

Decompress (decompress.c):

Overview: The decompression code takes the data that is compressed in the format of the output from compress_final.cpp, puts it in the original format and then transposes it.

Method:

- Read:

For each packet, the code reads in the third and fourth header words, which indicates the total number of compressed words for that packet. The numbers for these headers are calculated and established in the compression code.

The last 8 bits of the third word are left-shifted and OR'ed with the last 8 bits of the fourth word, and the result is the total number of compressed words in that packet. See below for example:

In Hex	In Binary	Calculation
c801	1100100000000001	<< 8 100000000 (1)
c08c	1100000010001100	10001100 (2)

(1) OR (2) = 110001100 = 396 words

This indicates that from the start of the packet, there should be 396 16-bit words (including ADC words, headers, etc)..

- Decompress:

Decompression uses the same logic from compression. All the

Hex	Binary				
8064	10	00	0000	0110	0100
B212	10	11	0010	0001	0010
8C44	10	00	1100	1000	0100
B313	10	11	0011	0001	0011
9A10	10	01	1010	0001	0000
803F	10	00	0000	0011	1111

Ch.	ranges:	difference:	min:	Total:
0	14	100	0	100
1	4	2	589	591
2	4	1	545	546
3	4	2	556	558
4	4	3	550	553
5	4	1	527	528
6	4	2	543	545
7	4	3	508	511
8	4	3	527	530
9	4	1	570	571
10	4	3	501	504
11	4	3	535	538
12	4	4	552	556
13	4	8	574	582
14	4	6	582	588
15	14	63	0	63

- Transpose:

In the original format, the energy words are arranged by time sample first, and then by channel. Meaning, the first sixteen words correspond to the first time sample for channels 0 through 15, in that order. The next sixteen words correspond to the second time sample, and so on. (See figure 1 below).

In the transposed format, the energy words are arranged by channel first, and then by time sample. This means that the first 64 words are time samples 0 through 63 for channel 0. The next 64 words are all the time samples for channel 1, and so on. (See figure 2 below)

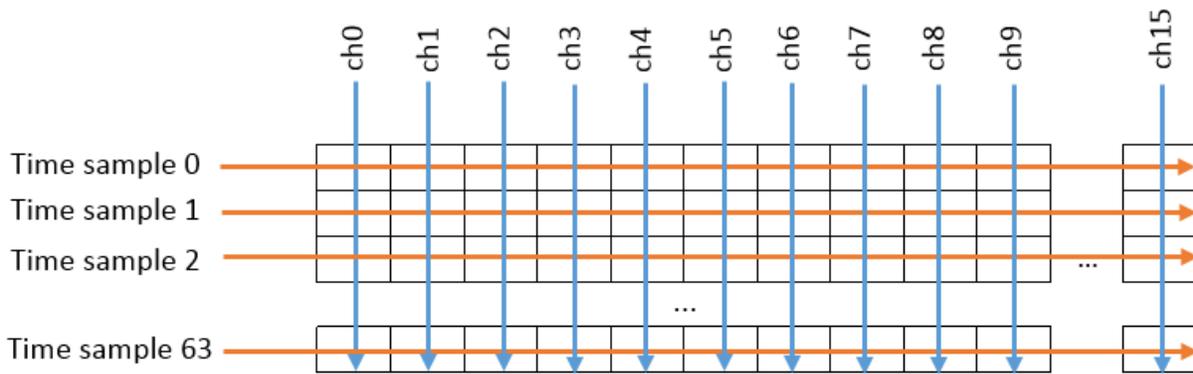


Figure 1: Original format for the energy words

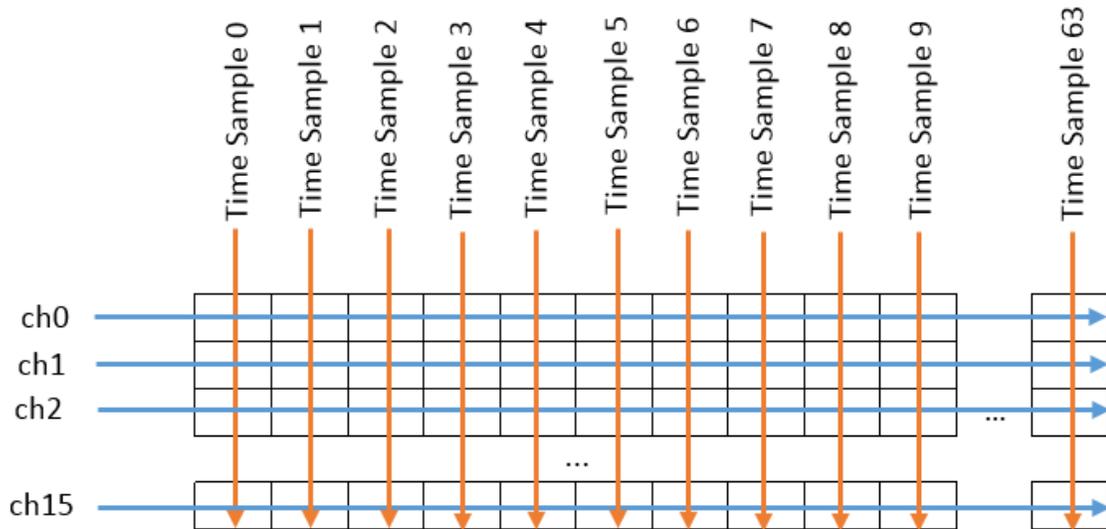


Figure 2: New (transposed) format for the energy words.

The function “Transpose” in the decompression code does exactly this: rearrange the energy words in the second format.

Results:

The decompressed data is saved in a file called “run#_node#_slot#_decompressed.bin”
Before implementing the transpose function, the code is tested using “CheckDecompress.c”
When running the executable for this code, the program prompts the user to insert what node and slot number they wish to compare, and how many packets in those files. The program then compares the energy words in the decompressed file (“run#_node#_slot#_decompressed.bin”) with the original file (“run#_node#_slot#_uncompressed.bin”).
Using this program, we tested both of our compression and decompression codes, making sure that the data that was first compressed and then decompressed matched the original.