Joint TSG-S4#10 - SMG11#15 Meeting
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Title: **Verification of AMR floating-point C code**

Source: **Texas Instruments**

1. Introduction

As part of the AMR floating-point C code specification, a list of verification items has been defined. Texas Instruments performed the verification of items #1 (verification of the format and correctness of the C-code) and #10 (stability of the codec over time). This paper describes how the work was performed and presents the results of the verification.

2. Item #1 : verification of the format and correctness of the C-code

2.1. Compilation of the code

The code was compiled successfully with gcc on Sun platform under Solaris and with Visual C++ (Win32 console mode) on a PC platform under Windows 95.

When trying to compile the code with Borland C++ v 5.0, on a PC platform under Windows 95, we encountered a problem with an undefined type LARGE_INTEGER. Since this type was only used for processor load measurement, we managed to compile the code after removing the line that was using it.

2.2. Verification of the executable

We used the executable generated with Borland C++ v 5.0 and compared the results of the encoder / decoder sequence with the results obtained with the original executables, generated with Visual C++. Some results were identical in a bit-exact way, but some other results (depending on the mode and on the speech sequence) were different. Nevertheless, the differences were very small, so the resulting speech quality was not impacted.

3. Item #10 : Stability of the codec over time

The potential concern is that a floating-point encoder operating together with a fixed-point decoder might lead to a slow divergence in the encoder and decoder. This could mean that when the codec is operated for a long time the quality would slowly deteriorate.

The verification was done by comparing normal short test samples (30 seconds long) with the same samples, but now preceded by a very long speech file (around 37 minutes). The verification test was a simple pairwise-comparison of the two samples.

The results show that, after a convergence time of 1 to 3 seconds (depending on the mode), the 2 outputs are identical (bit-exact). Furthermore, the convergence period does not generate any audible artifact.

4. Conclusion

This verification work shows that the code could be compiled on several compiler / platform configurations but the executable results may vary depending on this environment. This leads to the question of the verification of the quality of the AMR C floating-point output in other configurations than the tested ones. No problem was detected on the stability over the time.