



INTERNATIONAL TELECOMMUNICATION UNION

# ITU-T

# G.423

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**INTERNATIONAL ANALOGUE CARRIER SYSTEMS**

**GENERAL CHARACTERISTICS OF INTERNATIONAL  
CARRIER TELEPHONE SYSTEMS ON  
RADIO - RELAY OR SATELLITE LINKS AND  
INTERCONNECTION WITH METALLIC LINES**

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**INTERCONNECTION AT THE BASEBAND  
FREQUENCIES OF FREQUENCY - DIVISION  
MULTIPLEX RADIO - RELAY SYSTEMS**

**ITU-T Recommendation G.423**

(Extract from the *Blue Book*)

## NOTES

1 ITU-T Recommendation G.423 was published in Fascicle III.2 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.

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## INTERCONNECTION AT THE BASEBAND FREQUENCIES OF FREQUENCY-DIVISION MULTIPLEX RADIO-RELAY SYSTEMS<sup>1), 2)</sup>

(amended at Geneva, 1964)

### 1 General principles

The CCIR issued Recommendations 380 [1] and 381 [2] so that, as far as possible, radio-relay links using frequency-division multiplex should have characteristics which allow direct interconnection at baseband frequencies with systems of the same capacity on metallic lines having the same line frequencies.

Direct interconnection is advantageous, for example, in the following cases:

- 1) at a junction between a system on metallic lines and a radio-relay system of the same capacity, when it is not required to extract groups of telephone channels;
- 2) at a junction point between a radio-relay system and a short cable extension (see § 3 below). A cable extension is regarded as "short" if it does not require its own line-regulating system.

The pre-emphasis characteristics at the output of cable system repeaters have not been fully standardized by the CCITT. Moreover, line transmission in a repeater section of a system has various special features due, for example, to the presence of various pilots and to the power feeding of the repeaters. Further, points *R* and *T* defined in Recommendation G.213 may be very near to each other, or they may be linked by several kilometres of cable.

For these reasons, it is unnecessary to provide a direct interconnection of a telephony radio-relay link with either a symmetric cable pair or coaxial cable for a telephone system, such that the input and output levels of the relay link correspond exactly to the normal levels at the input and output of a repeater in the cable system. It is preferable to make the interconnection at a point in the telephone equipment where the level is independent of the frequency. Consequently, interconnection with multiplex telephone equipment in the baseband of a radio-relay link (which in accordance with CCIR Recommendation 381 [2] is always considered to be at one end of the line-regulating section on a radio-relay link) should always be effected in a main repeater station<sup>3)</sup>. Interconnection with another system whether cable or radio-relay link will be effected in this station between points *T* and *T'* defined in Recommendation G.213.

### 2 Baseband frequency limits, impedance and relative power levels

CCIR Recommendation 380 [1] includes a table which shows preferred values given by the CCIR for the following:

- baseband frequency limits;
- nominal baseband impedance;
- input and output relative power levels at the radio equipment (*R'* and *R*);

together with an annex on definitions which corresponds to CCITT' Recommendation G.213.

<sup>1)</sup> Brought up to date by the Secretariat after the Plenary Assembly of Mar del Plata, 1968.

<sup>2)</sup> Similarly to the corresponding CCIR Recommendations, this Recommendation applies to line-of-sight and near line-of-sight radio-relay systems and also to tropospheric scatter systems of the capacities concerned.

<sup>3)</sup> Described in § 3.18 of Recommendation G.211.

Table 1/G.423 shows the frequency arrangements, corresponding to the baseband frequency limits in CCIR Recommendation 380 [1], recommended by the CCITT for radio-relay systems that may be interconnected with metallic lines. These frequency arrangements are produced by CCITT standardized frequency-translating equipments for cable systems.

Figures 1/G.423 to 10/G.423 show diagrams of the frequency arrangement for the radio-relay baseband, recommended for purposes of interconnection with coaxial cable systems.

*Note 1* - All the diagrams in Figures 1/G.423 to 10/G.423 show the line pilots, the mastergroup pilots, the supermastergroup pilots, the 15-supergroup assembly pilots and the additional measuring frequencies which *may* be in the band transmitted (see § 3).

*Note 2* - The meaning of the symbols used in these Figures is given at the beginning of this fascicle.

*Note 3* - Some of the diagrams in the figures of other Recommendations also apply to radio-relay links (see Table 1/G.423).

### 3 Regulated-line sections - line-regulating and other pilots

In CCIR Recommendation 381 [2], the following pilots are recommended for the regulation of radio-relay links:

- 1) a continuity pilot outside the "total bandwidth" shown in Table 1/G.423;
- 2) a line-regulating pilot with a frequency of 308 kHz (or 60 kHz, depending on the radio-link capacity), and a level of -10 dBm0;
- 3) when required, an upper line-regulating pilot of frequency and level in accordance with CCITT Recommendations for the relevant cable systems.

#### 3.1 Pilot-blocking at an interconnection point

The CCITT makes the following general recommendations to the CCIR: in all cases, the level of the continuity pilot of a radio-relay system should be reduced so that it is not greater than -50 dBm0 at an interconnection point with a system on a metallic line.

This interconnection point normally occurs at the limits of two regulated-line sections, one of them being on a metallic line and the other on a radio-relay system. This being so, at the interconnection point the following conditions should be observed:

- 1) the level of any line-regulating pilot on the metallic line should be reduced so that it is not greater than -50 dBm0, unless otherwise agreed by the Administrations concerned;
- 2) the absolute power level of any regulating pilot of the radio-relay link should be reduced so that it is below -50 dBm0<sup>4)</sup>;
- 3) any other pilot or additional measuring frequency of the metallic line system that is within the "total bandwidth" defined in Table 1/G.423 will be freely transmitted over the radio-relay system.

A radio-relay system may be extended by short cable sections that form part of the same regulated-line section: there may then be overall transmission of the pilot on that regulated-line section.

<sup>4)</sup> In the case of low-capacity systems (up to 120 channels) a line-regulating pilot of 60 kHz with a level of -10 dBm0 may be used; in this case the suppression level should conform with the provisions of the CCITT (Recommendation G.243 and Recommendation G.322, § 1.4). The level of the line-regulating pilot established by the CCITT for lines differs according to whether it concerns coaxial cables or symmetric pairs (-10 dBm0 for coaxial cables and -15 dBm0 for symmetric pair systems).