info("End of Data remaining stuff : {}", to_hex(eod));
00107
00108     int nonzeroCount = 0;
00109     for(bit8_t it = eod.begin(); it != eod.end(); it++)
00110         if(static_cast<int>(*it) != 0) nonzeroCount++;
00111     c.NonZeroValueAtEndOfData[nonzeroCount]++;
00112     } // end of DIF while loop
00113     m_Logger->warn("***** Event number {} *****", m_NbrEvents);
00114     m_NbrEvents++;
00115     } // end of event while loop
00116     m_Destination.end();
00117     m_Source.end();
00118     timer.stop();
00119     fmt::print("=== elapsed time {}ms ({}ms/event) ===\n", timer.getElapsedTime() / 1000,
00120         timer.getElapsedTime() / (1000 * m_NbrEvents));
00121     }
00122     void printAllCounters() { c.printAllCounters(); }
00123     std::shared_ptr<spdlog::logger> log() { return m_Logger; }
00124
00125     void setDetectorIDs(const std::vector<DetectorID>& detectorIDs) { m_DetectorIDs = detectorIDs; }
00126
00127 private:
00128     std::vector<DetectorID> m_DetectorIDs;
00129     std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00130     std::vector<spdlog::sink_ptr> m_Sinks;
00131     BufferLooperCounter c;
00132     SOURCE& m_Source{nullptr};
00133     DESTINATION& m_Destination{nullptr};
00134     bool m_Debug{false};
00135     std::uint32_t m_NbrEvents{1};
00136 };

```

5.7 /home/runner/work/streamout/streamout/libs/core/include/Buffer↵ LooperCounter.h File Reference

```

#include <map>
#include <memory>
#include <string>

```

Classes

- struct [BufferLooperCounter](#)

5.7.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.8 BufferLooperCounter.h

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

```
00001
00005 #pragma once
00006
00007 #include <map>
00008 #include <memory>
00009 #include <string>
00010
00011 struct BufferLooperCounter
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);
00023     void printAllCounters();
00024 };
```

5.9 /home/runner/work/streamout/streamout/libs/core/include/DetectorId.h File Reference

```
#include <stdint>
```

Enumerations

- enum class [DetectorID](#) : std::uint16_t { [HARDROC](#) = 100 , [HARDROC_NEW](#) = 150 , [RUNHEADER](#) = 255 }

5.9.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.9.2 Enumeration Type Documentation

5.9.2.1 DetectorID

```
enum class DetectorID : std::uint16_t [strong]
```

Enumerator

HARDROC	
HARDROC_NEW	
RUNHEADER	

Definition at line 9 of file [DetectorId.h](#).

```
00010 {
00011     HARDROC      = 100,
00012     HARDROC_NEW  = 150,
00013     RUNHEADER    = 255
00014 };
```

5.10 DetectorId.h

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

```
00001
00005 #pragma once
00006
00007 #include <stdint>
00008
00009 enum class DetectorID : std::uint16_t
00010 {
00011     HARDROC      = 100,
00012     HARDROC_NEW  = 150,
00013     RUNHEADER    = 255
00014 };
```

5.11 /home/runner/work/streamout/streamout/libs/core/include/DIFPtr.h

File Reference

```
#include "DIFUnpacker.h"
#include <stdint>
#include <spdlog/spdlog.h>
#include <string>
#include <vector>
```

Classes

- class [DIFPtr](#)

5.11.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.12 DIFPtr.h

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

```

00001
00005 #pragma once
00006
00007 #include "DIFUnpacker.h"
00008
00009 #include <stdint>
00010 #include <spdlog/spdlog.h>
00011 #include <string>
00012 #include <vector>
00013
00014 class DIFPtr
00015 {
00016 public:
00017     void setBuffer(unsigned char* p, const std::uint32_t& max_size);
00018     unsigned char* getPtr() const;
00019     std::uint32_t getGetFramePtrReturn() const;
00020     std::vector<unsigned char*> getFramesVector();
00021     std::vector<unsigned char*> getLinesVector();
00022     std::uint32_t getID() const;
00023     std::uint32_t getDTC() const;
00024     std::uint32_t getGTC() const;
00025     std::uint64_t getAbsoluteBCID() const;
00026     std::uint32_t getBCID() const;
00027     std::uint32_t getLines() const;
00028     bool hasLine(uint32_t line) const;
00029     std::uint32_t getTASU1() const;
00030     std::uint32_t getTASU2() const;
00031     std::uint32_t getTDIF() const;
00032     float getTemperatureDIF() const;
00033     float getTemperatureASU1() const;
00034     float getTemperatureASU2() const;
00035     bool hasTemperature() const;
00036     bool hasAnalogReadout() const;
00037     std::uint32_t getNumberOfFrames() const;
00038     unsigned char* getFramePtr(uint32_t i) const;
00039     std::uint32_t getFrameAsicHeader(uint32_t i) const;
00040     std::uint32_t getFrameBCID(uint32_t i) const;
00041     std::uint32_t getFrameTimeToTrigger(uint32_t i) const;
00042     bool getFrameLevel(uint32_t i, uint32_t ipad, uint32_t ilevel) const;
00043     // Addition by GG
00044     uint32_t getDIFid() const;
00045     uint32_t getASICid(uint32_t i) const;
00046     uint32_t getThresholdStatus(uint32_t i, uint32_t ipad) const;
00047
00048 private:
00049     std::uint32_t theSize_{0};
00050     std::uint32_t theGetFramePtrReturn_{0};
00051     unsigned char* theDIF_{nullptr};
00052     std::vector<unsigned char*> theFrames_;
00053     std::vector<unsigned char*> theLines_;
00054 };
00055
00056 inline void DIFPtr::setBuffer(unsigned char* p, const std::uint32_t& max_size)
00057 {
00058     theFrames_.clear();
00059     theLines_.clear();
00060     theSize_ = max_size;
00061     theDIF_ = p;
00062     try
00063     {
00064         theGetFramePtrReturn_ = DIFUnpacker::getFramePtr(theFrames_, theLines_, theSize_, theDIF_);
00065     }
00066     catch(const std::string& e)
00067     {
00068         spdlog::get("streamout")->error(" DIF {} T ? {} {} ", getID(), hasTemperature(), e);
00069     }
00070 }
00071
00072 inline unsigned char* DIFPtr::getPtr() const { return theDIF_; }
00073 inline std::uint32_t DIFPtr::getGetFramePtrReturn() const { return
    theGetFramePtrReturn_; }
00074 inline std::vector<unsigned char*> DIFPtr::getFramesVector() { return theFrames_; }
00075 inline std::vector<unsigned char*> DIFPtr::getLinesVector() { return theLines_; }
00076 inline std::uint32_t DIFPtr::getID() const { return DIFUnpacker::getID(theDIF_); }
00077 inline std::uint32_t DIFPtr::getDTC() const { return DIFUnpacker::getDTC(theDIF_); }
00078 inline std::uint32_t DIFPtr::getGTC() const { return DIFUnpacker::getGTC(theDIF_); }
00079 inline std::uint64_t DIFPtr::getAbsoluteBCID() const { return
    DIFUnpacker::getAbsoluteBCID(theDIF_); }
00080 inline std::uint32_t DIFPtr::getBCID() const { return DIFUnpacker::getBCID(theDIF_); }
00081 inline std::uint32_t DIFPtr::getLines() const { return DIFUnpacker::getLines(theDIF_); }
00082 inline bool DIFPtr::hasLine(uint32_t line) const { return
    DIFUnpacker::hasLine(line, theDIF_); }

```

```

00083 inline std::uint32_t          DIFPtr::getTASU1() const { return DIFUnpacker::getTASU1(theDIF_);
    }
00084 inline std::uint32_t          DIFPtr::getTASU2() const { return DIFUnpacker::getTASU2(theDIF_);
    }
00085 inline std::uint32_t          DIFPtr::getTDIF() const { return DIFUnpacker::getTDIF(theDIF_); }
00086 inline float                  DIFPtr::getTemperatureDIF() const { return 0.508 * getTDIF() -
    9.659; }
00087 inline float                  DIFPtr::getTemperatureASU1() const { return (getTASU1() >> 3) *
    0.0625; }
00088 inline float                  DIFPtr::getTemperatureASU2() const { return (getTASU2() >> 3) *
    0.0625; }
00089 inline bool                   DIFPtr::hasTemperature() const { return
    DIFUnpacker::hasTemperature(theDIF_); }
00090 inline bool                   DIFPtr::hasAnalogReadout() const { return
    DIFUnpacker::hasAnalogReadout(theDIF_); }
00091 inline std::uint32_t          DIFPtr::getNumberOfFrames() const { return theFrames_.size(); }
00092 inline unsigned char*         DIFPtr::getFramePtr(uint32_t i) const { return theFrames_[i]; }
00093 inline std::uint32_t          DIFPtr::getFrameAsicHeader(uint32_t i) const { return
    DIFUnpacker::getFrameAsicHeader(theFrames_[i]); }
00094 inline std::uint32_t          DIFPtr::getFrameBCID(uint32_t i) const { return
    DIFUnpacker::getFrameBCID(theFrames_[i]); }
00095 inline std::uint32_t          DIFPtr::getFrameTimeToTrigger(uint32_t i) const { return getBCID()
    - getFrameBCID(i); }
00096 inline bool                   DIFPtr::getFrameLevel(uint32_t i, uint32_t ipad, uint32_t ilevel)
    const { return DIFUnpacker::getFrameLevel(theFrames_[i], ipad, ilevel); }
00097 // Addition by GG
00098 inline uint32_t               DIFPtr::getDIFid() const { return getID() & 0xFF; }
00099 inline uint32_t               DIFPtr::getASICid(uint32_t i) const { return getFrameAsicHeader(i)
    & 0xFF; }
00100 inline uint32_t               DIFPtr::getThresholdStatus(uint32_t i, uint32_t ipad) const {
    return (((uint32_t) getFrameLevel(i, ipad, 1)) << 1) | ((uint32_t) getFrameLevel(i, ipad, 0)); }

```

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

```

#include <bitset>
#include <cstdint>
#include <map>
#include <string>

```

Classes

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

5.13.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.14 DIFSlowControl.h

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

```

00001
00005 #pragma once
00006
00007 #include <bitset>
00008 #include <cstdint>
00009 #include <map>
00010 #include <string>
00019 class DIFSlowControl
00020 {
00021 public:
00023
00028 DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIFid, unsigned char* buf);
00029
00031 inline std::uint8_t getDIFid();
00032
00034
00037 inline std::map<int, std::map<std::string, int>> getChipsMap();
00038
00040
00044 inline std::map<std::string, int> getChipSlowControl(const int& asicid);
00045
00047
00051 inline int getChipSlowControl(const std::int8_t& asicid, const std::string& param);
00052
00054 void Dump();
00055
00056 private:
00058 DIFSlowControl() = delete;
00060 void FillHR1(const int& header_shift, unsigned char* cbuf);
00062 void FillHR2(const int& header_shift, unsigned char* cbuf);
00064 void FillAsicHR1(const std::bitset<72 * 8>& bs);
00066 void FillAsicHR2(const std::bitset<109 * 8>& bs);
00067
00068 unsigned int m_DIFid{0};
00069 unsigned int m_Version{0};
00070 unsigned int m_AsicType{0}; // asicType_
00071 unsigned int m_NbrAsic{0};
00072 std::map<int, std::map<std::string, int>> m_MapSC;
00073 };

```

5.15 /home/runner/work/streamout/streamout/libs/core/include/DIFUnpacker.h File Reference ↩

```

#include <cstdint>
#include <vector>

```

Classes

- class [DIFUnpacker](#)

5.15.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.16 DIFUnpacker.h

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

```

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

```

5.17 /home/runner/work/streamout/streamout/libs/core/include/↵ Formatters.h File Reference

```

#include "Bits.h"
#include <iosfwd>
#include <string>

```

Functions

- std::string [to_dec](#) (const [Buffer](#) &b, const std::size_t &begin=0, const std::size_t &end=-1)
- std::string [to_dec](#) (const [bit8_t](#) &)
- std::string [to_dec](#) (const [bit16_t](#) &)
- std::string [to_dec](#) (const [bit32_t](#) &)
- std::string [to_dec](#) (const [bit64_t](#) &)
- std::string [to_hex](#) (const [Buffer](#) &b, const std::size_t &begin=0, const std::size_t &end=-1)
- std::string [to_hex](#) (const [bit8_t](#) &)
- std::string [to_hex](#) (const [bit16_t](#) &)
- std::string [to_hex](#) (const [bit32_t](#) &)
- std::string [to_hex](#) (const [bit64_t](#) &)
- std::string [to_bin](#) (const [Buffer](#) &b, const std::size_t &begin=0, const std::size_t &end=-1)

- `std::string to_bin` (const `bit8_t` &)
- `std::string to_bin` (const `bit16_t` &)
- `std::string to_bin` (const `bit32_t` &)
- `std::string to_bin` (const `bit64_t` &)
- `std::string to_oct` (const `Buffer` &b, const `std::size_t` &begin=0, const `std::size_t` &end=-1)
- `std::string to_oct` (const `bit8_t` &)
- `std::string to_oct` (const `bit16_t` &)
- `std::string to_oct` (const `bit32_t` &)
- `std::string to_oct` (const `bit64_t` &)

5.17.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.17.2 Function Documentation

5.17.2.1 to_bin() [1/5]

```
std::string to_bin (  
    const bit16_t & b )
```

Definition at line 71 of file [Formatters.cc](#).

```
00071 { return fmt::format("{:#016b}", b); }
```

5.17.2.2 to_bin() [2/5]

```
std::string to_bin (  
    const bit32_t & b )
```

Definition at line 73 of file [Formatters.cc](#).

```
00073 { return fmt::format("{:#032b}", b); }
```

5.17.2.3 to_bin() [3/5]

```
std::string to_bin (  
    const bit64_t & b )
```

Definition at line 75 of file [Formatters.cc](#).

```
00075 { return fmt::format("{:#064b}", b); }
```

5.17.2.4 to_bin() [4/5]

```
std::string to_bin (
    const bit8_t & b )
```

Definition at line 69 of file [Formatters.cc](#).

```
00069 { return fmt::format("{:08b}", b); }
```

5.17.2.5 to_bin() [5/5]

```
std::string to_bin (
    const Buffer & b,
    const std::size_t & begin = 0,
    const std::size_t & end = -1 )
```

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

```
00057 {
00058     std::size_t iend = end;
00059     if(iend == -1) iend = b.size();
00060     std::string ret;
00061     for(std::size_t k = begin; k < iend; k++)
00062     {
00063         ret += to_bin(b[k]);
00064         ret += " - ";
00065     }
00066     return ret;
00067 }
```

5.17.2.6 to_dec() [1/5]

```
std::string to_dec (
    const bit16_t & b )
```

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

```
00029 { return fmt::format("{:d}", b); }
```

5.17.2.7 to_dec() [2/5]

```
std::string to_dec (
    const bit32_t & b )
```

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

```
00031 { return fmt::format("{:d}", b); }
```

5.17.2.8 to_dec() [3/5]

```
std::string to_dec (
    const bit64_t & b )
```

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

```
00033 { return fmt::format("{:#d}", b); }
```

5.17.2.9 to_dec() [4/5]

```
std::string to_dec (
    const bit8_t & b )
```

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

```
00027 { return fmt::format("{:#d}", b); }
```

5.17.2.10 to_dec() [5/5]

```
std::string to_dec (
    const Buffer & b,
    const std::size_t & begin = 0,
    const std::size_t & end = -1 )
```

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

```
00015 {
00016     std::size_t iend = end;
00017     if(iend == -1) iend = b.size();
00018     std::string ret;
00019     for(std::size_t k = begin; k < iend; k++)
00020     {
00021         ret += to_dec(b[k]);
00022         ret += " - ";
00023     }
00024     return ret;
00025 }
```

5.17.2.11 to_hex() [1/5]

```
std::string to_hex (
    const bit16_t & b )
```

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

```
00050 { return fmt::format("{:#04x}", b); }
```

5.17.2.12 to_hex() [2/5]

```
std::string to_hex (
    const bit32_t & b )
```

Definition at line 52 of file [Formatters.cc](#).

```
00052 { return fmt::format("{:#08x}", b); }
```

5.17.2.13 to_hex() [3/5]

```
std::string to_hex (
    const bit64_t & b )
```

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

```
00054 { return fmt::format("{:#016x}", b); }
```

5.17.2.14 to_hex() [4/5]

```
std::string to_hex (
    const bit8_t & b )
```

Definition at line 48 of file [Formatters.cc](#).

```
00048 { return fmt::format("{:#02x}", b); }
```

5.17.2.15 to_hex() [5/5]

```
std::string to_hex (
    const Buffer & b,
    const std::size_t & begin = 0,
    const std::size_t & end = -1 )
```

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

```
00036 {
00037     std::size_t iend = end;
00038     if(iend == -1) iend = b.size();
00039     std::string ret;
00040     for(std::size_t k = begin; k < iend; k++)
00041     {
00042         ret += to_hex(b[k]);
00043         ret += " - ";
00044     }
00045     return ret;
00046 }
```

5.17.2.16 to_oct() [1/5]

```
std::string to_oct (
    const bit16_t & b )
```

Definition at line 92 of file [Formatters.cc](#).

```
00092 { return fmt::format("{:#08o}", b); }
```

5.17.2.17 to_oct() [2/5]

```
std::string to_oct (
    const bit32_t & b )
```

Definition at line 94 of file [Formatters.cc](#).

```
00094 { return fmt::format("{:#016o}", b); }
```

5.17.2.18 to_oct() [3/5]

```
std::string to_oct (
    const bit64_t & b )
```

Definition at line 96 of file [Formatters.cc](#).

```
00096 { return fmt::format("{:#032o}", b); }
```

5.17.2.19 to_oct() [4/5]

```
std::string to_oct (
    const bit8_t & b )
```

Definition at line 90 of file [Formatters.cc](#).

```
00090 { return fmt::format("{:#04o}", b); }
```

5.17.2.20 to_oct() [5/5]

```
std::string to_oct (
    const Buffer & b,
    const std::size_t & begin = 0,
    const std::size_t & end = -1 )
```

Definition at line 77 of file [Formatters.cc](#).

```
00078 {
00079     std::size_t iend = end;
00080     if(iend == -1) iend = b.size();
00081     std::string ret;
00082     for(std::size_t k = begin; k < iend; k++)
00083     {
00084         ret += to_oct(b[k]);
00085         ret += " - ";
00086     }
00087     return ret;
00088 }
```

5.18 Formatters.h

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

```
00001
00005 #pragma once
00006
00007 #include "Bits.h"
00008
00009 #include <iosfwd>
00010 #include <string>
00011
00012 class Buffer;
00013
00014 std::string to_dec(const Buffer& b, const std::size_t& begin = 0, const std::size_t& end = -1);
00015 std::string to_dec(const bit8_t&);
00016 std::string to_dec(const bit16_t&);
00017 std::string to_dec(const bit32_t&);
00018 std::string to_dec(const bit64_t&);
00019
00020 std::string to_hex(const Buffer& b, const std::size_t& begin = 0, const std::size_t& end = -1);
00021 std::string to_hex(const bit8_t&);
00022 std::string to_hex(const bit16_t&);
00023 std::string to_hex(const bit32_t&);
00024 std::string to_hex(const bit64_t&);
00025
00026 std::string to_bin(const Buffer& b, const std::size_t& begin = 0, const std::size_t& end = -1);
00027 std::string to_bin(const bit8_t&);
00028 std::string to_bin(const bit16_t&);
00029 std::string to_bin(const bit32_t&);
00030 std::string to_bin(const bit64_t&);
00031
00032 std::string to_oct(const Buffer& b, const std::size_t& begin = 0, const std::size_t& end = -1);
00033 std::string to_oct(const bit8_t&);
00034 std::string to_oct(const bit16_t&);
00035 std::string to_oct(const bit32_t&);
00036 std::string to_oct(const bit64_t&);
```

5.19 /home/runner/work/streamout/streamout/libs/core/include/Interface.h File Reference

```
#include "Buffer.h"
#include <memory>
#include <spdlog/logger.h>
```

Classes

- class [Interface](#)

template class should implement void SOURCE::start(); bool SOURCE::next(); void SOURCE::end(); const Buffer& SOURCE::getSDHCALBuffer();

5.19.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.20 Interface.h

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

```
00001
00004 #pragma once
00005
00006 #include "Buffer.h"
00007
00008 #include <memory>
00009 #include <spdlog/logger.h>
00010
00026 class Interface
00027 {
00028 public:
00029     Interface() {}
00030     virtual ~Interface() {}
00031     std::shared_ptr<spdlog::logger>& log() { return m_Logger; }
00032     void setLogger(const std::shared_ptr<spdlog::logger>& logger) { m_Logger
        = logger; }
00033
00034 private:
00035     std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00036 };
```

5.21 /home/runner/work/streamout/streamout/libs/core/include/RawBufferNavigator.h File Reference

```
#include "Buffer.h"
#include "DIFPtr.h"
#include "DIFUnpacker.h"
```

Classes

- class [RawBufferNavigator](#)

5.21.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.22 RawBufferNavigator.h

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

```
00001
00005 #pragma once
00006
00007 #include "Buffer.h"
00008 #include "DIFPtr.h"
00009 #include "DIFUnpacker.h"
00010
00011 // class to navigate in the raw data buffer
00012 class RawBufferNavigator
00013 {
00014 public:
00015     RawBufferNavigator() = default;
```

```

00016 ~RawBufferNavigator() = default;
00017 explicit RawBufferNavigator(const Buffer& b, const int& start = -1);
00018 void setBuffer(const Buffer& b, const int& start = -1)
00019 {
00020     m_BadSCdata = false;
00021     m_Buffer     = b;
00022     StartAt(start);
00023     m_DIFstartIndex = DIFUnpacker::getStartOfDIF(m_Buffer.begin(), m_Buffer.size(), m_Start);
00024 }
00025 std::uint8_t    getDetectorID();
00026 bool            validBuffer();
00027 std::uint32_t   getStartOfDIF();
00028 unsigned char*  getDIFBufferStart();
00029 std::uint32_t   getDIFBufferSize();
00030 Buffer           getDIFBuffer();
00031 DIFPtr&         getDIFPtr();
00032 std::uint32_t   getEndOfDIFData();
00033 std::uint32_t   getSizeAfterDIFPtr();
00034 std::uint32_t   getDIF_CRC();
00035 bool            hasSlowControlData();
00036 Buffer           getSCBuffer();
00037 bool            badSCData();
00038 Buffer           getEndOfAllData();
00039 static void     StartAt(const int& start);
00040
00041 private:
00042 void            setSCBuffer();
00043 Buffer           m_Buffer;
00044 Buffer           m_SCbuffer;
00045 std::uint32_t   m_DIFstartIndex{0};
00046 DIFPtr          m_TheDIFPtr;
00047 bool            m_BadSCdata{false};
00048 static int      m_Start;
00049 };

```

5.23 /home/runner/work/streamout/streamout/libs/core/include/Timer.h

File Reference

```
#include <chrono>
```

Classes

- class [Timer](#)

5.23.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde A.Pingault L.Mirabito

See also

<https://github.com/apingault/Trivent4HEP>

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

5.24 Timer.h

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

```
00001
00006 #pragma once
00007
00008 #include <chrono>
00009
00010 class Timer
00011 {
00012 public:
00013     void start() { m_StartTime = std::chrono::high_resolution_clock::now(); }
00014     void stop() { m_StopTime = std::chrono::high_resolution_clock::now(); }
00015     float getElapsedTime() { return std::chrono::duration_cast<std::chrono::microseconds>(m_StopTime -
        m_StartTime).count(); }
00016
00017 private:
00018     std::chrono::time_point<std::chrono::high_resolution_clock> m_StartTime;
00019     std::chrono::time_point<std::chrono::high_resolution_clock> m_StopTime;
00020 };
```

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

File Reference

```
#include <stdint>
```

Enumerations

- enum `DU` : `std::uint8_t` {
`START_OF_DIF` = 0xB0 , `START_OF_DIF_TEMP` = 0xBB , `END_OF_DIF` = 0xA0 , `START_OF_LINES` = 0xC4 ,
`END_OF_LINES` = 0xD4 , `START_OF_FRAME` = 0xB4 , `END_OF_FRAME` = 0xA3 , `ID_SHIFT` = 1 ,
`DTC_SHIFT` = 2 , `GTC_SHIFT` = 10 , `ABCID_SHIFT` = 14 , `BCID_SHIFT` = 20 ,
`LINES_SHIFT` = 23 , `TASU1_SHIFT` = 24 , `TASU2_SHIFT` = 28 , `TDIF_SHIFT` = 32 ,
`FRAME_ASIC_HEADER_SHIFT` = 0 , `FRAME_BCID_SHIFT` = 1 , `FRAME_DATA_SHIFT` = 4 , `FRAME_SIZE` = 20 }

5.25.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.25.2 Enumeration Type Documentation

5.25.2.1 DU

```
enum DU : std::uint8_t
```

Enumerator

START_OF_DIF	
START_OF_DIF_TEMP	
END_OF_DIF	
START_OF_LINES	
END_OF_LINES	
START_OF_FRAME	
END_OF_FRAME	
ID_SHIFT	
DTC_SHIFT	
GTC_SHIFT	
ABCID_SHIFT	
BCID_SHIFT	
LINES_SHIFT	
TASU1_SHIFT	
TASU2_SHIFT	
TDIF_SHIFT	
FRAME_ASIC_HEADER_SHIFT	
FRAME_BCID_SHIFT	
FRAME_DATA_SHIFT	
FRAME_SIZE	

Definition at line 9 of file [Words.h](#).

```

00010 {
00011     START_OF_DIF      = 0xB0,
00012     START_OF_DIF_TEMP = 0xBB,
00013     END_OF_DIF        = 0xA0,
00014     START_OF_LINES    = 0xC4,
00015     END_OF_LINES      = 0xD4,
00016
00017     START_OF_FRAME = 0xB4,
00018     END_OF_FRAME   = 0xA3,
00019
00020     ID_SHIFT      = 1,
00021     DTC_SHIFT     = 2,
00022     GTC_SHIFT     = 10,
00023     ABCID_SHIFT   = 14,
00024     BCID_SHIFT    = 20,
00025     LINES_SHIFT   = 23,
00026     TASU1_SHIFT   = 24,
00027     TASU2_SHIFT   = 28,
00028     TDIF_SHIFT    = 32,
00029
00030     FRAME_ASIC_HEADER_SHIFT = 0,
00031     FRAME_BCID_SHIFT        = 1,
00032     FRAME_DATA_SHIFT        = 4,
00033     FRAME_SIZE               = 20
00034 };

```

5.26 Words.h

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

```

00001
00005 #pragma once
00006
00007 #include <stdint>
00008
00009 enum DU : std::uint8_t
00010 {
00011     START_OF_DIF      = 0xB0,
00012     START_OF_DIF_TEMP = 0xBB,
00013     END_OF_DIF        = 0xA0,
00014     START_OF_LINES    = 0xC4,

```

```

00015  END_OF_LINES      = 0xD4,
00016
00017  START_OF_FRAME    = 0xB4,
00018  END_OF_FRAME      = 0xA3,
00019
00020  ID_SHIFT          = 1,
00021  DTC_SHIFT         = 2,
00022  GTC_SHIFT         = 10,
00023  ABCID_SHIFT       = 14,
00024  BCID_SHIFT        = 20,
00025  LINES_SHIFT       = 23,
00026  TASU1_SHIFT       = 24,
00027  TASU2_SHIFT       = 28,
00028  TDIF_SHIFT        = 32,
00029
00030  FRAME_ASIC_HEADER_SHIFT = 0,
00031  FRAME_BCID_SHIFT      = 1,
00032  FRAME_DATA_SHIFT      = 4,
00033  FRAME_SIZE           = 20
00034 };

```

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

```
#include "Bits.h"
```

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`.

5.27.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.27.2 Function Documentation

5.27.2.1 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 8 of file [Bits.cc](#).

```
00008 { return os << c + 0; }
```

5.28 Bits.cc

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

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

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

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

5.30 Buffer.cc

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

```
00001
00006 #include "Buffer.h"
```

5.31 /home/runner/work/streamout/streamout/libs/core/src/Buffer← LooperCounter.cc File Reference

```
#include "BufferLooperCounter.h"
#include <fmt/core.h>
```

5.32 BufferLooperCounter.cc

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

```
00001
00005 #include "BufferLooperCounter.h"
00006
00007 #include <fmt/core.h>
00008
00009 void BufferLooperCounter::printAllCounters()
00010 {
00011     fmt::print("BUFFER LOOP FINAL STATISTICS : \n");
00012     printCounter("Start of DIF header", DIFStarter);
00013     printCounter("Value after DIF data are processed", DIFPtrValueAtReturnedPos);
00014     printCounter("Size remaining in buffer after end of DIF data", SizeAfterDIFPtr);
00015     fmt::print("Number of Slow Control found {} out of which {} are bad\n", hasSlowControl,
00016               hasBadSlowControl);
00017     printCounter("Size remaining after all of data have been processed", SizeAfterAllData);
00018     printCounter("Number on non zero values in end of data buffer", NonZeroValusAtEndOfData);
00019 }
00020 void BufferLooperCounter::printCounter(const std::string& description, const std::map<int, int>& m)
00021 {
00022     std::string out{"statistics for " + description + " : \n"};
00023     for(std::map<int, int>::const_iterator it = m.begin(); it != m.end(); it++)
00024     {
00025         if(it != m.begin()) out += ",";
00026         out += " [" + std::to_string(it->first) + "]= " + std::to_string(it->second);
00027     }
00028     out += "\n";
00029     fmt::print(out);
00030 }
```

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

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

5.33.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.34 DIFSlowControl.cc

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

```
00001
00005 #include "DIFSlowControl.h"
00006
00007 #include <stdint>
00008 #include <iostream>
00009
00010 DIFSlowControl::DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIFId, unsigned char*
    cbuf) : 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] != 0xal) size_hardroc1 = 0;
00023
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();
00051         jt++) std::cout << jt->first << " : " << jt->second << std::endl;
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(((l < 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(((l < 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_Discri"] = static_cast<int>(bs[566]);
00123     mAsic["ON_Fsb"] = static_cast<int>(bs[565]);
00124     mAsic["ON_Otag"] = 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["HardroHeader"] = static_cast<int>(asicid);
00160 mAsic["EN_Out_Discri"] = 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["Smalldac"] = 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 }

```

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

```

#include "DIFUnpacker.h"
#include "Formatters.h"
#include "Words.h"
#include <bitset>
#include <cstdint>
#include <iostream>
#include <spdlog/spdlog.h>

```

5.35.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.36 DIFUnpacker.cc

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

```

00001
00005 #include "DIFUnpacker.h"
00006
00007 #include "Formatters.h"
00008 #include "Words.h"
00009
00010 #include <bitset>
00011 #include <cstdint>
00012 #include <iostream>
00013 #include <spdlog/spdlog.h>
00014
00015 std::uint64_t DIFUnpacker::GrayToBin(const std::uint64_t& n)
00016 {
00017     std::uint64_t ish{1};
00018     std::uint64_t anss{n};
00019     std::uint64_t idiv{0};
00020     std::uint64_t ishmax{sizeof(std::uint64_t) * 8};
00021     while(true)
00022     {
00023         idiv = anss >> ish;
00024         anss ^= idiv;
00025         if(idiv <= 1 || ish == ishmax) return anss;
00026         ish <= 1;
00027     }
00028 }
00029
00030 std::uint32_t DIFUnpacker::getStartOfDIF(const unsigned char* cbuf, const std::uint32_t& size_buf,
const std::uint32_t& start)
00031 {
00032     std::uint32_t id0{0};
00033     for(std::uint32_t i = start; i < size_buf; i++)
00034     {
00035         if(cbuf[i] != DU::START_OF_DIF && cbuf[i] != DU::START_OF_DIF_TEMP) continue;
00036         else
00037         {
00038             id0 = i;
00039             break;
00040         }
00041         // if (cbuf[id0+DU::ID_SHIFT]>0xFF) continue;
00042     }
00043     // std::cout << "***** " << id0 << std::endl;
00044     return id0;
00045 }
00046
00047 std::uint32_t DIFUnpacker::getID(const unsigned char* cb, const std::uint32_t& idx) { return cb[idx +
DU::ID_SHIFT]; }
00048
00049 std::uint32_t DIFUnpacker::getDTC(const unsigned char* cb, const std::uint32_t& idx) { 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]; }
00050
00051 std::uint32_t DIFUnpacker::getGTC(const unsigned char* cb, const std::uint32_t& idx) { 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]; }
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::BCID_SHIFT};
00057     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]));
00058     return LBC;
00059 }
00060
00061 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]; }
00062 std::uint32_t DIFUnpacker::getLines(const unsigned char* cb, const std::uint32_t& idx) { return
(cb[idx + DU::LINES_SHIFT] >> 4) & 0x5; }
00063
00064 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); }
00065
00066 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]; }
00067
00068 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]; }
00069
00070 std::uint32_t DIFUnpacker::getTDIF(const unsigned char* cb, const std::uint32_t& idx) { return (cb[idx
+ DU::TDIF_SHIFT]); }

```

```

00071
00072 bool DIFUnpacker::hasTemperature(const unsigned char* cb, const std::uint32_t& idx) { return (cb[idx]
    == DU::START_OF_DIF_TEMP); }
00073
00074 bool DIFUnpacker::hasAnalogReadout(const unsigned char* cb, const std::uint32_t& idx) { return
    (DIFUnpacker::getLines(cb, idx) != 0); }
00075
00076 std::uint32_t DIFUnpacker::getFrameAsicHeader(const unsigned char* framePtr) { return
    (framePtr[DU::FRAME_ASIC_HEADER_SHIFT]); }
00077
00078 std::uint32_t DIFUnpacker::getFrameBCID(const unsigned char* framePtr)
00079 {
00080     std::uint32_t igray = (framePtr[DU::FRAME_BCID_SHIFT] << 16) + (framePtr[DU::FRAME_BCID_SHIFT + 1] <<
        8) + framePtr[DU::FRAME_BCID_SHIFT + 2];
00081     return DIFUnpacker::GrayToBin(igray);
00082 }
00083
00084 bool DIFUnpacker::getFramePAD(const unsigned char* framePtr, const std::uint32_t& ip)
00085 {
00086     std::uint32_t* iframe{(std::uint32_t*)&framePtr[DU::FRAME_DATA_SHIFT]};
00087     return ((iframe[3 - ip / 32] >> (ip % 32)) & 0x1);
00088 }
00089
00090 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); }
00091
00092 std::uint32_t DIFUnpacker::getAnalogPtr(std::vector<unsigned char*> vLines, unsigned char* cb, const
    std::uint32_t& idx)
00093 {
00094     std::uint32_t fshift{idx};
00095     if(cb[fshift] != DU::START_OF_LINES) return fshift;
00096     fshift++;
00097     while(cb[fshift] != DU::END_OF_LINES)
00098     {
00099         vLines.push_back(&cb[fshift]);
00100         std::uint32_t nchip{cb[fshift]};
00101         fshift += 1 + nchip * 64 * 2;
00102     }
00103     return fshift++;
00104 }
00105
00106 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)
00107 {
00108     std::uint32_t fshift{0};
00109     if(DATA_FORMAT_VERSION >= 13)
00110     {
00111         fshift = idx + DU::LINES_SHIFT + 1;
00112         if(DIFUnpacker::hasTemperature(cb, idx)) fshift = idx + DU::TDIF_SHIFT + 1;
00113         // jenlev 1
00114         if(DIFUnpacker::hasAnalogReadout(cb, idx)) fshift = DIFUnpacker::getAnalogPtr(vLines, cb, fshift);
00115         // to be implemented
00116     }
00117     else
00118     {
00119         fshift = idx + DU::BCID_SHIFT + 3;
00120         if(cb[fshift] != DU::START_OF_FRAME)
00121         {
00122             std::cout << "This is not a start of frame " << to_hex(cb[fshift]) << " \n";
00123             return fshift;
00124         }
00125         do {
00126             // printf("fshift %d and %d \n", fshift, max_size);
00127             if(cb[fshift] == DU::END_OF_DIF) return fshift;
00128             if(cb[fshift] == DU::START_OF_FRAME) fshift++;
00129             if(cb[fshift] == DU::END_OF_FRAME)
00130             {
00131                 fshift++;
00132                 continue;
00133             }
00134             std::uint32_t header = DIFUnpacker::getFrameAsicHeader(&cb[fshift]);
00135             if(header == DU::END_OF_FRAME) return (fshift + 2);
00136             // std::cout<<header<<" "<<fshift<<std::endl;
00137             if(header < 1 || header > 48) { throw header + " Header problem " + fshift; }
00138             vFrame.push_back(&cb[fshift]);
00139             fshift += DU::FRAME_SIZE;
00140             if(fshift > max_size)
00141             {
00142                 std::cout << "fshift " << fshift << " exceed " << max_size << " \n";
00143                 return fshift;
00144             }
00145             if(cb[fshift] == DU::END_OF_FRAME) fshift++;
00146         } while(true);
00147     }
00148 }
00149
00150 void DIFUnpacker::dumpFrameOld(const unsigned char* buf)
00151 {

```

```

00148     bool          PAD[128];
00149     bool          l0[64];
00150     bool          l1[64];
00151     std::uint8_t  un{1};
00152     for(std::size_t ip = 0; ip < 128; ip++) { PAD[ip] = false; } // init PADs
00153     std::uint32_t idx1{4};
00154     for(int ik = 0; ik < 4; ik++)
00155     {
00156         std::uint32_t PadEtat{swap_bytes(&buf[idx1])};
00157         idx1 += 4;
00158         for(int e = 0; e < 32; e++)
00159         {
00160             PAD[((3 - ik) * 32) + (31 - e)] = PadEtat & un; // binary operation
00161             PadEtat = PadEtat >> 1; // décalage des bit de 1
00162         }
00163     }
00164     // fill bool arrays
00165     for(int p = 0; p < 64; p++)
00166     {
00167         l0[p] = static_cast<bool>(PAD[(2 * p)]); // _Lev0 (PAD paire)
00168         l1[p] = static_cast<bool>(PAD[(2 * p) + 1]); // _Lev1 (PAD impaires)
00169     }
00170     std::bitset<64> bs0(0);
00171     std::bitset<64> bs1(0);
00172     for(std::uint32_t ip = 0; ip < 64; ip++)
00173     {
00174         bs0.set(ip, l0[ip]);
00175         bs1.set(ip, l1[ip]);
00176     }
00177     std::cout << "\t \t" << bs0 << std::endl;
00178     std::cout << "\t \t" << bs1 << std::endl;
00179 }
00180
00181 std::uint32_t DIFUnpacker::swap_bytes(const unsigned char* buf)
00182 {
00183     unsigned char Swapped[4];
00184     for(std::size_t i = 0; i < 4; i++) Swapped[i] = buf[4 - 1 - i];
00185     return *reinterpret_cast<std::uint32_t*>(&Swapped[0]);
00186 }

```

5.37 /home/runner/work/streamout/streamout/libs/core/src/Formatters.cc File Reference

```

#include "Formatters.h"
#include "Bits.h"
#include "Buffer.h"
#include "Words.h"
#include <fmt/format.h>

```

Functions

- std::string to_dec (const Buffer &b, const std::size_t &begin, const std::size_t &end)
- std::string to_dec (const bit8_t &b)
- std::string to_dec (const bit16_t &b)
- std::string to_dec (const bit32_t &b)
- std::string to_dec (const bit64_t &b)
- std::string to_hex (const Buffer &b, const std::size_t &begin, const std::size_t &end)
- std::string to_hex (const bit8_t &b)
- std::string to_hex (const bit16_t &b)
- std::string to_hex (const bit32_t &b)
- std::string to_hex (const bit64_t &b)
- std::string to_bin (const Buffer &b, const std::size_t &begin, const std::size_t &end)
- std::string to_bin (const bit8_t &b)
- std::string to_bin (const bit16_t &b)
- std::string to_bin (const bit32_t &b)

- `std::string to_bin (const bit64_t &b)`
- `std::string to_oct (const Buffer &b, const std::size_t &begin, const std::size_t &end)`
- `std::string to_oct (const bit8_t &b)`
- `std::string to_oct (const bit16_t &b)`
- `std::string to_oct (const bit32_t &b)`
- `std::string to_oct (const bit64_t &b)`

5.37.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.37.2 Function Documentation

5.37.2.1 to_bin() [1/5]

```
std::string to_bin (  
    const bit16_t & b )
```

Definition at line 71 of file [Formatters.cc](#).

```
00071 { return fmt::format("{:016b}", b); }
```

5.37.2.2 to_bin() [2/5]

```
std::string to_bin (  
    const bit32_t & b )
```

Definition at line 73 of file [Formatters.cc](#).

```
00073 { return fmt::format("{:032b}", b); }
```

5.37.2.3 to_bin() [3/5]

```
std::string to_bin (  
    const bit64_t & b )
```

Definition at line 75 of file [Formatters.cc](#).

```
00075 { return fmt::format("{:064b}", b); }
```

5.37.2.4 to_bin() [4/5]

```
std::string to_bin (
    const bit8_t & b )
```

Definition at line 69 of file [Formatters.cc](#).

```
00069 { return fmt::format("{:08b}", b); }
```

5.37.2.5 to_bin() [5/5]

```
std::string to_bin (
    const Buffer & b,
    const std::size_t & begin,
    const std::size_t & end )
```

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

```
00057 {
00058     std::size_t iend = end;
00059     if(iend == -1) iend = b.size();
00060     std::string ret;
00061     for(std::size_t k = begin; k < iend; k++)
00062     {
00063         ret += to_bin(b[k]);
00064         ret += " - ";
00065     }
00066     return ret;
00067 }
```

5.37.2.6 to_dec() [1/5]

```
std::string to_dec (
    const bit16_t & b )
```

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

```
00029 { return fmt::format("{:d}", b); }
```

5.37.2.7 to_dec() [2/5]

```
std::string to_dec (
    const bit32_t & b )
```

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

```
00031 { return fmt::format("{:d}", b); }
```

5.37.2.8 to_dec() [3/5]

```
std::string to_dec (
    const bit64_t & b )
```

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

```
00033 { return fmt::format("{:#d}", b); }
```

5.37.2.9 to_dec() [4/5]

```
std::string to_dec (
    const bit8_t & b )
```

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

```
00027 { return fmt::format("{:#d}", b); }
```

5.37.2.10 to_dec() [5/5]

```
std::string to_dec (
    const Buffer & b,
    const std::size_t & begin,
    const std::size_t & end )
```

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

```
00015 {
00016     std::size_t iend = end;
00017     if(iend == -1) iend = b.size();
00018     std::string ret;
00019     for(std::size_t k = begin; k < iend; k++)
00020     {
00021         ret += to_dec(b[k]);
00022         ret += " - ";
00023     }
00024     return ret;
00025 }
```

5.37.2.11 to_hex() [1/5]

```
std::string to_hex (
    const bit16_t & b )
```

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

```
00050 { return fmt::format("{:#04x}", b); }
```


5.37.2.12 to_hex() [2/5]

```
std::string to_hex (
    const bit32_t & b )
```

Definition at line 52 of file [Formatters.cc](#).

```
00052 { return fmt::format("{:#08x}", b); }
```

5.37.2.13 to_hex() [3/5]

```
std::string to_hex (
    const bit64_t & b )
```

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

```
00054 { return fmt::format("{:#016x}", b); }
```

5.37.2.14 to_hex() [4/5]

```
std::string to_hex (
    const bit8_t & b )
```

Definition at line 48 of file [Formatters.cc](#).

```
00048 { return fmt::format("{:#02x}", b); }
```

5.37.2.15 to_hex() [5/5]

```
std::string to_hex (
    const Buffer & b,
    const std::size_t & begin,
    const std::size_t & end )
```

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

```
00036 {
00037     std::size_t iend = end;
00038     if(iend == -1) iend = b.size();
00039     std::string ret;
00040     for(std::size_t k = begin; k < iend; k++)
00041     {
00042         ret += to_hex(b[k]);
00043         ret += " - ";
00044     }
00045     return ret;
00046 }
```

5.37.2.16 to_oct() [1/5]

```
std::string to_oct (
    const bit16_t & b )
```

Definition at line 92 of file [Formatters.cc](#).

```
00092 { return fmt::format("{:#08o}", b); }
```

5.37.2.17 to_oct() [2/5]

```
std::string to_oct (
    const bit32_t & b )
```

Definition at line 94 of file [Formatters.cc](#).

```
00094 { return fmt::format("{:#016o}", b); }
```

5.37.2.18 to_oct() [3/5]

```
std::string to_oct (
    const bit64_t & b )
```

Definition at line 96 of file [Formatters.cc](#).

```
00096 { return fmt::format("{:#032o}", b); }
```

5.37.2.19 to_oct() [4/5]

```
std::string to_oct (
    const bit8_t & b )
```

Definition at line 90 of file [Formatters.cc](#).

```
00090 { return fmt::format("{:#04o}", b); }
```

5.37.2.20 to_oct() [5/5]

```
std::string to_oct (
    const Buffer & b,
    const std::size_t & begin,
    const std::size_t & end )
```

Definition at line 77 of file [Formatters.cc](#).

```
00078 {
00079     std::size_t iend = end;
00080     if(iend == -1) iend = b.size();
00081     std::string ret;
00082     for(std::size_t k = begin; k < iend; k++)
00083     {
00084         ret += to_oct(b[k]);
00085         ret += " - ";
00086     }
00087     return ret;
00088 }
```

5.38 Formatters.cc

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

```

00001
00006 #include "Formatters.h"
00007
00008 #include "Bits.h"
00009 #include "Buffer.h"
00010 #include "Words.h"
00011
00012 #include <fmt/format.h>
00013
00014 std::string to_dec(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00015 {
00016     std::size_t iend = end;
00017     if(iend == -1) iend = b.size();
00018     std::string ret;
00019     for(std::size_t k = begin; k < iend; k++)
00020     {
00021         ret += to_dec(b[k]);
00022         ret += " - ";
00023     }
00024     return ret;
00025 }
00026
00027 std::string to_dec(const bit8_t& b) { return fmt::format("{:#d}", b); }
00028
00029 std::string to_dec(const bit16_t& b) { return fmt::format("{:#d}", b); }
00030
00031 std::string to_dec(const bit32_t& b) { return fmt::format("{:#d}", b); }
00032
00033 std::string to_dec(const bit64_t& b) { return fmt::format("{:#d}", b); }
00034
00035 std::string to_hex(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00036 {
00037     std::size_t iend = end;
00038     if(iend == -1) iend = b.size();
00039     std::string ret;
00040     for(std::size_t k = begin; k < iend; k++)
00041     {
00042         ret += to_hex(b[k]);
00043         ret += " - ";
00044     }
00045     return ret;
00046 }
00047
00048 std::string to_hex(const bit8_t& b) { return fmt::format("{:#02x}", b); }
00049
00050 std::string to_hex(const bit16_t& b) { return fmt::format("{:#04x}", b); }
00051
00052 std::string to_hex(const bit32_t& b) { return fmt::format("{:#08x}", b); }
00053
00054 std::string to_hex(const bit64_t& b) { return fmt::format("{:#016x}", b); }
00055
00056 std::string to_bin(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00057 {
00058     std::size_t iend = end;
00059     if(iend == -1) iend = b.size();
00060     std::string ret;
00061     for(std::size_t k = begin; k < iend; k++)
00062     {
00063         ret += to_bin(b[k]);
00064         ret += " - ";
00065     }
00066     return ret;
00067 }
00068
00069 std::string to_bin(const bit8_t& b) { return fmt::format("{:#08b}", b); }
00070
00071 std::string to_bin(const bit16_t& b) { return fmt::format("{:#016b}", b); }
00072
00073 std::string to_bin(const bit32_t& b) { return fmt::format("{:#032b}", b); }
00074
00075 std::string to_bin(const bit64_t& b) { return fmt::format("{:#064b}", b); }
00076
00077 std::string to_oct(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00078 {
00079     std::size_t iend = end;
00080     if(iend == -1) iend = b.size();
00081     std::string ret;
00082     for(std::size_t k = begin; k < iend; k++)
00083     {
00084         ret += to_oct(b[k]);
00085         ret += " - ";
00086     }

```

```

00087     return ret;
00088 }
00089
00090 std::string to_oct(const bit8_t& b) { return fmt::format("{:#04o}", b); }
00091
00092 std::string to_oct(const bit16_t& b) { return fmt::format("{:#08o}", b); }
00093
00094 std::string to_oct(const bit32_t& b) { return fmt::format("{:#016o}", b); }
00095
00096 std::string to_oct(const bit64_t& b) { return fmt::format("{:#032o}", b); }

```

5.39 /home/runner/work/streamout/streamout/libs/core/src/RawBufferNavigator.cc File Reference ↩

```

#include "RawBufferNavigator.h"
#include <iostream>

```

5.39.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.40 RawBufferNavigator.cc

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

```

00001
00005 #include "RawBufferNavigator.h"
00006
00007 #include <iostream>
00008
00009 int RawBufferNavigator::m_Start = 92;
00010
00011 void RawBufferNavigator::StartAt(const int& start)
00012 {
00013     if(start >= 0) m_Start = start;
00014 }
00015
00016 RawBufferNavigator::RawBufferNavigator(const Buffer& b, const int& start) : m_Buffer(b) { setBuffer(b,
    start); }
00017
00018 std::uint8_t RawBufferNavigator::getDetectorID() { return m_Buffer[0]; }
00019
00020 bool RawBufferNavigator::validBuffer() { return m_DIFstartIndex != 0; }
00021
00022 std::uint32_t RawBufferNavigator::getStartOfDIF() { return m_DIFstartIndex; }
00023
00024 unsigned char* RawBufferNavigator::getDIFBufferStart() { return &(m_Buffer.begin())[m_DIFstartIndex]; }
00025
00026 std::uint32_t RawBufferNavigator::getDIFBufferSize() { return m_Buffer.size() - m_DIFstartIndex; }
00027
00028 Buffer RawBufferNavigator::getDIFBuffer() { return Buffer(getDIFBufferStart(), getDIFBufferSize()); }
00029
00030 DIFPtr& RawBufferNavigator::getDIFPtr()
00031 {
00032     m_TheDIFPtr.setBuffer(getDIFBufferStart(), getDIFBufferSize());
00033     return m_TheDIFPtr;
00034 }
00035
00036 std::uint32_t RawBufferNavigator::getEndOfDIFData() { return getDIFPtr().getGetFramePtrReturn() + 3; }
00037

```

```

00038 std::uint32_t RawBufferNavigator::getSizeAfterDIFPtr() { return getDIFBufferSize() -
    getDIFPtr().getGetFramePtrReturn(); }
00039
00040 std::uint32_t RawBufferNavigator::getDIF_CRC()
00041 {
00042     uint32_t i{getEndOfDIFData()};
00043     uint32_t ret{0};
00044     ret |= ((m_Buffer.begin()[i - 2]) < 8);
00045     ret |= m_Buffer.begin()[i - 1];
00046     return ret;
00047 }
00048
00049 bool RawBufferNavigator::hasSlowControlData() { return getDIFBufferStart()[getEndOfDIFData()] == 0xb1;
    }
00050
00051 Buffer RawBufferNavigator::getSCBuffer()
00052 {
00053     setSCBuffer();
00054     return m_SCbuffer;
00055 }
00056
00057 bool RawBufferNavigator::badSCData()
00058 {
00059     setSCBuffer();
00060     return m_BadSCdata;
00061 }
00062
00063 void RawBufferNavigator::setSCBuffer()
00064 {
00065     if(!hasSlowControlData()) return;
00066     if(m_SCbuffer.size() != 0) return; // deja fait
00067     if(m_BadSCdata) return;
00068     m_SCbuffer.set(&(getDIFBufferStart()[getEndOfDIFData()]));
00069     // compute Slow Control size
00070     std::size_t maxsize{m_Buffer.size() - m_DIFstartIndex - getEndOfDIFData() + 1}; // should I +1 here
    ?
00071     uint32_t k{1}; // SC Header
00072     uint32_t dif_ID{m_SCbuffer[1]};
00073     uint32_t chipSize{m_SCbuffer[3]};
00074     while((dif_ID != 0xal && m_SCbuffer[k] != 0xal && k < maxsize) || (dif_ID == 0xal && m_SCbuffer[k +
    2] == chipSize && k < maxsize))
    {
00075     {
00076         k += 2; // DIF ID + ASIC Header
00077         uint32_t scsize = m_SCbuffer[k];
00078         if(scsize != 74 && scsize != 109)
00079         {
00080             std::cout << "PROBLEM WITH SC SIZE " << scsize << std::endl;
00081             k = 0;
00082             m_BadSCdata = true;
00083             break;
00084         }
00085         k++; // skip size bit
00086         k += scsize; // skip the data
00087     }
00088     if(m_SCbuffer[k] == 0xal && !m_BadSCdata) m_SCbuffer.setSize(k + 1); // add the trailer
00089     else
00090     {
00091         m_BadSCdata = true;
00092         std::cout << "PROBLEM SC TRAILER NOT FOUND " << std::endl;
00093     }
00094 }
00095
00096 Buffer RawBufferNavigator::getEndOfAllData()
00097 {
00098     setSCBuffer();
00099     if(hasSlowControlData() && !m_BadSCdata) { return Buffer(&(m_SCbuffer.begin()[m_SCbuffer.size()]),
    getSizeAfterDIFPtr() - 3 - m_SCbuffer.size()); }
00100     else
00101     return Buffer(&(getDIFBufferStart()[getEndOfDIFData()]), getSizeAfterDIFPtr() - 3); // remove the
    2 bytes for CRC and the DIF trailer
00102 }

```

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

```

#include "DIFPtr.h"
#include "Interface.h"
#include "spdlog/sinks/stdout_color_sinks.h"
#include <memory>

```

```
#include <spdlog/logger.h>
```

Classes

- class [textDump](#)

5.41.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.42 textDump.h

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

```
00001
00005 #pragma once
00006
00007 #include "DIFPtr.h"
00008 #include "Interface.h"
00009 #include "spdlog/sinks/stdout_color_sinks.h"
00010
00011 #include <memory>
00012 #include <spdlog/logger.h>
00013
00014 class textDump : public Interface
00015 {
00016 public:
00017     textDump()
00018     {
00019         m_InternalLogger = std::make_shared<spdlog::logger>("textDump",
00020             std::make_shared<spdlog::sinks::stdout_color_sink_mt>());
00021         m_InternalLogger->set_level(spdlog::level::trace);
00022     }
00023     void start();
00024     void processDIF(const DIFPtr&);
00025     void processFrame(const DIFPtr&, uint32_t frameIndex);
00026     void processPadInFrame(const DIFPtr&, uint32_t frameIndex, uint32_t
00027         channelIndex);
00028     void processSlowControl(Buffer);
00029     void end();
00030     std::shared_ptr<spdlog::logger>& print() { return m_InternalLogger; }
00031     void setLevel(const spdlog::level::level_enum& level) {
00032         m_InternalLogger->set_level(level); }
00033 private:
00034     // This class is a dumb class to print on terminal so we need the logger + the standard one given by
00035     the interface.
00036     std::shared_ptr<spdlog::logger> m_InternalLogger{nullptr};
00037 };
```

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

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

5.43.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.44 textDump.cc

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

```
00001
00005 #include "textDump.h"
00006
00007 #include "DIFPtr.h"
00008
00009 void textDump::start() { print()->info("Will dump bunch of DIF data"); }
00010
00011 void textDump::processDIF(const DIFPtr& d) { print()->info("DIF_ID : {}, DTC : {}, GTC : {}, DIF BCID
    {}, Absolute BCID : {}, Nbr frames {}", d.getDIFid(), d.getDTC(), d.getGTC(), d.getBCID(),
    d.getAbsoluteBCID(), d.getNumberOfFrames()); }
00012
00013 void textDump::processFrame(const DIFPtr& d, uint32_t frameIndex)
00014 {
00015     print()->info("\tDisplaying frame number {} : ASIC ID {}, Frame BCID {}, Frame Time To Trigger
    (a.k.a timestamp) is {}", frameIndex, d.getASICid(frameIndex), d.getFrameBCID(frameIndex),
    d.getFrameTimeToTrigger(frameIndex));
00016 }
00017
00018 void textDump::processPadInFrame(const DIFPtr& d, uint32_t frameIndex, uint32_t channelIndex)
00019 {
00020     if(d.getThresholdStatus(frameIndex, channelIndex) > 0) { print()->info("\t\tChannel {}, Threshold
    {}", channelIndex, d.getThresholdStatus(frameIndex, channelIndex)); }
00021 }
00022
00023 void textDump::processSlowControl(Buffer) { print()->error("textDump::processSlowControl not
    implemented yet."); }
00024
00025 void textDump::end() { print()->info("textDump end of report"); }
```

5.45 /home/runner/work/streamout/streamout/libs/interface/ LCIO/include/LCIOWriter.h File Reference

5.45.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.46 LCIOWriter.h

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

```
00001
00005 #pragma once
```

5.47 /home/runner/work/streamout/streamout/libs/interface/LCIO/src/LCIOWriter.cc File Reference

5.47.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.48 LCIOWriter.cc

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

00001

5.49 /home/runner/work/streamout/streamout/libs/interface/RawDataReader/include/RawdataReader.h File Reference

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

Classes

- class [RawdataReader](#)

5.49.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.50 RawdataReader.h

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

```

00001
00005 #pragma once
00006
00007 #include "Interface.h"
00008
00009 #include <array>
00010 #include <cstdint>
00011 #include <fstream>
00012 #include <string>
00013 #include <vector>
00014
00015 class Buffer;
00016
00017 class RawdataReader : public Interface
00018 {
00019 public:
00020     explicit RawdataReader(const char* fileName);
00021     void start();
00022     void end();
00023     float getFileSize();
00024     void openFile(const std::string& fileName);
00025     void closeFile();
00026     bool nextEvent();
00027     bool nextDIFbuffer();
00028     const Buffer& getSDHCALBuffer();
00029     virtual ~RawdataReader() { closeFile(); }
00030     static void setDefaultBufferSize(const std::size_t& size);
00031
00032 private:
00033     void uncompress();
00034     std::ifstream m_FileStream;
00035     void setFileSize(const std::size_t& size);
00036     static std::size_t m_BufferSize;
00037     std::size_t m_FileSize{0};
00038     std::uint32_t m_NumberOfDIF{0};
00039     std::uint32_t m_EventNumber{0};
00040     std::vector<bit8_t> m_buf;
00041     Buffer m_Buffer;
00042     std::string m_Filename;
00043 };

```

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

```

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

```

5.51.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.52 RawdataReader.cc

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

```

00001
00004 #include "RawdataReader.h"
00005
00006 #include <cstdlib>
00007 #include <cstring>
00008 #include <stdexcept>
00009 #include <zlib.h>
00010
00012 std::size_t RawdataReader::m_BufferSize = 0x100000;
00013
00014 void RawdataReader::setDefaultBufferSize(const std::size_t& size) { m_BufferSize = size; }
00015
00016 RawdataReader::RawdataReader(const char* fileName)
00017 {
00018     m_buf.reserve(m_BufferSize);
00019     m_Filename = fileName;
00020 }
00021
00022 void RawdataReader::start() { openFile(m_Filename); }
00023
00024 void RawdataReader::end() { closeFile(); }
00025
00026 void RawdataReader::uncompress()
00027 {
00028     static const std::size_t size_buffer{0x20000};
00029     std::size_t shift{3 * sizeof(std::uint32_t) + sizeof(std::uint64_t)};
00030     static bit8_t obuf[size_buffer];
00031     unsigned long size_buffer_end{0x20000}; // NOLINT(runtime/int)
00032     std::int8_t rc = ::uncompress(obuf, &size_buffer_end, &m_Buffer[shift], m_Buffer.size()
- shift);
00033     switch(rc)
00034     {
00035         case Z_OK: break;
00036         default: throw "decompress error"; break;
00037     }
00038     memcpy(&m_Buffer[shift], obuf, size_buffer_end);
00039     m_Buffer.setSize(size_buffer_end + shift);
00040 }
00041
00042 void RawdataReader::closeFile()
00043 {
00044     try
00045     {
00046         if(m_FileStream.is_open()) m_FileStream.close();
00047     }
00048     catch(const std::ios_base::failure& e)
00049     {
00050         log()->error("Caught an ios_base::failure in closeFile : {} {}", e.what(), e.code().value());
00051         throw;
00052     }
00053 }
00054
00055 void RawdataReader::openFile(const std::string& fileName)
00056 {
00057     try
00058     {
00059         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00060         m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00061         m_FileStream.open(fileName.c_str(), 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
00062         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00063         if(m_FileStream.is_open())
00064         {
00065             setFileSize(m_FileStream.tellg());
00066             m_FileStream.seekg(0, std::ios::beg);
00067         }
00068     }
00069     catch(const std::ios_base::failure& e)
00070     {
00071         log()->error("Caught an ios_base::failure in openFile : {} {}", e.what(), e.code().value());
00072         throw;
00073     }
00074 }
00075
00076 bool RawdataReader::nextEvent()
00077 {
00078     try
00079     {
00080         m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));
00081         m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));
00082     }
00083     catch(const std::ios_base::failure& e)

```

```
00084     {
00085         return false;
00086     }
00087     return true;
00088 }
00089
00090 bool RawdataReader::nextDIFbuffer()
00091 {
00092     try
00093     {
00094         static int DIF_processed{0};
00095         if(DIF_processed >= m_NumberOfDIF)
00096         {
00097             DIF_processed = 0;
00098             return false;
00099         }
00100         else
00101         {
00102             DIF_processed++;
00103             std::uint32_t bsize{0};
00104             m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));
00105             m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);
00106             m_Buffer = Buffer(m_buf);
00107         }
00108     }
00109     catch(const std::ios_base::failure& e)
00110     {
00111         return false;
00112     }
00113     return true;
00114 }
00115
00116 const Buffer& RawdataReader::getSDHCALBuffer()
00117 {
00118     uncompress();
00119     return m_Buffer;
00120 }
00121
00122 void RawdataReader::setFileSize(const std::size_t& size) { m_FileSize = size; }
00123
00124 float RawdataReader::getFileSize() { return m_FileSize; }
```

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

```
#include "Buffer.h"
#include "DIFPtr.h"
#include "Interface.h"
#include "TTree.h"
```

Classes

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

5.53.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.54 ROOTtreeDest.h

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

```

00001
00006 #pragma once
00007
00008 #include "Buffer.h"
00009 #include "DIFPtr.h"
00010 #include "Interface.h"
00011 #include "TTree.h"
00012
00013 class ROOTtreeDest : public Interface
00014 {
00015 public:
00016     typedef struct
00017     {
00018         UInt_t    DIFid, ASICid, CHANNELid;
00019         UInt_t    Thresh;
00020         UInt_t    DTC, GTC, DIF_BCID, frame_BCID, timeStamp;
00021         ULong64_t AbsoluteBCID;
00022     } DATA;
00023
00024     ROOTtreeDest();
00025
00026     void start();
00027     void processDIF(const DIFPtr&);
00028     void processFrame(const DIFPtr&, const std::uint32_t& frameIndex);
00029     void processPadInFrame(const DIFPtr&, const std::uint32_t& frameIndex, const std::uint32_t&
channelIndex);
00030     void processSlowControl(const Buffer&) { ; }
00031     void end() { ; }
00032
00033 private:
00034     DATA _data;
00035     TTree* _tree;
00036     void dataReset();
00037 };

```

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

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

5.55.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

5.56 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,
        "DIFid/i:ASICid:CHANNELid:Thresh:DTC:GTC:DIF_BCID:frame_BCID:timeStamp:AbsoluteBCID/1");

```

```
00013 }
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(const 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(const DIFPtr& d, const std::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(const DIFPtr& d, const std::uint32_t& frameIndex, const
std::uint32_t& channelIndex)
00042 {
00043     _data.CHANNELid = channelIndex;
00044     _data.Thresh = d.getThresholdStatus(frameIndex, channelIndex);
00045     if(_data.Thresh != 0) _tree->Fill();
00046 }
```

