



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

G.343

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

**INTERNATIONAL ANALOGUE CARRIER SYSTEMS
INDIVIDUAL CHARACTERISTICS OF
INTERNATIONAL CARRIER TELEPHONE SYSTEMS
ON METALLIC LINES**

**4 MHz SYSTEMS ON STANDARDIZED
1.2/4.4 mm COAXIAL CABLE PAIRS**

ITU-T Recommendation G.343

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation G.343 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.

Recommendation G.343

4 MHz SYSTEMS ON STANDARDIZED 1.2/4.4 mm COAXIAL CABLE PAIRS

(Geneva, 1964; further amended)

Preliminary note

The present Recommendation describes a system designed to carry a maximum of 960 carrier telephone channels on a 1.2/4.4 mm coaxial pair (see Recommendation G.622).

A system of this kind is produced by halving the length of the repeater section of a 1.3 MHz system (as described in Recommendation G.341) if this length is 8 km, corresponding to a nominal repeater spacing of 4 km for a 4 MHz system.

1 Line frequencies

The CCITT recommends the two plans in Figure 1/G.343. Plan 1 shows the supergroup allocations and Plan 2 the mastergroup allocations.

It may be desirable to make provision for the through-connection of entire mastergroups or a supermastergroup to this system. This can be effected in accordance with the frequency arrangement of Plan 2 in Figure 1/G.343.

Plan 2 uses the three lowest mastergroups in the 12 MHz system on a 2.6/9.5 mm coaxial pair. It permits, in particular, direct interconnection with a 12 MHz coaxial system using the Plan 1A frequency allocation shown in Figure 1/G.332 and with a radio-relay link of 900 or 1800 channels operated according to Recommendation G.423 (Figures 4/G.423 and 8/G.423).

2 Pilots and additional measuring frequencies

2.1 Line-regulating pilots

The frequencies recommended for the various cases indicated in § 1 above and shown in Figure 1/G.343 are as follows:

Plan 1 - The CCITT recommends the use of the following frequencies:

- i) 60 kHz or 308 kHz for the lower line-regulating pilot;
- ii) 4092 kHz or 4287 kHz for the upper line-regulating pilot.

However, each Administration, when so requested by another Administration, should permanently send a line-regulating pilot at 4287 kHz.

Plan 2 - The line-regulating pilots recommended in Recommendation G.332 for the 12 MHz system in the same frequency band.

In every instance, the recommended stability is $\pm 1 \times 10^{-5}$, the power level recommended is -10 dBm0, while the tolerances at this level are the same as in Recommendation G.332, § 2.1. The harmonics of the 60 and 308 kHz pilot should each have a level not higher than -70 dBm0.

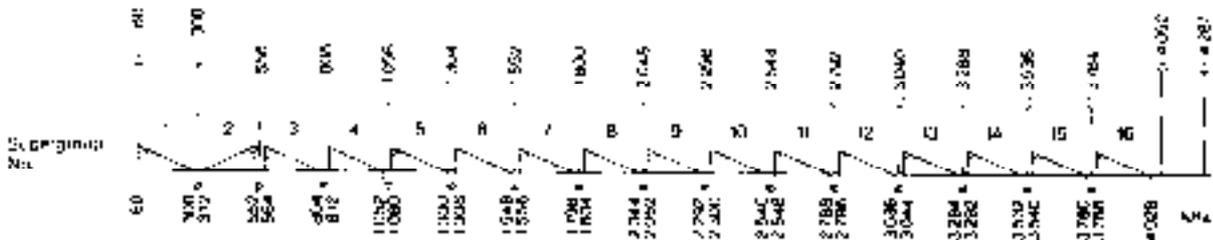


Fig. 1
a) Supergroup allocation

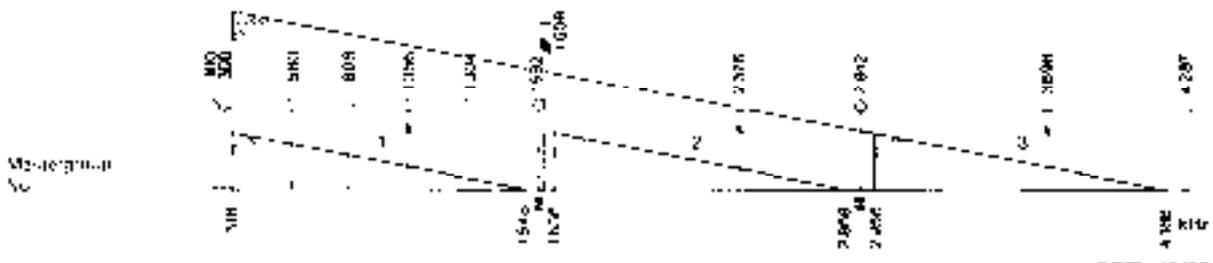


Fig. 2
b) Mastergroup allocation

FIGURE 1-C.343
Allocation of line frequencies in international 4 MHz carrier system on 12-14 mm coaxial pairs

2.2 Frequency comparison pilots

Plan 1 - For a national routine frequency check as described in Recommendation G.225, a frequency of either 60 kHz or 308 kHz may be used for the frequency-comparison pilot.

The power level of a frequency-comparison pilot should be adjusted at the output of the transmit amplifier, to a nominal value of -10 dBm0. The harmonics of the frequency-comparison pilots should each have a level not higher than -70 dBm0.

The frequency 1800 kHz is provisionally reserved for international frequency comparisons, as required. However, if the Administrations concerned so desire, this frequency 1800 kHz may be used for the frequency-comparison pilot.

Administrations concerned with an international carrier system on coaxial cable may agree to use (if they consider it desirable) one of the lower line-regulating pilots (either 60 or 308 kHz) for level control as well as for frequency checking.

In any case, it is desirable that one of the following two solutions should always be applied, so as to allow the line-regulating pilots to be used at the same time for frequency checking:

- provide, in each regulated-line section, a master oscillator which is regularly compared, directly or indirectly, with a national frequency standard;
- if there is no master oscillator in a regulated-line section, then beyond the junction between the two regulated-line sections considered, reintroduce the lower line-regulating pilot coming from the previous section, after its level has been stabilized.

Generally speaking, it is possible for one pilot to have two or more functions if the Administrations concerned so decide.

Plan 2 - The same recommendation as for the 12-MHz system (Recommendation G.332, § 2.2).

2.3 *Additional measuring frequencies*

Plan 1 - Frequencies that may be used are the following:

60, 308, 556, 808, 1056, 1304, 1552, 1800, 2048,
2296, 2544, 2792, 3040, 3288, 3536 and 3784 kHz.

The recommended accuracy for the frequency of these signals is ± 40 Hz. The power level of these additional measuring frequencies should be adjusted at the output of the transmit amplifier to have a nominal value of -10 dBm0.

The harmonics of the additional measuring frequencies below 2.1 MHz should each have a level at this point not higher than -70 dBm0.

Plan 2 - The additional measuring frequencies recommended for the 12-MHz system in the same frequency band should be used (Recommendation G.332).

3 **Hypothetical reference circuits**

The hypothetical reference circuit depends on the line frequency arrangement.

With the supergroup arrangement, the first hypothetical reference circuit for the 1.3 MHz system, described in Recommendation G.341, § 3.1, is to be used.

With the mastergroup arrangement, the circuit to be used is:

- either the second hypothetical reference circuit for the 1.3 MHz system, described in Recommendation G.341, § 3.2,
- or the first hypothetical reference circuit for the 12 MHz system, described in Recommendation G.332, § 3.1.

4 **Noise**

Recommendation G.341, § 4 applies.

5 **Matching of the coaxial-pair impedance and repeater impedances**

For an elementary cable section above 4 km in length the sum N of the three terms defined in Recommendation G.332, § 5 must be at least equal to the following:

- 50 dB at 60 kHz,
- 57 dB above 300 kHz,

with linear variation from 50 dB to 57 dB in the 60-300 kHz band, in the case of a linear frequency scale.

Note - These values are based on the assumption that the attenuation/frequency characteristic does not show any ripple exceeding ± 1 dNp (about ± 1 dB) at the end of a homogeneous section 280 km long. A relaxed condition was applied at 60 kHz, as it may be difficult at low frequencies to obtain a reflection coefficient for the repeater input and output impedances which is sufficiently small in relation to the impedance of the cable.

6 Relative levels and interconnection

6.1 Relative level at amplifier output

- at 4028 kHz: - 9 dBr, or
- at 4287 kHz: - 8.5 dBr.

6.2 Pre-emphasis characteristic

This is defined by the formula:

$$A = 10 \log_{10} \left[1 + \frac{a}{1 + \frac{b}{\left(\frac{f}{f_r} - \frac{f_r}{f}\right)^2}} \right] \text{ (dB)}$$

in which the constants are so selected as to give between 9 and 11 dB of pre-emphasis.

Both of the sets of values below meet this requirement:

- 1) $a = 10$ $b = 3$ $f_r = 4.7$ MHz
- 2) $a = 11.25$ $b = 1.56$ $f_r = 4.4$ MHz

6.3 Interconnection in a frontier section of two systems in which the elementary cable sections are of the same nominal length (this is true of two 4 MHz systems, and also of two 6 MHz systems)

As the relative line levels and the pre-emphasis characteristic are already covered by recommendations, the interconnection of two systems in a frontier section will not give rise to any great difficulty in this case. The Administration on the receiving side can receive the other Administration's line levels provided minor adjustments are made in the first main repeater station (for details, see Recommendation G.352).

6.4 Interconnection of a 4 MHz and a 6 MHz system in a frontier section

In the absence of a special agreement between Administrations, the method described in Recommendation G.352 should be applied in this case.

6.5 Interconnection at a main station

See Recommendation G.213.

7 Power-feeding and alarm systems

Recommendation G.341, § 7) also applies to systems conforming to the present Recommendation.