

Source: Siemens
Title: Real Time Factor Measurements of the AMR Floating Point Codec
Document for: Discussion
Agenda Item:

1. Introduction

This document presents results of real time factor measurements of the AMR floating point code v0.2.1 [1] and the AMR fixed point code v7.3.0 [2]. The measurements have been performed on two different platforms:

- a. PC with Pentium III processor @ 450 MHz
Operating system SuSE Linux v6.3 with Kernel v2.2.13, C compiler: gcc -O4 (egcs-1.2.2 release)
- b. SUNW Ultra-60 workstation with SPARC processor,
Operating system SunOS v5.7, C compiler: cc (v4.2)

The data basis consists of all AMR fixed point code test vectors T00.INP ... T21.INP, T00A.INP .. T21A.INP, T00U.INP ...T21U.INP.

2. Simulation Results

The computational complexity measurements are shown in Figures 1 to 4 in terms of the real time factor. Figures 1 and 2 present the results obtained on the PC, while Figures 3 and 4 present the results obtained on the SUN workstation. Both platforms are not only different in terms of hardware features, but also different compilers and options are used (we chose a "typical" compiler for each platform). This makes it difficult to compare the "PC" results with the "SUN" results. Note that the focus of the presented simulations is to prove the speed gain of the AMR floating point codec as compared to the fixed point codec on the same platform.

As expected, the floating point implementation speeds up the execution significantly (by a factor of α) as compared to the fixed point code. On the PC α is in the range from 7.42 (7.4 kbps mode) to 8.23 (4.75 kbps mode). On the workstation the range of α is from 9.65 (5.15 kbps mode) to 10.63 (12.2 kbps mode). In any case, the floating point codec is able to run in real time: On the PC real time factors of 7.22% (5.15 kbps mode) up to 9.82% (7.95 kbps mode) are reached, on the SUN workstation they are 39.93% (5.15 kbps mode) up to 50.08% (7.95 kbps mode).

It should be noted that also the combination of floating point encoder and fixed point decoder is able to run in real time on both platforms.

[1] 3G TS 26.104: "ANSI-C code for the floating-point AMR speech codec"

[2] 3G TS 26.073: "ANSI-C code for the Adaptive Multi Rate speech codec"

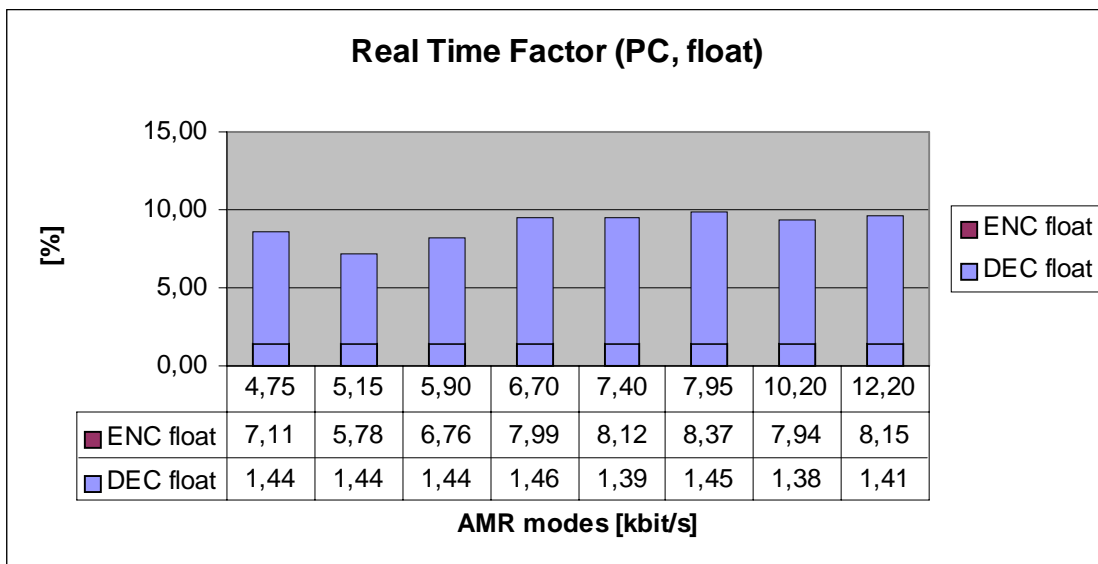


Figure 1: Real time factor of floating point AMR codec on PC platform

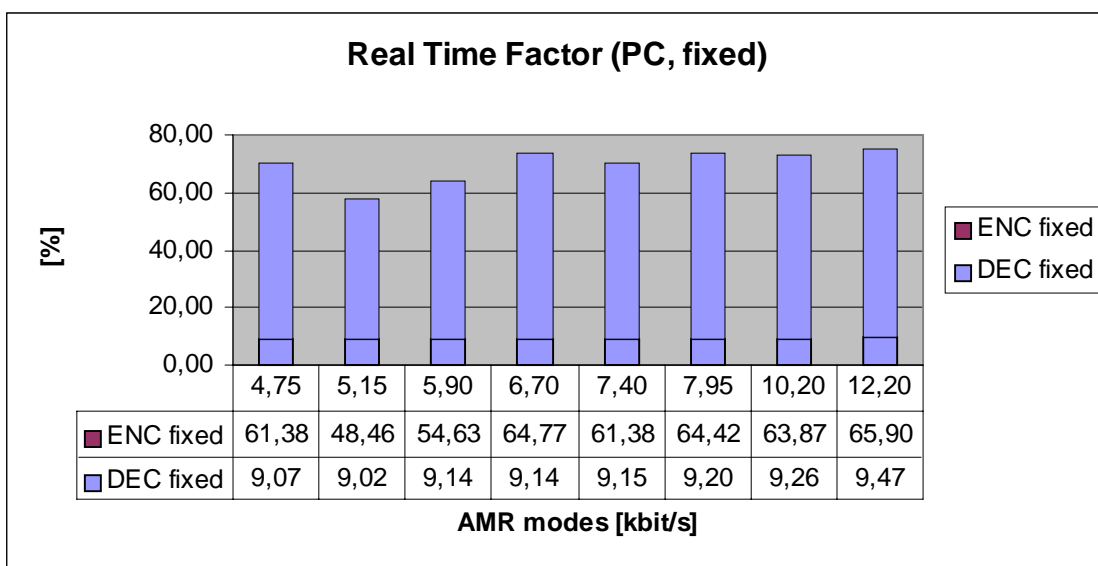


Figure 2: Real time factor of fixed point AMR codec on PC platform

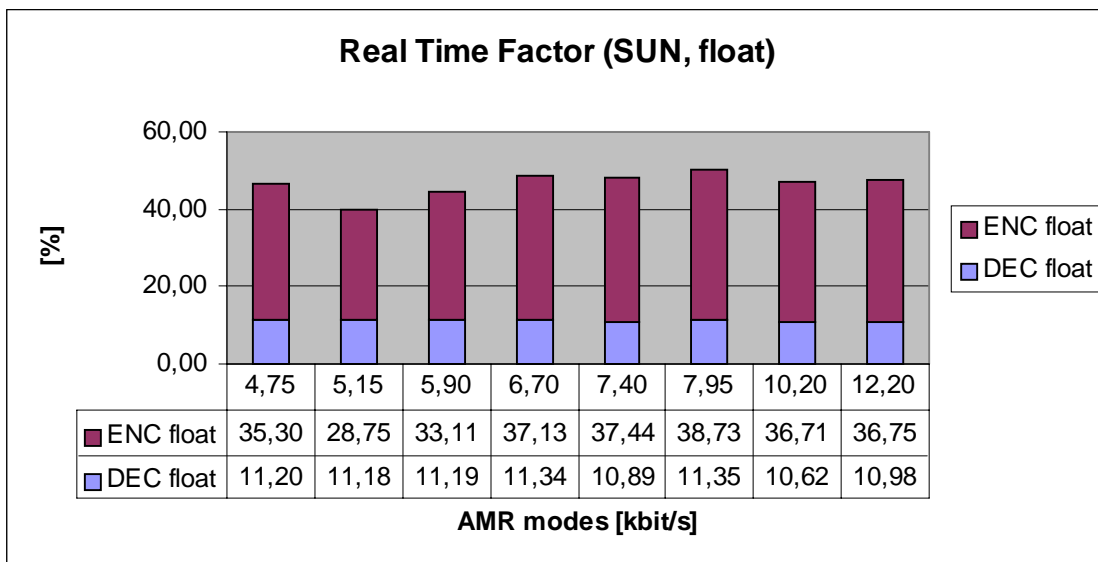


Figure 3: Real time factor of floating point AMR codec on SUN workstation platform

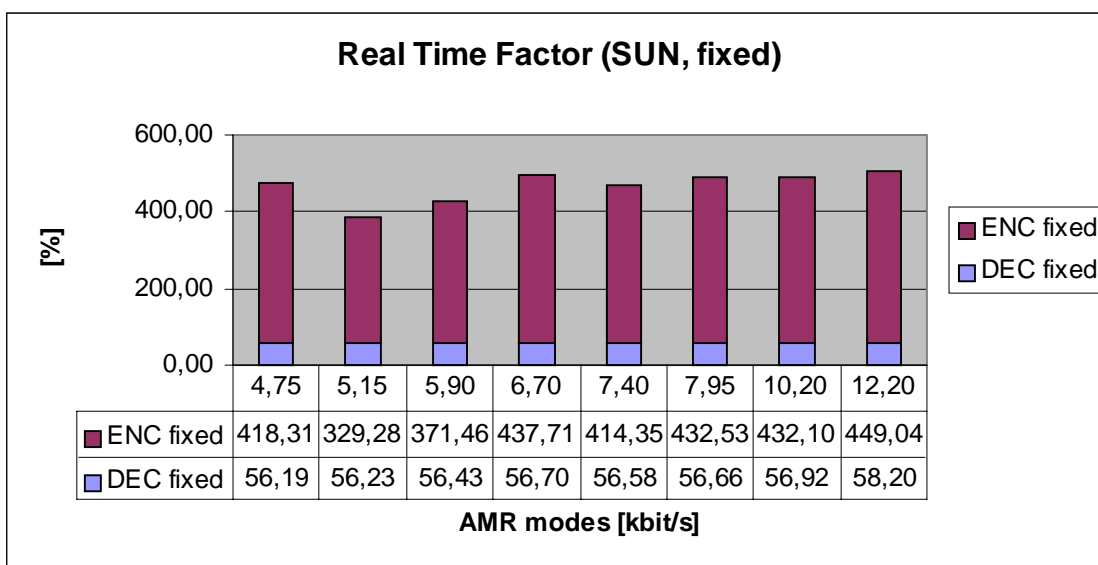


Figure 4: Real time factor of fixed point AMR codec on SUN workstation platform