Worked example of creating a preset from raw information

The C structure definition:

```
typedef struct {
 uint8_t curr_preset;
 uint8_t preset_num;
 char UUID[STR LEN];
 char Name[STR_LEN];
 char Version[STR LEN];
 char Description[STR LEN];
 char Icon[STR_LEN];
 float BPM;
 struct SparkEffects {
   char EffectName[STR LEN];
   bool OnOff;
   uint8 t NumParameters;
   float Parameters[10];
 } effects[7];
 uint8_t chksum;
} SparkPreset;
```

And a completed example:

Msgpack key formats (from msgpack.org)

Format name	First byte (in hex)	Remaining bytes
positive fixint	0x00 - 0x7f	-
fixmap	0x80 - 0x8f	-
fixarray	0x90 - 0x9f	-
fixstr	0xa0 - 0xbf	-
nil	0xc0	-
false	0xc2	-
true	0xc3	-
uint 32	0xce	4 bytes big endian uint (uint 32 stores a 32-bit big-endian unsigned integer)
float 32	0xca	4 bytes big endian float (big-endian IEEE 754 single precision floating point number)
str 8	0xd9	number of bytes bytes of string

The data is encoded in msgpack format. Strings are either of the format 'fixstr' or 'str 8' (in a simple message the strings are also prefixed with their length, before the msgpack header).

In the Spark implementation each float has an integer and 'array of 1^\prime .

Also the set of floats are indicated by an 'array of $\mathbf{x'}$ before them - this should probably be a fixmap rather than fixarray.

Create the msgpack data from the $\ensuremath{\mathsf{C}}$ information

0	0	
haff4218-75b5- A02d-8d9- 399286bB5aa A3 30 32 64 20 33 66 34 32 21 38 20 7 35 62 35 20 A02d-8d9- 399286bB5aa A3 30 32 64 20 33 66 44 33 20 C A3 30 39 39 32 38 36 64 62 38 35 61 61 A3 41 43 34 30 20 64 67 66 65 A3 30 28 37 A9 41 43 34 30 20 67 76 62 20 74 6F 6E 65 A3 30 22 37 A8 40 79 20 6F 77 6E 20 74 6F 6E 65 A8 69 63 6F 6E 2E 70 6E 67 B120.00 A8 69 63 6F 6E 2E 70 6E 67 B120.00 A8 69 63 6F 6E 2E 70 6E 67 B120.00 A8 69 63 6F 6E 2E 70 6E 67 B120.00 A8 69 63 6F 6E 2E 70 6E 67 B120.00 A8 69 63 6F 6E 2E 70 6E 67 B120.00 B120		
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393286db85aa		
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<pre>{array of 5} 0, {arr 1}, 0.08 1, {arr 1}, 0.50 2, {arr 1}, 0.55 3, {arr 1}, 0.37 4, {arr 1}, 1.00 "bias.reverb true {array of 8} 0, {arr 1}, 0.50 0 91 CA 3F 00 00 00 "bias.reverb true {array of 8} 0, {arr 1}, 0.50 1, {arr 1}, 0.25 2, {arr 1}, 0.49 4, {arr 1}, 0.34 3, {arr 1}, 0.34 4, {arr 1}, 0.34 5, {arr 1}, 0.34 6, {arr 1}, 0.30 7, {arr 1}, 0.30 0 91 CA 3F 80 00 00 95 96 97 98 98 98 98 98 98 98 98 98 98 98 98 98</pre>	_	
0, {arr 1}, 0.08 1, {arr 1}, 0.50 2, {arr 1}, 0.55 3, {arr 1}, 0.37 4, {arr 1}, 1.00 **Bias.reverb** C3 {array of 8} 0, {arr 1}, 0.25 0, {arr 1}, 0.25 0, {arr 1}, 0.25 0, {arr 1}, 0.50 0, {arr 1}, 0.50 0, {arr 1}, 0.50 0, {arr 1}, 0.25 0, {arr 1}, 0.34 0, {arr 1}, 0.30 0, {arr		
1, {arr 1}, 0.50 2, {arr 1}, 0.55 3, {arr 1}, 0.37 4, {arr 1}, 1.00 **Bias.reverb** C3 **Carray of 8} 0, {arr 1}, 0.25 2, {arr 1}, 0.34 3, {arr 1}, 0.34 4, {arr 1}, 0.50 1, {arr 1}, 0.34 3, {arr 1}, 0.34 4, {arr 1}, 0.34 5, {arr 1}, 0.34 6, {arr 1}, 0.30 7, {arr 1}, 0.30 0 0 1 91 CA 3F 00 00 00 3F 00 00 00 3F 00 00 3F 00 00 00	_	
2, {arr 1}, 0.55 3, {arr 1}, 0.37 4, {arr 1}, 1.00 **Bias.reverb** true		
3, {arr 1}, 0.37 4, {arr 1}, 1.00 "bias.reverb true		
4, {arr 1}, 1.00 04 91 CA 3F 80 00 00 "bias.reverb AB 62 69 61 73 2E 72 65 76 65 72 62 true {array of 8} 0, {arr 1}, 0.50 1, {arr 1}, 0.25 2, {arr 1}, 0.34 3, {arr 1}, 0.49 4, {arr 1}, 0.34 5, {arr 1}, 0.34 6, {arr 1}, 0.30 7, {arr 1}, 0.30 06 91 CA 3F 80 00 00 4F 80 00 00		
"bias.reverb AB 62 69 61 73 2E 72 65 76 65 72 62 true {array of 8} 0, {arr 1}, 0.50 1, {arr 1}, 0.25 2, {arr 1}, 0.34 3, {arr 1}, 0.49 4, {arr 1}, 0.34 5, {arr 1}, 0.34 6, {arr 1}, 0.30 7, {arr 1}, 1.00 AB 62 69 61 73 2E 72 65 76 65 72 62 C3 C3 C3 C4 C5 C3 C8 C9 C9 CA SE 80 00 00 CA SE AE 14 7B SE AE		
true {		
{array of 8} 0, {arr 1}, 0.50 1, {arr 1}, 0.25 2, {arr 1}, 0.34 3, {arr 1}, 0.49 4, {arr 1}, 0.34 5, {arr 1}, 0.34 6, {arr 1}, 0.30 7, {arr 1}, 1.00 98 00 91 CA		
0, {arr 1}, 0.50		
1, {arr 1}, 0.25	_	
2, {arr 1}, 0.34 02 91 CA 3E AE 14 7B 3, {arr 1}, 0.49 03 91 CA 3E FA E1 48 4, {arr 1}, 0.34 04 91 CA 3E AE 14 7B 5, {arr 1}, 0.34 05 91 CA 3E AE 14 7B 6, {arr 1}, 0.30 06 91 CA 3E 99 99 9A 7, {arr 1}, 1.00 07 91 CA 3F 80 00 00		
3, {arr 1}, 0.49		
4, {arr 1}, 0.34 04 91 CA 3E AE 14 7B 5, {arr 1}, 0.34 05 91 CA 3E AE 14 7B 6, {arr 1}, 0.30 06 91 CA 3E 99 99 9A 7, {arr 1}, 1.00 07 91 CA 3F 80 00 00		
5, {arr 1}, 0.34		
6, {arr 1}, 0.30 06 91 CA 3E 99 99 9A 7, {arr 1}, 1.00 07 91 CA 3F 80 00 00		
7, {arr 1}, 1.00 07 91 CA 3F 80 00 00		
1 1 11		
16/ A/		
	167	A 7

The final byte is the checksum - this is calculated by adding all the data bytes in the msgpack data apart from the first two bytes, modulo 256.

Create the 'packed' 7 bit data with a chunk header.

The chunk is formatted like this:

Offset (in block)	Length	Description
10	2	0xf001
12	1	Sequence number
13	1	Checksum (8 bit Xor)
14	1	Command
15	1	Sub-command
16		Data
	1	0xf7

The 8 bit xor is the xor of all the data bytes following the header so it does not include the header or the final 0xf7 trailer.

The data is the msgpack data but stored in 7 bit format. The first byte in each 8 byte slice contains the 8^{th} bit of each of the following bytes. Bit 0 of that byte stores the 8^{th} bit of the byte following and so on.

At the start of each data segment are three bytes which are inserted into the msgpack data - the total number of chunks, this chunk number (starting at 0) and the size of this chunk data.

The size of the data is the size of the actual msgpack data, so excludes these added three bytes and also all of the bytes storing the $8^{\rm th}$ bits.

This is usually 0x80 data bytes in a 'full' chunk being send. Because this is 7bit encoded this looks like 0x00 for the 'full' chunks.

F0	01	20	75	01	01		
	03					5.0	21
	62					32	
	38					35	
			32				
	34				39		32
	38		64		38	35	61
	61		41			30	
	54	6F		65		30	2E
02	37	2В	4 D	79	20	6F	77
40	6E		74	6F	6E	65	28
00	69	63	6F	6E	2E	70	6E
4A	67	4A	42	70	00	00	17
01	2E	62	69	61	73	2E	6E
00	6F	69	73	65	67	61	74
36	65	43	13	00	11	4A	3E
31	ΟF	5C	29	01	11	4A	3E
37	19	19	1A	02	11	4A	3F
09			00				
00	70	72	65	73	73	F7	
FO	01	21	72	01	01		
	_		00		72	43	12
		11			42		5C
		11	4A			75	43
01	27	42	6F	6F		74	
	72		11	00	11		
0E		75	43	28	41	43	20
	42		6F	73	74	43	15
26		11	4A		02	0F	5C
			4A			23	
			4A		6B		1F
			4A 4A				
20	0.3	тт	4A	JF	0 /	2 E	⊥4

```
66 04 11 4A 3E 19 19 1A
01 2C 43 68 6F 72 75 73
40 41 6E 61 6C 6F 67 42
OD 14 00 11 4A 3F 17 0A
2C 3D 01 11 4A 3E 33 33
4C 33 02 11 4A 3F 19 19
6D 1A 03 11 4A 3E 70 23
03 57 2D 44 65 6C F7
FO 01 22 26 01 01
00 03 02 76 61 79 45 63
40 68 6F 46 69 6C 74 42
6D 15 00 11 4A 3D 23 57
OC 0A 01 11 4A 3F 00 00
4C 00 02 11 4A 3F 0C 4C
2D 4D 03 11 4A 3E 3D 70
2D 24 04 11 4A 3F 00 00
02 00 2B 62 69 61 73 2E
40 72 65 76 65 72 62 43
OD 18 00 11 4A 3F 00 00
2C 00 01 11 4A 3E 00 00
2C 00 02 11 4A 3E 2E 14
6C 7B 03 11 4A 3E 7A 61
2C 48 04 11 4A 3E 2E 14
2C 7B 05 11 4A 3E 2E 14
6C 7B 06 11 4A 3E 19 19
2D 1A 07 11 4A 3F 00 00
02 00 27 F7
```

Create the block output

Prepend the block header of 16 bytes and adjust the length byte to be the length of the whole block.

```
01 FE 00 00 53 FE AD 00
00 00 00 00 00 00 00
F0 01 20 75 01 01
24 03 00 00 00 7F 59 24
00 62 61 36 66 34 32 31
00 38 2D 37 35 62 35 2D
00 34 30 32 64 2D 38 64
00 34 39 2D 33 39 39 32
00 38 36 64 62 38 35 61
02 61 29 41 43 34 30 20
10 54 6F 6E 65 23 30 2E
02 37 2B 4D 79 20 6F 77
40 6E 20 74 6F 6E 65 28
00 69 63 6F 6E 2E 70 6E
4A 67 4A 42 70 00 00 17
01 2E 62 69 61 73 2E 6E
00 6F 69 73 65 67 61 74
36 65 43 13 00 11 4A 3E
31 OF 5C 29 01 11 4A 3E
37 19 19 1A 02 11 4A 3F
09 00 00 00 2A 43 6F 6D
00 70 72 65 73 73 F7
01 FE 00 00 53 FE AD 00
00 00 00 00 00 00 00 00
F0 01 21 72 01 01
64 03 01 00 6F 72 43 12
36 00 11 4A 3E 42 0F 5C
76 01 11 4A 3E 28 75 43
01 27 42 6F 6F 73 74 65
36 72 43 11 00 11 4A 3F
OE 28 75 43 28 41 43 20
60 42 6F 6F 73 74 43 15
26 00 11 4A 3F 02 0F 5C
76 01 11 4A 3E 70 23 57
36 02 11 4A 3E 6B 05 1F
26 03 11 4A 3F 07 2E 14
66 04 11 4A 3E 19 19 1A
01 2C 43 68 6F 72 75 73
40 41 6E 61 6C 6F 67 42
OD 14 00 11 4A 3F 17 0A
2C 3D 01 11 4A 3E 33 33
4C 33 02 11 4A 3F 19 19
6D 1A 03 11 4A 3E 70 23
03 57 2D 44 65 6C F7
01
         00
            53 FE A2
  FE 00
                     0.0
     00 00 00 00 00 00
  00
F0 01 22 26 01 01
00 03 02 76 61 79 45 63
40 68 6F 46 69 6C 74 42
6D 15 00 11 4A 3D 23 57
OC 0A 01 11 4A 3F 00 00
4C 00 02 11 4A 3F 0C 4C
2D 4D 03 11 4A 3E 3D 70
2D 24 04 11 4A 3F 00 00
02 00 2B 62 69 61 73 2E
40 72 65 76 65 72 62 43
OD 18 00 11 4A 3F 00 00
2C 00 01 11 4A 3E 00 00
2C 00 02 11 4A 3E 2E 14
6C 7B 03 11 4A 3E 7A 61
2C 48 04 11 4A 3E 2E 14
2C 7B 05 11 4A 3E 2E 14
6C
  7B 06 11 4A 3E 19 19
2D 1A 07 11 4A 3F 00 00
02 00 27 F7
```

Preset format

Туре	Length	Content	Example
Integer	1	0	0x00
Integer	1	Hardware preset 0-3 Software preset 0x7f	0x7f
Long string	36	UUID of preset	
Short string	n+1	Name	0xad Spooky Melody
Short string	n+1	Version	0xa3 0.7
Short string / Long string	n+1 / n+2	Description	0xb7 Description for Alternative Preset 1
Short string	n+1	Icon name	0xa8 icon.png
Float	5	BPM	0xca 0x42 0x70 0x00 0x00 (60.0)
Fixed array	1	Number of effects	0x97 (7)
Effect 0		See below	
Parameter 0		See below	
Parameter 1		See below	
Effect 1		See below	
Parameter 0		See below	
Effect 2		See below	
Effect 3		See below	
Effect 4		See below	
Effect 5		See below	
Effect 6		See below	
Integer	1	Checksum of the msgpack formatted data - excluding preset location (first two bytes) Sum of all bytes modulo 256.	