INTERNATIONAL TELECOMMUNICATION UNION

ITU-T G.442

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 LINKS

RADIO - RELAY SYSTEM DESIGN OBJECTIVES FOR NOISE AT THE FAR END OF A HYPOTHETICAL REFERENCE CIRCUIT WITH REFERENCE TO TELEGRAPHY TRANSMISSION

ITU-T Recommendation G.442

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation G.442 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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Recommendation G.442

RADIO-RELAY SYSTEM DESIGN OBJECTIVES FOR NOISE AT THE FAR END OF A HYPOTHETICAL REFERENCE CIRCUIT WITH REFERENCE TO TELEGRAPHY TRANSMISSION

(modified at Geneva, 1964)

As is shown in Recommendation G.222, if the intention is to use on radio links, amplitude-modulated voice-frequency telegraph equipment for 50 bauds conforming to Series R Recommendations, then in order to obtain telegraph connections with the quality indicated in Recommendation F.10 [1], the design of these radio links should include the objectives recommended for telephone transmission and signalling and, in addition, should include the objectives set out below:

On any telephone channel constituted in accordance with the hypothetical reference circuit for the type of radio link considered, the unweighted noise power, measured or calculated with a time-constant (integrating time) of 5 ms and referred to a zero relative level point, should not exceed 10^6 pW0 during more than 10^{-5} (i.e. 0.001%) of any month, nor more than 0.1% of any hour.

Provided that short bursts of high-level noise due to causes other than propagation have been reduced to negligible proportions, and assuming that the fine structure of the noise is the same as white noise, it is assumed that, in designing line-of-sight radio links, the objective during any month is in practice equivalent to the following objective:

The unweighted noise power on a telephone channel at a zero relative point, calculated from measurements made with an integrating time of 1 second, should not exceed 2×10^5 pW0 for more than 10^{-4} (i.e. for more than 0.01%) of any month.

With regard to the objective to be met during any hour, it may happen that on certain radio links unforeseen exceptional propagation conditions may result in this objective not being met during certain most unfavourable hours. These hours, called "hours of interrupted telegraph traffic", will be those during which a noise level of 10^6 pW0 is exceeded for more than 36 seconds.

Every effort should be made to reduce the number of such hours to a very small fraction of the total time. Since it follows from the recommended objective for telephone signalling that the 5 ms unweighted noise power should not exceed 10^6 pW0 during more than 10^{-4} (i.e. 0.01%) of any month, there should never be more than seven "hours of interrupted telegraph traffic" during a month.

It may then be expected that the telegraph service will be satisfactory. Nevertheless, to achieve this object, it may be necessary in certain cases to select the channels allocated to amplitude-modulated voice-frequency telegraphy for 50 bauds from among those which are the least sensitive to propagation noise.

Note 1 - Use of a measuring instrument having a 5-ms time constant (integrating time) is recommended so as to detect, in particular, the presence of short high-level noise bursts, such as those caused by power supplies and by the equipment. Administrations should take all possible practical steps to eliminate such noise.

It is expected that on the majority of line-of-sight radio links (if not on all) it will be possible to reduce short noise bursts to negligible proportions, and that for the majority of radio links, any remaining short high-level noise bursts will be due to propagation. Noise surges having a mean power in excess of about 10^5 pW0 will then last from 1 to 10 seconds and will have an approximately constant level during this period. Under these conditions, for propagation measurements and preliminary design measurements for radio links, instruments having a time constant (integrating time) of 1 second could be used.

Note 2 - The fraction 10^{-5} of a month, for a 2500-km circuit, leads to impracticably small fractions of the time for shorter circuits (for example, 10^{-6} for a 250-km circuit). It is for this reason that the practical objective refers to a greater fraction of the time (10^{-4} for 2500 km), together with a reduced power (2×10^5 pW0), the latter measured with a time constant (integrating time) of 1 second.

Reference

[1] CCITT Recommendation *Character error rate objective for telegraph communication using 5-unit start-stop equipment*, Vol. II, Rec. F.10.