



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.121

(03/93)

TRANSMISSION SYSTEMS AND MEDIA

GENERAL CHARACTERISTICS OF NATIONAL SYSTEMS FORMING PART OF INTERNATIONAL CONNECTIONS

LOUDNESS RATINGS (LRs) OF NATIONAL SYSTEMS

ITU-T Recommendation G.121

(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.121 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 Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.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.

All sending and receiving LR_s in this Recommendation are “nominal values” as explained in clause 4 and are referred to the corresponding Virtual International Connecting Points (VICPs) of an international circuit at the International Switching Centre unless otherwise stated.

The definition of the Virtual International Connecting Points (VICPs) of international circuits can be found in Recommendation 2.12/G.101.

Additional information is given in Supplement No. 31 (to this Recommendation): “Principles of determining an impedance strategy for the local networks”.

The values given below in terms of LR should be used by Administrations to verify that their national systems meet the general objectives resulting from Recommendation G.111.

Administrations employing CREs should preferably translate the LR_s of this Recommendation into their national CREs by the methods given in Annex C/G.111 or, as a second choice, apply the values given in Volume III of the *Red Book* (Geneva, 1985).

NOTES

- 1 The main terms used in this Recommendation are defined and/or explained in Annex A/G.111.
- 2 For many telephone sets using carbon microphones, the SLR and STMR values can only be determined with limited accuracy.

Recommendation G.121**LOUDNESS RATINGS (LRs) OF NATIONAL SYSTEMS***(amended at 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.111, the SLRs and RLRs of the national systems are referred to the Virtual International Connecting Points (VICPs) of the first international circuit, as defined in Recommendation 2.12/G.101.

The Virtual International Connecting Points are points 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 and mixed analogue/digital circuits.

NOTES

1 These levels do not necessarily apply to national circuits, which are governed by the national transmission plan. In determining these levels, Recommendation 2.1/G.131 may have been applied, or 2-wire switching may still be in use; see Figure 6/G.101.

2 Earlier the “virtual analogue switching points (VASP)” having the relative levels –3.5 and –4 dBr were used as the reference points.

3 The concept of relative levels (dBr) and associated terms are defined and explained in Recommendation G.101 and Annex A/G.101.

1.2 Traffic-weighted mean values of the distribution of send and receive loudness ratings, SLRs and RLRs

An objective for the mean value is necessary to ensure that satisfactory transmission is given to most subscribers. Transmission would not be satisfactory if the maximum values permitted in clause 2 were consistently used for every connection.

An appropriate subdivision of the overall loudness requirement is obtained by the following long-term objectives referred to the VICP:

- SLR: 7 to 9 dB;
- RLR: 1 to 3 dB.

NOTES

1 In some networks the long-term values cannot be attained at this time and appropriate short-term objectives are:

- SLR: 7 to 15 dB;
- RLR: 1 to 6 dB.

2 In some networks the actual traffic distribution is known only incompletely. In such cases, subscribers generating heavy traffic, like PBXs, should be given special consideration.

3 The long-term traffic weighted mean values of LRs should be the same for each main type of subscriber categories, such as urban, suburban and rural. Only considering the mean value for the whole country in the transmission plan might lead to a discrimination of some important customer groups.

4 The ranges stated for SLR and RLR are for planning and do not include measuring and manufacturing tolerances.

5 Some Administrations have found it advantageous in some circumstances to include a manual volume control in the receive part of the digital telephone set. See the remarks made in 3.2/G.111.

2 Maximum Send and Receive Loudness Ratings, SLR and RLR

2.1 Values for each direction of transmission

The maximum SLRs and RLRs given below in Table 1 mainly apply when the national system is predominantly analogue. When modernizing networks by digital techniques, efforts should be made to avoid having those maximum values for the national system.

TABLE 1/G.121

Nominal maximum LR_s recommended for national systems

Country size ^{a)}	No. of national ^{b)} circuits in the 4-w chain above the primary centre	0 dBr point		VASP	
		SLR	RLR	SLR	RLR
Average	Up to 3	16.5	13	20	9
Large	4	17	13.5	20.5	9.5
Large	5	17.5	14	21	10

a) See 3.1/G.101.
b) Analogue or mixed analogue/digital.

NOTE – When comparing these maximum values of LR_s with LR_s determined for existing networks some discrepancies may be found. If the actual LR_s are greater by 2 or even 3 dB this is no cause for concern. On the other hand, if a margin of 2 or 3 dB seems to appear, the permissible attenuation for subscriber lines should not automatically be increased. The first step should instead be to use the margin to improve the traffic-weighted mean values referred to in 1.2.

2.2 Difference in transmission loss between the two directions of transmission in national systems

The difference in nominal loss between the two directions of transmission on an international connection should not exceed 8 dB, preferably not 6 dB. It has been found practical to have a certain asymmetry in the nominal loss in the two directions of transmission in the national part of the connection. It is recommended that the difference between loss a-t and loss t-b (see Recommendation G.122) should be 3-9 dB.

In a national network where all 4-wire circuits are digital and extends down to the local exchange, this difference will be equal to the difference between the T and R pads in the local exchange (see Figure 1). Pads chosen by different Administrations are shown in Annex C.

The following points should be noted:

- 1) Bearing in mind that most administrations allocate the losses of their national extension circuits in much the same sort of way connections set up in practice should not exhibit differences much in excess of 3 dB.
- 2) As far as speech transmission is concerned, from the studies carried out by several Administrations in 1968-1972, it is clear that for connections with overall LR_s falling within the range found in practice, no great disadvantage attaches to any reasonable difference in LR between the two directions of transmission.
- 3) When devising national transmission plans, Administrations should take into account the needs of data transmission between modems complying with the pertinent Recommendations.