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ITU-T G.723.1

Implementers Guide

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SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Digital terminal equipments – Coding of analogue signals
by methods other than PCM

Implementors' Guide for G.723.1

***(Dual rate speech coder for multimedia
communications transmitting at 5.3 & 6.3 kbit/s)***

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Implementers Guide for Recommendation G.723.1

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SUMMARY

Implementors' Guide for Recommendation G.723.1

This document contains Implementers' Guide for the text of ITU-T Recommendation G.723.1 Annex A and for the software C-codes of G.723.1 Annexes A and B that corrects defects reported at SG 16's meeting on 15-25 October 2002.

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Implementers' Guide for G.723.1 Annexes A & B

1 Corrections to G.723.1 annexes A and B source codes

In March 1996, SG 15 approved Rec. G.723.1 Annex A. As described in [COM16-D261](#), a problem in G.723.1 Annex A has been discovered. When the encoder input PCM file starts with absolute silence (i.e. all zeros input), the encoder never generates any silent frames, only speech frames and SID frames. For instance, the encoding of 30 seconds of absolute silence outputs 3 speech frames followed by 997 SID frames while only 1 SID frame followed by silent frames would have been expected.

This strange behaviour of G723.1 annex A (and also annex B) with silent input comes from the filters comparison (Itakura-Saito distance computation) in the section A4.2 (Comparison of the LPC filters) equation A-10.

The current LPC filter and SID filter are considered as significantly different if the Itakura distance between the two filters exceeds the given threshold, which is expressed by:

$$\sum_{j=0}^{10} R_a[j] \times R'[j] \geq E_t \times thr1 \quad (A-10)$$

where $R_a[j]$, $j = 0$ to 10 is a function derived from the autocorrelation of the coefficients of the SID filter.

With null input, E_t , all $R_a[i]$ and $R_t[i]$ (except $R_t[0]$) are all equal to zero.

In the ANSI C-source code, however the following test is performed: $\sum_{j=0}^{10} R_a[j] \times R'[j] < E_t \times thr1$

If the test is false, the filters are judged different otherwise they are not. However with zeros the test $<$ is not true, so the filters are judged different and SID frames are sent. To fix this, it is sufficient to replace $<$ by \leq

In the fixed-point C source code (G.723.1 Annex A), it is proposed to modify the line 463 in file COD_CNG.C, routine LpcDiff:

Replace line 463: if (L_temp0 < L_temp1) diff =1 by if (L_temp0 ≤ L_temp1) diff =1

In the floating-point C source code (G.723.1 Annex B), it is proposed to modify the line 397 in file CODCNG2.C, routine LpcDiff

Replace line 397: if (temp0 < temp1) by if (temp0 ≤ temp1)

Table 1 summarizes these modifications.

Table 1:
Modified lines in the comparison of the LPC filters routines

Annex	File name	Routine name	Modified line	Correction
A	COD_CNG.C	LpcDiff	463	if(L_temp0≤L_temp1) diff =1
B	CODCNG2.C	LpcDiff	397	if (temp0 ≤ temp1)

2 Editorial corrections to section 2.9/G.723.1 Annex A recommendation text

[COM16-D261](#) also reported editorial errors in the ITU-T G.723.1 Annex A recommendation text in equation (A.10) and (A.11) in the sub-section "Comparison of the LPC filters" of the section A.4.2 "Computation of the current frame type Ftyp_t"

In equation (A.10), the index i should be replaced by j. Furthermore, it was pointed out that the text should be aligned with the C-source code, modified as described in the previous section.

The equation (A.10) should be: $\sum_{j=0}^{10} R_a[j] \times R^t[j] > E_t \times thr1$ instead of: $\sum_{j=0}^{10} R_a[i] \times R^t[i] \geq E_t \times thr1$

In the first line of equation (A.11), the sum operand is wrongly set as an exponent. The equation (A.11) should be:

$$R_a[j] = 2 \sum_{k=0}^{10-j} a_{sid}[k] \times a_{sid}[k+j], \text{ if } j \neq 0 \text{ instead of } R_a[j] = 2 \sum_{k=0}^{10-j} a_{sid}^k[k] \times a_{sid}[k+j] \text{ if } j \neq 0$$

The exiting text should be corrected as shown below.

[Begin Correction]

Comparison of the LPC filters

The current LPC filter and SID filter are considered as significantly different if the Itakura distance between the two filters exceeds the given threshold, which is expressed by:

$$\sum_{j=0}^{10} R_a[j] \times R^t[j] > E_t \times thr1 \quad (\text{A-10})$$

where $R_a[j]$, $j = 0$ to 10 is a function derived from the autocorrelation of the coefficients of the SID filter, given by :

$$\begin{cases} R_a[j] = 2 \sum_{k=0}^{10-j} a_{sid}[k] \times a_{sid}[k+j] \text{ if } j \neq 0 \\ R_a(0) = \sum_{k=0}^{10} a_{sid}^2[k] \end{cases} \quad (\text{A-11})$$

[End Correction]