INTERNATIONAL TELECOMMUNICATION UNION

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THE INTERNATIONAL
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CONSULTATIVE COMMITTEE

N.1

(11/1988)

SERIES N: MAINTENANCE OF INTERNATIONAL SOUND – PROGRAMME AND TELEVISION TRANSMISSION CIRCUITS

International sound-programme transmissions – Definitions

Definitions for application to international sound-programme transmissions

Reedition of CCITT Recommendation N.1
published in the Blue Book, Fascicle IV.3 (1988)

NOTES

1 CCITT Recommendation N.1 was published in Fascicle IV.3 of the *Blue Book*. This file is an extract from the *Blue Book.* While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

Recommendation N.1

DEFINITIONS FOR APPLICATION TO INTERNATIONAL SOUND-PROGRAMME TRANSMISSIONS [1), 2)]

The following definitions apply to the maintenance of international sound-programme transmissions. Other definitions are used for other purposes, e.g., an international sound-programme link and international multiple destination sound-programme link as defined in §§ 11 and 12 respectively below, are within the definition of an international sound-programme circuit as defined by the CMTT.

Note 1 – It is intended that the definitions given in Recommendations N.1 and N.51 should remain identical, so far as is practical, by use of only simultaneous amendments.

Note 2 – A sound-programme circuit section, circuit, link or connection is considered to be permanent for maintenance purposes if it is always available for use when required, whether or not it is continuously in use. Such a circuit may be used for the purposes of occasional transmission, that is, transmissions of short duration, e.g. less than 24 hours, or it may be used for a long duration, i.e. one day or more. A permanent sound-programme connection between broadcasting organizations' premises may be used at any time, except only for periods of maintenance as agreed between the Administrations and broadcasting organizations concerned.

A sound-programme circuit section, circuit, link or connection is considered to be temporary for maintenance purposes when it has no existence outside the period of transmission (including line-up and testing time) for which it is required.

1 international sound-programme transmission

The transmission of sound signals over the international telecommunication network for the purpose of interchanging sound-programme material between broadcasting organizations in different countries.

2 broadcasting organization

A broadcasting organization is an organization which is concerned with either or both sound and television broadcasting. Most of the customers ordering facilities for sound-programme and television transmission are broadcasting organizations; for convenience, the term broadcasting organization is used to denote the activity of any user or customer and, where so used, it is equally applicable to any other customer requiring sound-programme or television transmissions.

3 broadcasting organization (send)

The broadcasting organization at the sending end of an international sound-programme transmission.

4 broadcasting organization (receive)

The broadcasting organization at the receiving end of an international sound-programme transmission.

5 international sound-programme centre (ISPC)

A centre at which at least one international sound-programme circuit (see § 9) terminates and in which international sound-programme connections (see § 13) can be made up by the interconnection of international and national sound-programme circuits.

The responsibility of an ISPC is given in Recommendation N.5.

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1) Definitions in this Recommendation apply both to analogue and digital systems.

2) Annex A to this Recommendation gives definitions for units of measurements for sound-programme transmissions.

6 national sound-programme centre (NSPC)

A centre at which two or more national sound-programme circuits terminate and at which national sound-programme circuits may be interconnected.

7 sound-programme circuit section

The unidirectional national or international sound-programme transmission path between two stations at which the programme is accessible at audio frequencies. The transmission path may be established via terrestrial or single destination satellite routing. (See Note 2 above and Figures 1/N.1 and 3/N.1.)

8 international multiple destination sound-programme circuit section

The unidirectional sound-programme transmission path from one frontier station to two or more of the frontier stations at which interconnection is made at audio frequencies. (See Note 2 above and Figure 4/N.1.)

9 international sound-programme circuit

The transmission path between two ISPCs which comprises one or more sound-programme circuit sections (national or international), together with any necessary audio equipment. The transmission path may be established via terrestrial or single destination satellite routing. (See Note 2 above and Figures 1/N.1 and 3/N.1.)

10 international multiple destination sound-programme circuit

The unidirectional transmission path from one ISPC to two or more other ISPCs comprising sound-programme circuit sections (national or international) one of which is an international multiple destination circuit section, together with any necessary audio equipment. (See Note 2 above and Figure 4/N.1.)

11 international sound-programme link

The unidirectional transmission path between the ISPCs of the two terminal countries involved in an international sound-programme transmission. The international sound-programme link comprises one or more international sound-programme circuits (see Figures 1/N.1 and 3/N.1 below) interconnected at intermediate ISPCs. It can also include national sound-programme circuits in transit countries. (See Note 2 above and Figure 2/N.1.)

12 international multiple destination sound-programme link

The unidirectional transmission path between the ISPCs of the terminal countries involved in an international multiple destination sound-programme transmission. The international multiple destination sound-programme link comprises international sound-programme circuits, one of which is an international multiple destination sound-programme circuit. (See Note 2 above and Figure 5/N.1.)

13 international sound-programme connection

The unidirectional transmission path between the broadcasting organization (send) and the broadcasting organization (receive) comprising the international sound-programme link extended at its two ends over national sound-programme circuits to the broadcasting organization. (See Note 2 above and Figure 2/N.1.)

14 international multiple destination sound-programme connection

The unidirectional transmission path between the broadcasting organization (send) and two or more broadcasting organizations (receive) comprising the international multiple destination sound-programme link extended at its ends over national sound-programme circuits to the broadcasting organizations. (See Note 2 above and Figure 5/N.1.)

15 send reference station

The transmit sub-control station of an international multiple destination sound-programme circuit section (see § 8), circuit (see § 10) or link (see § 12). (See Figures 4/N.1 and 5/N.1.)

16 effectively transmitted signals in sound-programme transmission

For sound-programme *transmission*, a signal at a particular frequency is said to be effectively transmitted if the nominal overall loss at that frequency does not exceed the nominal overall loss at 800 Hz by more than 4.3 dB. This should not be confused with the analogous definition concerning telephone circuits given in the Recommendation cited in [1].

For sound-programme *circuits*, the overall loss (relative to that at 800 Hz) defining effectively transmitted frequency is 1.4 dB, i.e. about one third of the allowance.

17 types of sound-programme circuit [3)]

The various types of international sound-programme circuit or sections of such circuits should be referred to by quoting the top nominal frequency, in kHz, effectively transmitted.

Example: 10-kHz sound-programme circuit.

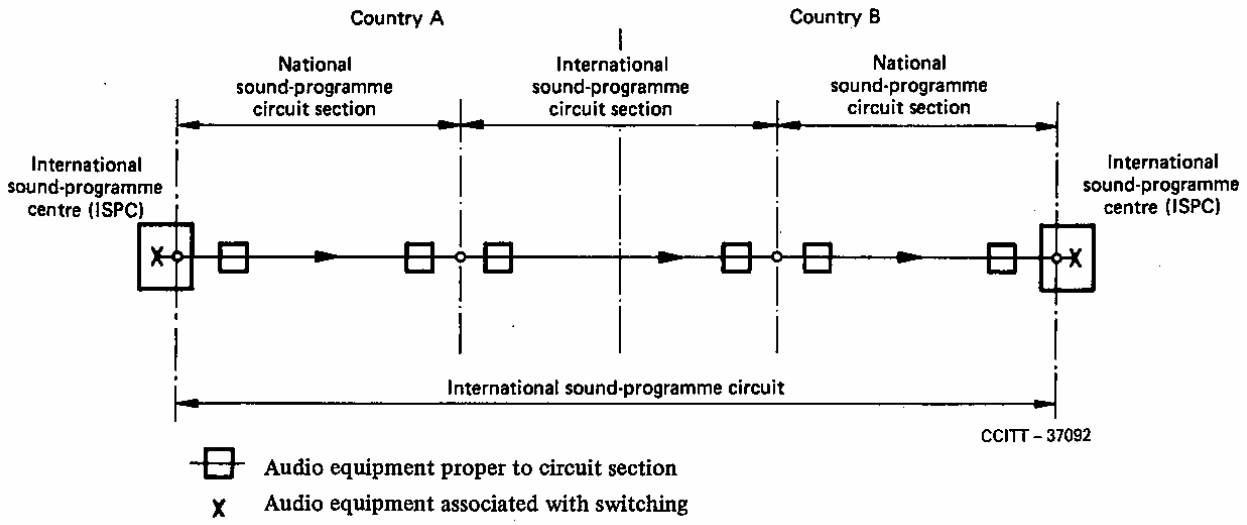

FIGURE 1/N.1

An international sound-programme circuit composed of two national and one international sound-programme circuit-sections

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[3)] To reduce problems in ordering and charging for sound-programme circuits, Study Group II has a classification of circuits based on their approximate bandwidth (see the Recommendation cited in [2]).

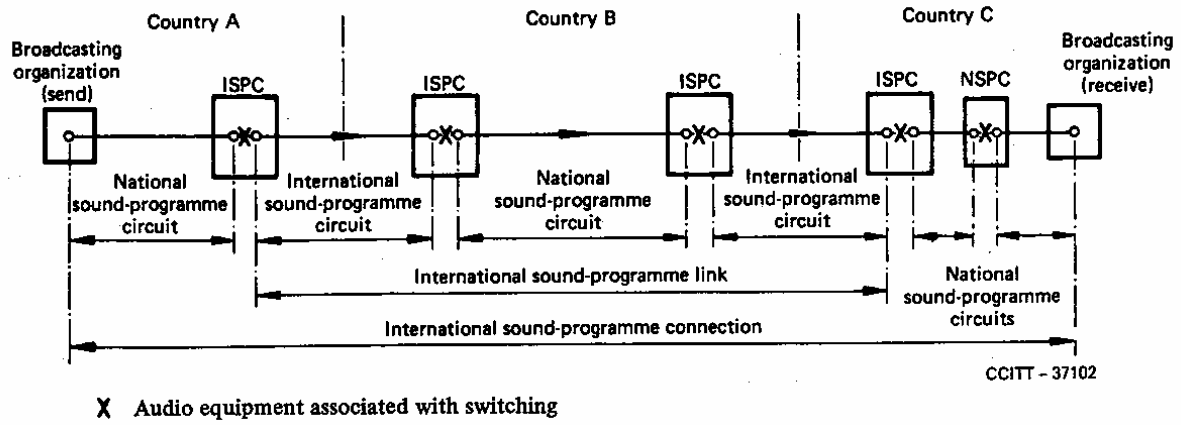


FIGURE 2/N.1

An international sound-programme link composed of international and national sound-programme circuits and extended on a national sound-programme circuit at each end to form an international sound-programme connection

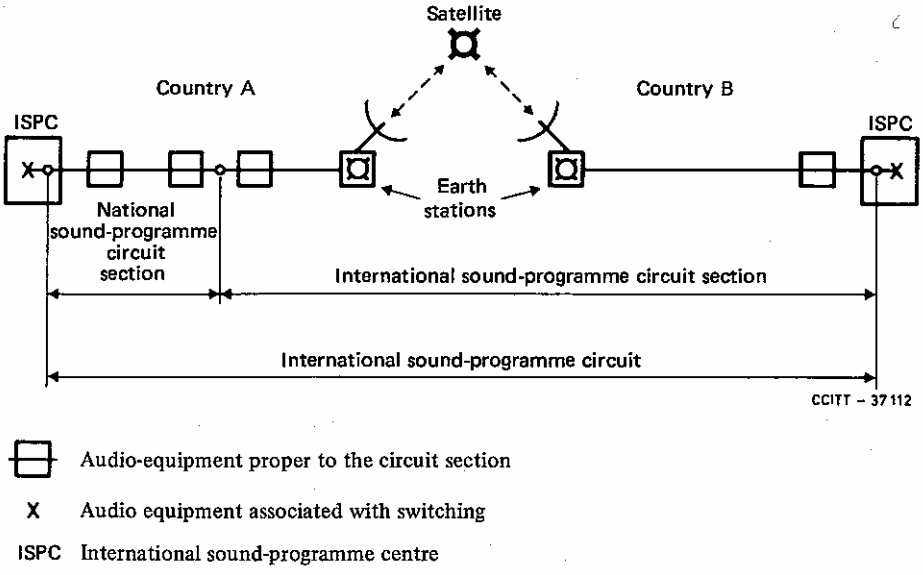
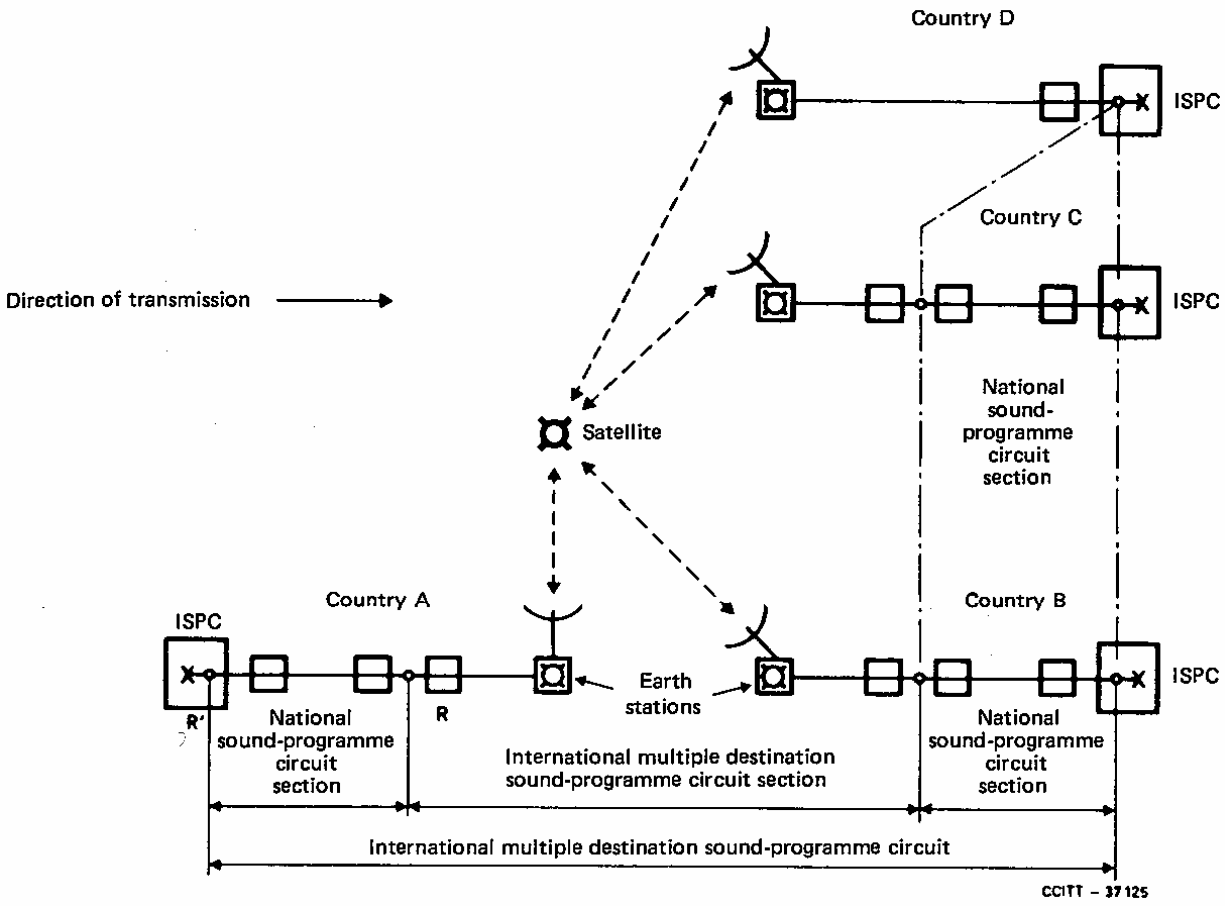


FIGURE 3/N.1

Single-destination international sound-programme circuit routed via a communication satellite system



Audio equipment proper to a circuit section

X Audio equipment associated with switching

ISPC International sound-programme centre

R *Send reference* station for the multiple destination international sound-programme circuit section

R' *Send reference* station for the multiple destination international sound-programme circuit

FIGURE 4/N.1

International multiple destination sound-programme circuit routed via a communication satellite system

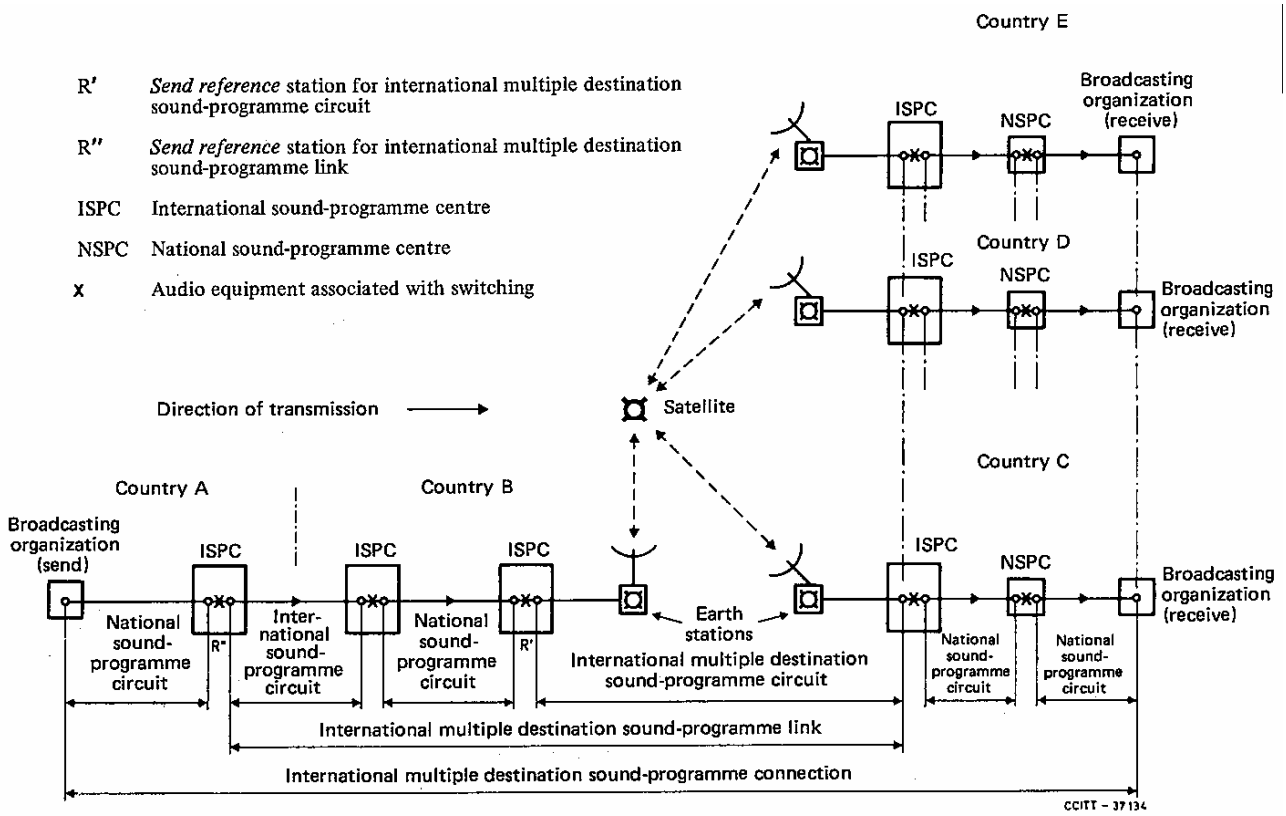


FIGURE 5/N.1

International multiple destination sound-programme link extended to form a connection routed via a communication satellite system

ANNEX A [4)]

(to Recommendation N.1)

Level and loss units used for sound-programme and television transmission

A.1 *Use of dB units in N Recommendations*

This Recommendation gives the quantities and units for sound-programme transmissions used in N Recommendations and is in accordance with existing Recommendations [3], [4].

A.2 *Units used*

A.2.1 **absolute power level (dBm)**

As a general rule, the dBm unit applies to the absolute power level. The unit is based on the ratio between measured power and the reference power of 1 mW.

$$\underbrace{L_m = 10 \log \frac{P}{P_0}\ \text{dBm} = 10 \log \frac{(U^2/Z)}{(U_0^2/Z_0)}\ \text{dBm}}_{\text{Absolute power level}} = \underbrace{\left(20 \log \frac{U}{U_0}\right.}_{\substack{\text{Absolute} \\ \text{voltage} \\ \text{level}}} \underbrace{\left. - 10 \log \frac{Z}{Z_0}\right)}_{\substack{\text{Impedance} \\ \text{correction}}}\ \text{dBm}$$

Absolute voltage levels, for which terminal impedance is not defined, are more rarely used. As a correction, power level may be calculated for impedances other than 600 ohms, with respect to 1 mW.

The power level thus calculated would be equal to that measured in a correctly terminated system.

A.2.2 **relative level (dBr)**

The relative power level of a point in a transmission system is the nominal power gain at the reference frequency from a reference point to the point considered. The same consideration is used for the relative voltage level in a transmission system based on voltage levels.

Relative levels can be used to compare two or more points of a network with respect to power (or voltage). One point of a network is usually defined as the reference point at 0 dBr, from which other measurement points are derived.

For sound-programme circuits, the zero relative level is located at the injection point, i.e. usually at the transmission point of a sound-programme circuit.

A.2.3 **absolute zero power level (dBm0) (load level [5)])**

In a transmission system based on power levels the absolute power level or load level (L_{m0}) with respect to 1 mW is referred to a point of zero relative level. That means that the absolute power level (L_m) minus the relative power level (L_r) will be

$$L_{m0} = L_m - L_r$$

This level indication is independent of the relative power level at the measurement point considered. For a given signal the load level is nominally the same along a transmission line. For this indication it is necessary to know to what extent the power at the zero relative point is greater or less than the reference power.

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4) It is intended that the text contained in this annex will be further studied and refined as necessary.

5) The term “load level” is used provisionally and is subject to further consideration.

A.2.4 *Relation between quantities and units*

There is a fixed relation between level quantities and units, namely:

Absolute power level = relative power level + absolute zero power level (load level)

$$L_m = L_r + L_{m0}$$

Therefore, for the level units: a dBm = b dBr + c dBm0.

When indications are given concerning the line signal, the absolute zero power level (load level) (dBm0) is given, at which, at the relative zero point, the absolute power level coincides with the relative power level.

$$L_m = L_{m0}, \quad \text{for} \quad L_r = 0$$

In order to simplify the specification of the level of a circuit or a system, it is most appropriate to specify the absolute power level which coincides with the relative zero power level. Thus this absolute power level and the absolute zero power level (load level) are the same.

A.2.5 *Weighted level*

Power level of disturbing signals are as a rule expressed in the same units as those defined above. For noise measurements made by a weighting filter (psophometric measurements), a "p" (for "pondéré" = weighted) is added to the units, e.g., dbm0p, dBmp.

A "q" indicates a quasi-peak value where the "m" is replaced by a "q" which, for instance, in dBm gives dBq.

A.2.6 *Extra indications*

Sound-programme transmission level units are indicated by an extra "s" (s for sound): dBrs, dBm0s, dBm0ps, dBq0pS.

Extra indications for units should be used whenever they facilitate understanding so as to prevent confusion when differing measurement techniques, weighting filters or meters are used.

A.3 *Various measuring instruments*

Absolute power level (in dBm) is obtained if a measurement is made on a terminated line.

Various measurement instruments provide measurements related to a (freely) preselected relative level value. The measurement will then directly express the absolute zero power level (load level).

A.4 *Practical problems*

There is a wide range of measuring instruments used at different measurement points, so that differences are always bound to appear. A state which every Administration is prepared to define is the permitted maximum level (PML). Despite different relative power levels, depending on the systems, a direct relation can now be indicated between the value of the level to be measured and the PML in dB. If, for instance, a signal of 21 dB below the PML is transmitted as a measurement signal, it must also be received as a signal 21 dB below PML, independently of local relative levels, which may differ according to systems and Administrations.

References

[1] CCITT Recommendation *General performance objectives applicable to all modern international circuits and national extension circuits*, Vol. III, Rec. G.151, Note 1, § 1.

[2] CCITT Recommendation *Occasional provision of circuits for International sound- and television-programme transmissions*, Vol. II, Rec. D.180, § 3.

[3] CCITT Recommendation *Use of the decibel and neper in telecommunications*, Vol. I, Rec. B.12.

[4] CCIR Recommendation *Use of the decibel and neper in telecommunications*, Vol. XIII, Rec. 574, ITU, Geneva, 1986.

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