Radiocommunication Study Groups

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PROPOSED AMENDMENTS TO SECTION 4.12.5 "MEASUREMENTS IN THE OUT-OF-BAND DOMAIN" OF THE ITU HANDBOOK ON SPECTRUM MONITORING

Introductory remarks

The proposed material is intended for consideration by the Rapporteur Group of WP 1C for the development of a new edition of the ITU Handbook on Spectrum Monitoring.

Section 4.12.5 of the ITU Handbook on Spectrum Monitoring presents two methods for measuring out-of-band emissions:

– the adjacent channel and alternate adjacent channel power method;

– the spectrum mask method.

However, Report ITU-R SM.2048 describes in detail another effective method, which is particularly attractive for that large group of emission classes for which out-of-band emission masks are not provided in the ITU-R documentation. It can be called the "fixed-levels measurement" method and consists of measuring the x-dB bandwidth values at levels of –40, –50 and –60 dB.

It seems appropriate to supplement section 4.12.5 with a reference to this method, and also to present in it some general provisions concerning the practical aspects of measuring out-of-band emissions at spectrum monitoring stations.

Proposals for amending section 4.12.5 of the Handbook are presented in the Annex.

Annex 1

ANNEX

PROPOSED AMENDMENTS TO SECTION 4.12.5

Measurements in the out-of-band domain

1) Amend section 4.12.5 as follows:

4.12.5 Measurements in the out-of-band domain

For most of the services, the result of the measurement of unwanted emissions is either expressed as the mean power (r.m.s.) emitted in channels other than the assigned channel, or in spectrum power density (or the power of discrete components) at frequencies above and below the limits of the necessary bandwidth. To determine the conformance of a signal regarding the out-of-band emissions, three different types of measurement could be defined:

– the adjacent channel and alternate adjacent channel power method;

– the spectrum mask method;

– the fixed-level measurement method.

These methods are described below.

Since out-of-band emissions are associated with low level spectral components of any class of emission at its both edges, special attention should be paid to the aspects of the influence of interference and noise on the measurement results in the conditions of operation of spectrum monitoring stations. In many cases, remote measurements cannot be carried out at all and measurements are required near the transmitters using mobile spectrum monitoring stations. And even in such circumstances difficulties with measurements may arise. In such cases may be useful the provisions given in Section 4 of Annex 2 to Recommendation ITU-R SM.443-4 concerning the measurement of x-dB bandwidth under conditions of interference.

It should also be taken into account that in spectrum monitoring conditions, measurements are carried out on signals of real messages and this may causes great variability of the reproduced spectra, including out-of-band ones, of a number of classes of emissions, especially single-channel ones under transmission of speech signals. Therefore, for better reproduction of the out-of-band spectrum envelope, it is desirable to use the "maximum hold" mode when reproducing a sufficiently large number of spectrum displays.

2) Sections 4.12.5.1 and 4.12.5.2– no change.

3) Introduce new section 4.12.5.3 as follows:

4.12.5.3 Fixed-levels measurements

Currently, spectrum masks are provided in the ITU-R documentation only for a relatively small number of used classes of emission. For the remaining classes, measurements of out-of-band emissions can be performed based on the measurement of the x-dB bandwidth values at fixed levels of –40, –50 and –60 dB in accordance with the data provided in Report ITU-R SM.2048-1. The Report contains tolerances for the bandwidth values at the specified levels for about 180 emission classes. Section 5 of the Report provides a detailed measurement methodology. Although it is presented for the case of measurements in stationary conditions using test signals, a number of its provisions, in particular those concerning the setting of zero reference levels and spectrum analyzer parameters, are also quite acceptable for spectrum monitoring conditions.

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