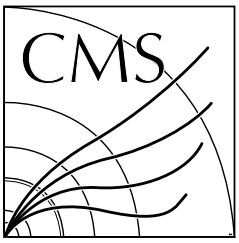

Definition uGT readout record

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1 Definition uGT readout record

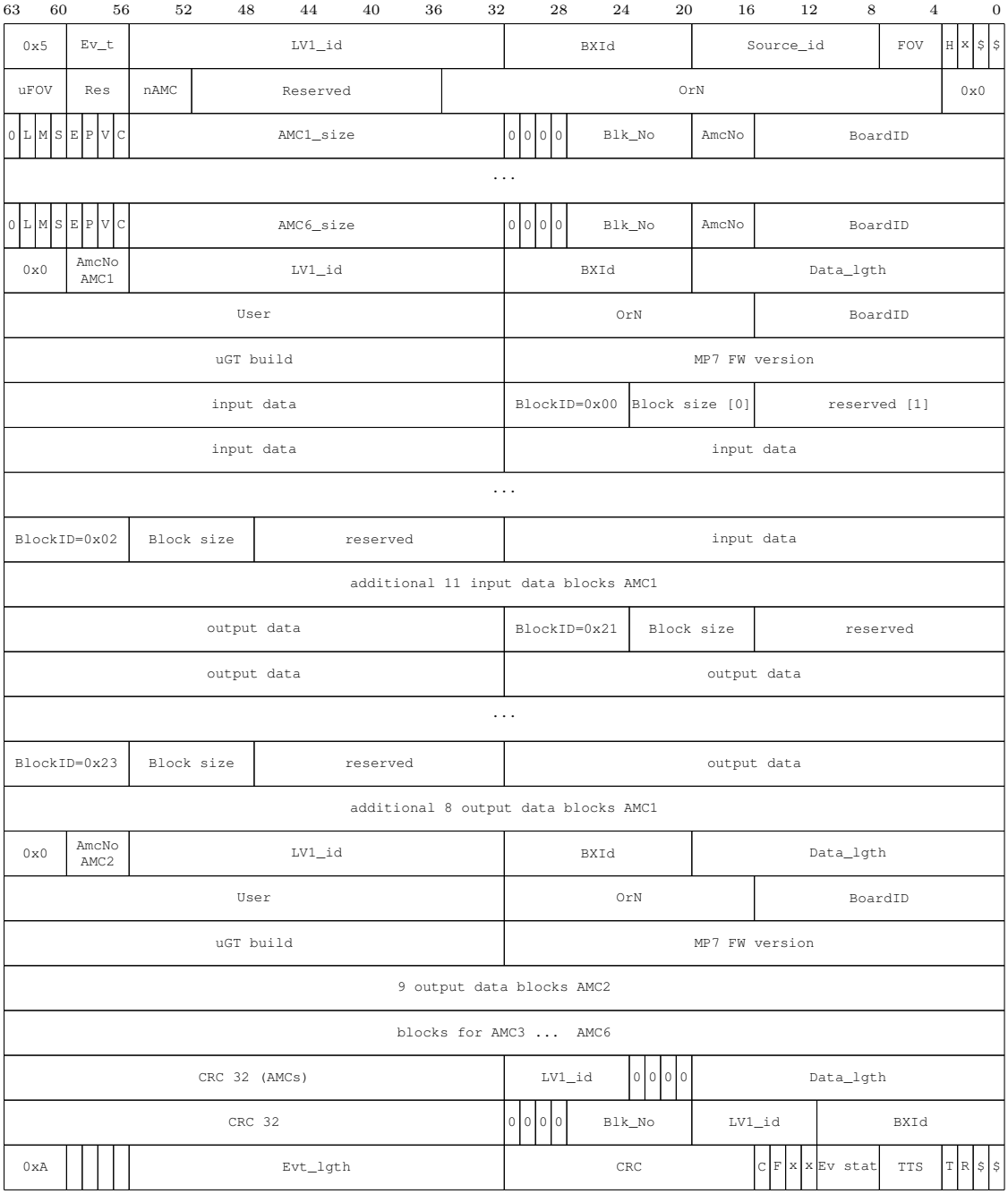
This document is a description of the structure of a uGT readout record.

In chapter "Event Builder Overview" of document [1] one can find a description about building a uGT readout record on AMC13.
The following description and explanations are based on documents [1] and [2].

1.1 Overview of structure

In the following table the structure of the uGT readout record is shown:

- the first 8 lines contain AMC13 header information,
- followed by 3 AMC#1 header lines.
- Then the first block of input data (of AMC#1), containing a block header and 30 data words (32 bits), is shown.
- A certain number of input data blocks and output data blocks (each with the same block size) and a AMC#1 trailer line finish AMC#1 readout record.
- Data of AMC#2 to AMC#6 with output data blocks only
- and 2 AMC13 trailer lines fill up the readout record.



[0]: "Event type" is set in configuration key: "ugt infra mp7 base" with
`<param cmd="roLoadMenu" id="mode1:eventType" type="uint">0xc0</param>`.

[1]: Contains probably the "bank id" which is set in configuration key: "ugt infra mp7 base" with
`<param cmd="roLoadMenu" id="mode1:capture1:bankId" type="uint">2</param>`
for input data and
`<param cmd="roLoadMenu" id="mode1:capture0:bankId" type="uint">1</param>`
for output data.

1.2 Readout record dump

Example of a readout record dump (with description):

```
5186f41767557c08 - AMC13 header:  Event type, LV1 id, BX id, FED#
1060424 0512ff30 - AMC13 header:  AMCs, Orbit nr (32 bits)
0f00014a00010000 - AMC13 header:  Data length, AMC#1
0f0000900002 0000 - AMC13 header:  Data length, AMC#2
0f00009000030000
0f00009000040000
0f00009000050000
0f00009000060000
0186f4176750014a - AMC#1 header:  AMC#1, LV1 id, BX id, Data length
000000c0ff300000 - AMC#1 header:  Ev.  type [0], Orbit nr (16 bits)
0000115200030202 - AMC#1 header:  uGT FW build, MP7 FW version
00000000001e0200 - AMC#1 input:  Block ID, Block size, "bankId"=input
...  muon input data
021e020000000000 - Block ID, Block size, "bankId"=input [1]
...  muon input data AMC#1
00000000041e0200
...  muon input data AMC#1
061e020000000000
...  muon input data AMC#1
06000200081e0200
...  e/gamma input data AMC#1
0a1e020006000200
...  e/gamma input data AMC#1
000008000c1e0200
...  jet input data AMC#1
0e1e020000000800
...  jet input data AMC#1
02000200101e0200
...  tau input data AMC#1
121e020002000200
...  tau input data AMC#1
0002a02a141e0200
...  esums data AMC#1
181e02000006f000
...  ext cond input data AMC#1
00000000211e0100 - AMC#1 output:  Block ID, Block size, "bankId"=output
...  algo output data AMC#1
231e010000000000
...  algo output data AMC#1
00000000251e0100
...  algo output data AMC#1
271e01005ca70bcc
...  algo output data AMC#1
```

```
00000000291e0100
...  algo output data AMC#1
2b1e010000000000
...  algo output data AMC#1
000000002d1e0100
...  algo output data AMC#1
2f1e010000000000
...  algo output data AMC#1
00000000311e0100
...  algo output data AMC#1
9ac23b7617000014a - AMC#1 trailer:  CRC, LV1 id (8 bits), Data length
0286f41767500090 - AMC#2 header
000000c0ff300000 - AMC#2 header
0000115200030202 - AMC#2 header
00000000211e0100
...  algo output data AMC#2
231e010000000000
...  algo output data AMC#2
00000000251e0100
...  algo output data AMC#2
271e01005ca70bcc
...  algo output data AMC#2
00000000291e0100
...  algo output data AMC#2
2b1e010000000000
...  algo output data AMC#2
000000002d1e0100
...  algo output data AMC#2
2f1e010000000000
...  algo output data AMC#2
00000000311e0100
...  algo output data AMC#2
cb79a76317000090 - AMC#2 trailer
0386f41767500090 - AMC#3 header
000000c0ff300000 - AMC#3 header
0000115200030202 - AMC#3 header
00000000211e0100
...
...  AMC#3 - AMC#6
...
36cb696317000090 - AMC#6 trailer
f6b9461200017675 - AMC13 trailer:  CRC, LV1 id (8 bits), BX id
a00004248468000 - AMC13 trailer:  Ev.  length, CRC (16 bits)
```

1.3 Data block

Description of a block with "block size" = 0x1e (6 frames [32 bits] @ +/-2 bx = 30) of a certain "Block ID" (0x00, 0x02, ..., 0x21, 0x23, ...):

```
00000000001e0200 - bx-2:  frame 0
0000000000000000 - bx-2:  frame 2, frame 1
0000000000000000 - bx-2:  frame 4, frame 3
0000000000000000 - bx-1:  frame 0, bx-2:  frame 5
0000000000000000 - bx-1:  frame 2, frame 1
0000000000000000 - bx-1:  frame 4, frame 3
0000000000000000 - bx:  frame 0, bx-1:  frame 5
0000000000000000 - bx:  frame 2, frame 1
0000000000000000 - bx:  frame 4, frame 3
0000000000000000 - bx+1:  frame 0, bx:  frame 5
0000000000000000 - bx+1:  frame 2, frame 1
0000000000000000 - bx+1:  frame 4, frame 3
0000000000000000 - bx+2:  frame 0, bx+1:  frame 5
0000000000000000 - bx+2:  frame 2, frame 1
0000000000000000 - bx+2:  frame 4, frame 3
021e020000000000 - bx+2:  frame 5
```

Remark:
The order of +/-2 bx has to be verified!

References

[1] AMC13 Event Builder:
http://ohm.bu.edu/~hazen/CMS/AMC13/UpdatedDAQPath_2014-07-10.pdf 1

[2] MP7 Readout & DAQ:
https://github.com/cms-l1-globaltrigger/mp7_ugt_legacy/blob/master/doc/read_out_record/MP7Readout.pdf 1