3GPP TSG-SA Codec Working Group
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Source: **Nokia**

Title: **Terminal audio characteristics**

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Agenda Item: **12**

1. Introduction

The document S4-99517 provides the specification TS 26.131 for "Narrow-Band Speech Telephony Terminal Acoustic Characteristics – Requirements". This specification is of great importance since it provides the minimum performance requirements to guarantee high quality for all connections.

The specification gives the receiving sensitivity requirements for mobile terminals. However, at the moment the receiving mask values were left for further study. In addition, the overall loudness ratios to integrated hands-free equipment. The purpose of this contribution is to propose values for the specification.

2. Proposal for handset and headset UE receiving

The headset and handset receiving sensitivity/frequency characteristics in the specification TS 26.131 were left for further study. Table 1 of this contribution proposes the characteristics. The proposed values are also presented in Figure 1 among the old (for further study) values mentioned in the draft specification.

Table 1: Receiving sensitivity/frequency mask

Freq	Upper limit	Lower limit
100	0	
200	(note 2)	
300	2	-10
500	(note 2)	(note 2)
700	(note 2)	-5
1000	0	-5
2000	(note 2)	-5
3000	2	-5
3400	2	-10
4000	2	

NOTE 1: All sensitivity values are expressed in dB on an arbitrary scale.
NOTE 2: The limit at intermediate frequencies lies on a straight line drawn between the given values on a log (frequency) - linear (dB) scale.

The main purpose to provide these values is to ensure compatibility with the wide-band acoustic hardware. The upper limit at 100 Hz (0 dB) is targeted especially for that purpose.

The proposals for the lower limit, lower corner ('knee') frequency from 500Hz to 700Hz, and level of ending low-frequency limit to -10dB are based on informal subjective testing. A handset wit flat characteristics down to 500 Hz, as measured on a low-leak ear, was perceived as too 'dark,' or 'heavy', presumably indicating test subjects were expecting less sensitivity at low frequency. Therefore, it is proposed to lower the lower limit at low frequencies according to Table 1.

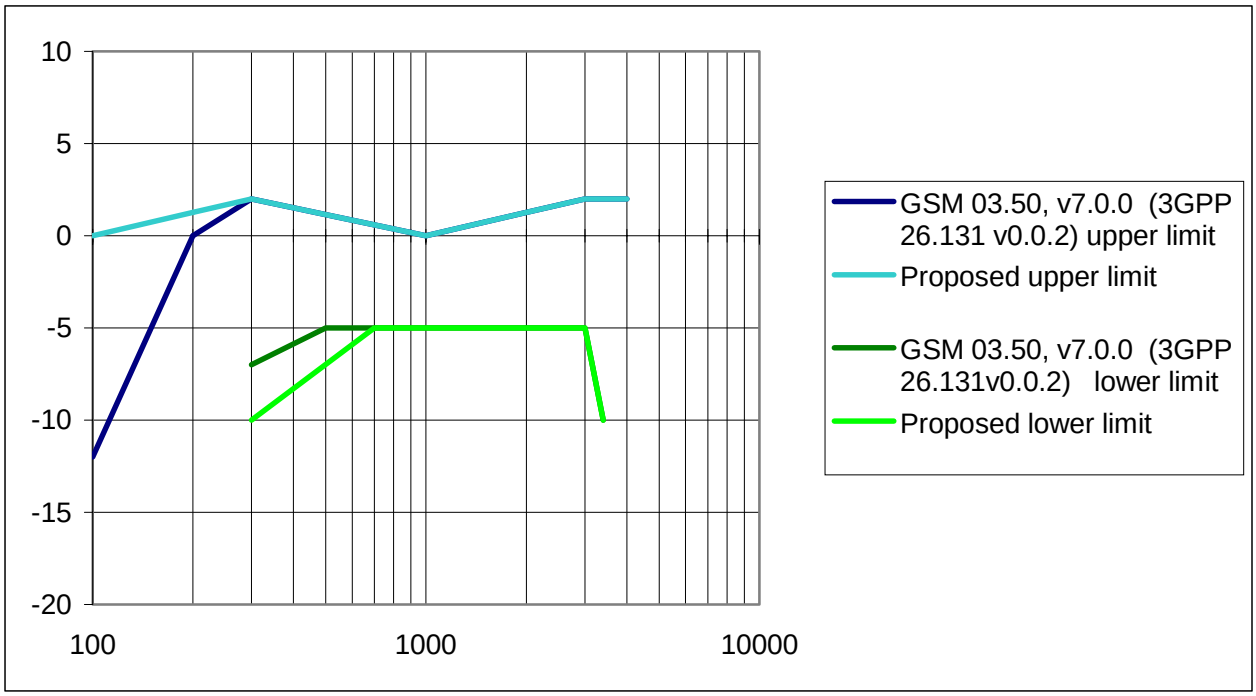

Figure 1. Receiving sensitivity/frequency mask

3. Regarding §5.2.4 Overall Loudness ratings

Currently the specification TS 26.131 has the receiving characteristics for integrated hands-free UE for further study. We propose that the SLR figures should be same for both external and integrated hands-free UE. However, the nominal RLR loudness rating for Integrated hands-free receive is recommended as RLR = +20 +/- 4 dB. Different figure to that of external hands-free UE is proposed, since the expected usage environment is different. Integrated hands-free will be mostly used in in-door environment. In addition, the nominal rating makes it possible to utilise the hands-free UE without disturbing other people. Otherwise, the requirements should be the same with external hands-free UE.

4. Regarding STMR, §5.5.1Sidetone loss

Considering the sidetone loss figure, according to Nokia experience low produced STMR values are unacceptable with modern mobile terminals. Our experience has shown that STMR should be tuned to approximately +18dB. This has proven to be more subjectively optimum level. Therefore, we propose to update the STMR figure in the TS 26.131 to STMR = 18dB ± 5.