Midi Time Code to SMPTE conversion (C++ / openframeworks)

I've recently needed to work with Midi Time Code (MTC) and could not find any code to parse the midi messages and construct an SMPTE timecode. Closest I got was finding **this documentation** (which is pretty good) on how the data is encoded in the bits of 8 bytes sent over 2 SMPTE frames, each byte sent at quarter frame intervals. From that I wrote the code below (I've only really tested the 25 fps). The code is from an openframeworks application but should work with any C/C++ code.

P.S. Some info on bits, bytes and nibbles **here.**

```cpp
class ofxMidiEventArgs: public ofEventArgs{
public:
    int     port;
    int     channel;
    int     status;
    int     byteOne;
    int     byteTwo;
    double  timestamp;
};

#define kMTCFrames      0
#define kMTCSeconds     1
#define kMTCMinutes     2
#define kMTCHours       3

// callback for when a midi message is received
void newMidiMessage(ofxMidiEventArgs& eventArgs){

    if(eventArgs.status == 240) {                        // if this is a MTC message...
        // these static variables could be globals, or class properties etc.
        static int  times[4]    = {0, 0, 0, 0};          // this static buffer will hold o
        static char *szType     = "";                    // SMPTE type as string (24fps, 2
        static int numFrames    = 100;                   // number of frames per second (s

        int messageIndex        = eventArgs.byteOne >> 4;   // the high nibble: which quarter
        int value               = eventArgs.byteOne & 0x0F; // the low nibble: value
        int timeIndex           = messageIndex>>1;          // which time component (frames,
        bool bNewFrame          = messageIndex % 4 == 0;


        // the time encoded in the MTC is 1 frame behind by the time we have received a new frame
        if(bNewFrame) {
            times[kMTCFrames]++;
            if(times[kMTCFrames] >= numFrames) {
                times[kMTCFrames] %= numFrames;
                times[kMTCSeconds]++;
                if(times[kMTCSeconds] >= 60) {
                    times[kMTCSeconds] %= 60;
                    times[kMTCMinutes]++;
                    if(times[kMTCMinutes] >= 60) {
                        times[kMTCMinutes] %= 60;
                        times[kMTCHours]++;
                    }
                }
            }
            printf("%i:%i:%i:%i | %s\n", times[3], times[2], times[1], times[0], szType);
        }


        if(messageIndex % 2 == 0) {                      // if this is lower nibble of tim
            times[timeIndex]    = value;
        } else {                                         // ... or higher nibble
            times[timeIndex]    |= value<<4;
        }


        if(messageIndex == 7) {
            times[kMTCHours] &= 0x1F;                     // only use lower 5 bits for
            int smpteType = value >> 1;
            switch(smpteType) {
                case 0: numFrames = 24; szType = "24 fps"; break;
                case 1: numFrames = 25; szType = "25 fps"; break;
                case 2: numFrames = 30; szType = "30 fps (drop-frame)"; break;
                case 3: numFrames = 30; szType = "30 fps"; break;
                default: numFrames = 100; szType = " **** unknown SMPTE type ****";
```

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```
                }
            }
        }
    }
}
```

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Submitted by **memo** on 7 February 2010 - 5:42pm.

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- to those asking, MSA::Gui (with midi+OSC+more) is not public yet, the API is changing every couple of hours :P but it will be soon 2 days ago

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