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ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.111

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TRANSMISSION SYSTEMS AND MEDIA GENERAL RECOMMENDATIONS ON THE TRANSMISSION QUALITY FOR AN ENTIRE INTERNATIONAL TELEPHONE CONNECTION

LOUDNESS RATINGS (LRs) IN AN INTERNATIONAL CONNECTION

ITU-T Recommendation G.111

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation G.111 was revised by the ITU-T Study Group XII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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PREAMBLE

Clauses 1 to 5 of this Recommendation apply in general to all-analogue, mixed analogue/digital and all-digital international telephone connections. However, where Recommendations are made on specific aspects in clause 6 for mixed analogue/digital or all-digital connections, clause 6 will govern.

In the international transmission plan, the loudness rating (LR) between two subscribers is not strictly limited; its maximum value results from various Recommendations.

The values given below, either in terms of LR should be used to verify that international telephone connections provide an adequate loudness of received speech.

Administrations employing CREs should preferably translate the LRs of this Recommendation into their national CREs by the methods given in Annex C or, as a second choice, apply the values given in Volume III of the *Red Book* (ITU, Geneva, 1985).

NOTES

- 1 The main terms used in this Recommendation are defined and/or explained in Annex A.
- 2 For many telephone sets using carbon microphones, the SLR and STMR values can only be determined with limited accuracy.

Recommendation G.111**LOUDNESS RATINGS (LRs) IN AN INTERNATIONAL CONNECTION**

*(Geneva, 1964; amended at Mar del Plata, 1968; Geneva, 1972, 1976 and 1980;
Malaga-Torremolinos, 1984; Melbourne, 1988, and Helsinki, 1993)*

1 Nominal LRs of the national systems**1.1 Definition of nominal LRs of the national systems**

Send and receive loudness ratings, SLRs and RLRs respectively, may in principle be determined at any interface in the telephone network. In this Recommendation and in Recommendation G.121, the SLRs and RLRs of the national systems are referred to the Virtual International Connecting Points (VICPs) as defined in 2.12/G.101; see Figure 1.

The **virtual international connecting point** is a point in the international circuit at the International Switching Centre (ISC). The relative levels at the VICP are:

- Sending: 0 dBr;
- Receiving: 0 dBr for digital circuits;
–0.5 dBr for analogue or mixed analogue/digital circuits.

The nominal circuit loss of international circuits at the reference frequency (1020 Hz) is therefore 0 dB for digital circuits and 0.5 dB for analogue and mixed analogue/digital circuits.

NOTES

1 In digital international circuits, the VICP will be at the digital bit stream. In analogue exchanges, the VICP often will be a hypothetical, not accessible point; see 2.12/G.101 and 2.13/G.101.

2 Earlier, the Virtual Analogue Switching Points (VASPs) having the relative levels –3.5dBr and –4 dBr were used as the reference points.

1.2 Recommended values

Recommendation G.121 gives objectives for the nominal SLR and RLR of national systems.

2 Nominal overall loss of the international chain

Each international analogue and mixed analogue/digital circuit should in principle have a 0.5 dB loss at 1020 Hz. However, some circuits can be operated with higher losses (see 2.1/G.131) and certain analogue and mixed analogue/digital circuits may be operated at zero loss (see 4.2/G.101). Digital circuits have 0 dB transmission loss (see clause 6 below).

As far as transmission is concerned, there is no strict limit on the number of international circuits which may be interconnected in tandem, provided each analogue and mixed analogue/digital circuit has 0.5 dB nominal loss, and provided there is a 4-wire interconnection. Naturally, the fewer the number of interconnected circuits the better the transmission performance is likely to be.

NOTE – Information on the actual number of circuits which are found in international connections is given in 3/G.101.

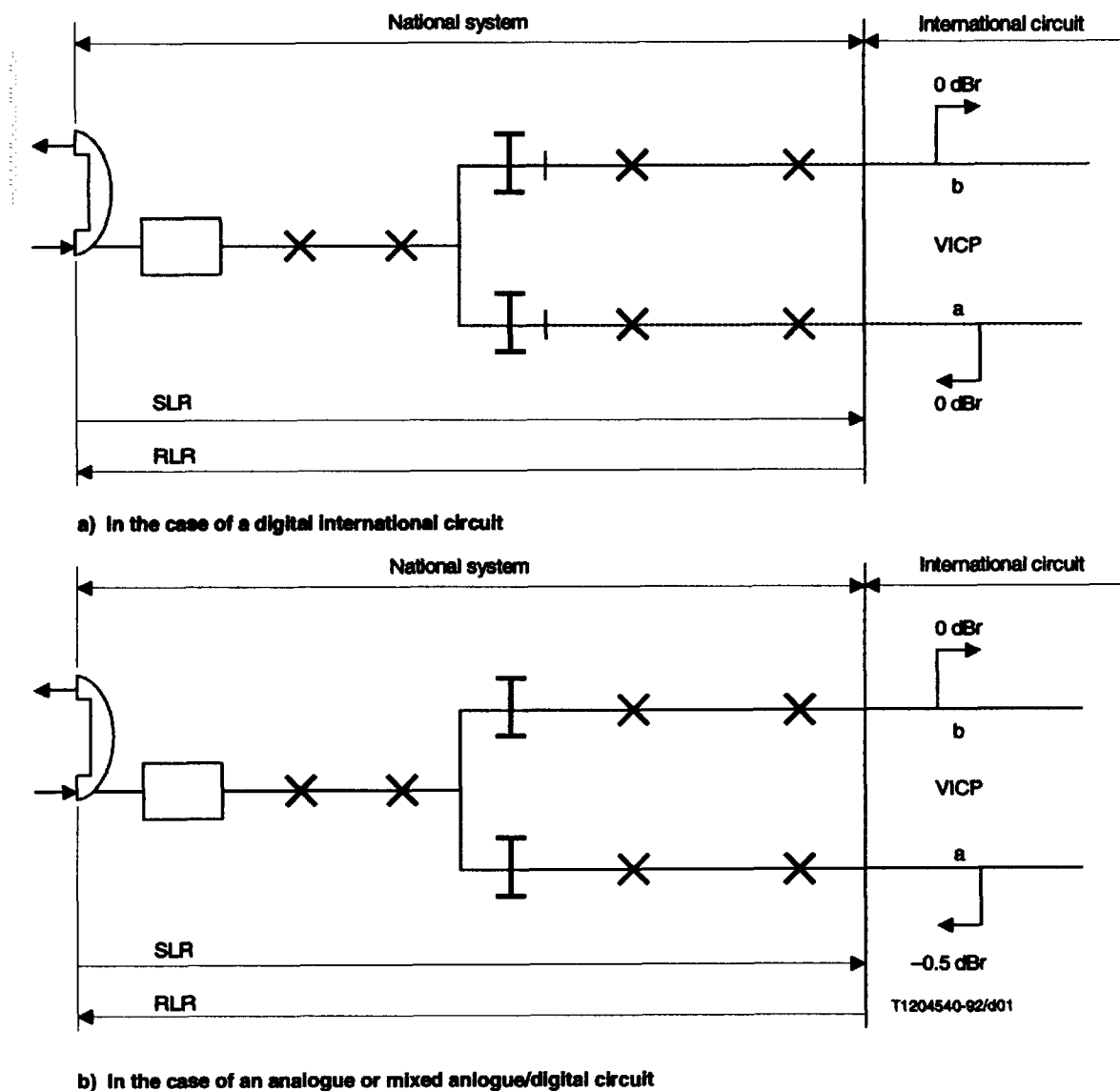


FIGURE 1/G.111

Reference points for defining the SLR and RLR for a national system

3 LRs and directional effects in a complete connection

3.1 Nominal LRs for each transmission direction

Subclauses A.3 and A.4 show how to calculate OLR, the overall loudness rating, of a complete connection. The nominal OLR of an international connection is the sum of

- the nominal SLR, send loudness rating, of the national sending system (see 4/G.121 and Annex A);
- the nominal CLR, circuit loudness rating, of the international chain (see Annex A);
- the nominal RLR, receive loudness rating, of the national receiving system (see 4/G.121 and Annex A).

3.2 Traffic-weighted mean values of OLRs

For connections under practical conditions a suitable value of OLR seems to be 10 dB in most cases.

The long-term objective for the traffic-weighted mean value should lie in the range of 8 to 12 dB.

An objective for the mean value is necessary to ensure that satisfactory transmission is given to most subscribers.

NOTES

1 For connections totally free from echo and sidetone problems, investigations have shown the optimum OLR to be somewhat lower than 10 dB, about 5 dB, but the optimum is rather flat so that moderate deviations from the given value have little subjective effect. (However, the "preferred OLR" in a particular application will to some extent depend on what subscribers have become used to. Thus, in some analogue PBXs, internal calls have had a very low OLR. Replacing such a PBX by a digital PBX having a higher OLR might cause some subscriber comments on "low speech levels". Some Administrations have solved this problem by means of a manual volume control in the receive part of the telephone set, the total range of variation being in the order of 10 to 12 dB. Note that in mobile telephony a common practice is to include a volume control which affects both the receive and send sides but in opposite directions.)

2 The long-term values cannot be attained at this time and an appropriate short-term objective for OLR is a range of 8 to 21 dB.

3 The 0.5 dB transmission loss of each analogue and mixed analogue/digital circuit in the international chain (see clause 2 above) has been allowed for by noting that the average number of international circuits encountered in international connections is 1.1. (See 3/G.101.)

As a result, the ranges mentioned above do not include allowances for connections between countries which

- involve more than one 0.5 dB international circuit;
- involve a single international circuit which has a higher loss than 0.5 dB as permitted by 2.1/G.131.

4 Clause 1/G.121 gives values for national systems based on the overall objectives of this Recommendation.

5 The ranges stated for OLR are for planning and do not include measuring and manufacturing tolerances.

6 Besides loudness, other important factors have to be considered in transmission planning. Sidetone, echo and stability problems may cause degradation of the overall speech quality in a connection. Thus, it is important to adopt an adequate impedance strategy in the national transmission plan to avoid harmful mismatches in the network; see Supplement No. 31/G.121.

3.3 Difference in transmission loss between the two directions of transmission

The difference in nominal loss between the two directions of transmission on an international connection should not exceed 8 dB, preferably not 6 dB. The asymmetry introduced by each of the two national systems is limited by the provisions of 2.2/G.121. The international circuits could, in practical circumstances outlined in the general remarks in 4/G.101, introduce additional asymmetry. This additional asymmetry will be acceptably small.

4 Variation in time and effect of circuit noise

4.1 Variations in time

The LR values calculated for national systems (see 4/G.121) do not cover variations in time of the loss of various parts of the national system. Clause 3/G.151 gives the objectives recommended by the CCITT for transmission loss variations on international circuits and national extension circuits as compared with the nominal values.

4.2 Effect of circuit noise

See Recommendation G.113.

5 Practical limits of the OLR between two operators or one operator and one subscriber

The same loudness rating limits as between two subscribers should apply.