Russian Federation

PROPOSED REVISIONS TO REPORT ITU-R SM.2356-1

Procedures for planning and optimization of spectrum-monitoring networks in the VHF/UHF frequency range

Introductory remarks

Results of calculations according to procedures of planning and optimization of AOA spectrum monitoring networks in the VHF/UHF frequency band, presented in Report ITU-R SM.2356-1, show that there are always significant areas of unconfident monitoring coverage where the sites covered and not covered by monitoring are interspersed. This raises some difficulties in determining the actual borders of the confident coverage zones. It is desirable to separate sites in which there is a small field strength deficit and which can be attributed to the zone of a confident coverage by monitoring, from sites where there is a significant field strength deficit, these sites are really not covered and require increased attention.

It seems useful to add to Report ITU-R SM.2356-1 a new section devoted to the analysis of such unconfident monitoring coverage areas with a view to adjust coverage zone borders.

It is proposed:

1)   To include in Report ITU-R SM.2356-1 the new section 3.5 to read as follows:

3.5   Adjustment of coverage zone borders

From figures given in sections 3.1 – 3.4 above it is clearly seen that for each spectrum monitoring function, such as listening, measurement of emission parameters, DF and location, there are three distinct areas:

- a confident coverage zone (which may contain "holes" within itself and at the edges, i.e. where the coverage in accordance with calculations under selected parameters are not provided; the number of such uncovered sites may significantly increase in rugged and mountainous terrains);

- an unconfident coverage area where the sites covered and not covered by the monitoring are heavily interspersed; and

- the most remote area from the group of monitoring stations of a considered network where monitoring coverage is not provided at all.

The presence of pronounced areas of unconfident coverage by spectrum monitoring functions is explained by the following.

In addition to uncertainty in the conditions of radio wave propagation when using any propagation model, it is necessary to take into account the pronounced threshold nature of the border field strength values used in calculations. If the threshold field strength values used in calculations (for example, 0 dB for listening, 12 dB for measurements of emission parameters and 20 dB for DF according to Table 6.8-1 of the ITU Spectrum Monitoring Handbook, edition of 2011) are designated as *Et*, a site where the field strength is, for example, *Et* + 0.1 dB will belong to the coverage zone, and a site with *Et* - 0.1 dB will not be considered as to be covered. It is clear, however, that monitoring service conditions in sites with *Et* + 0.1 dB and *Et* - 0.1 dB are virtually identical.

Depending on the terrain, especially in hilly and mountain regions, variations in field strength on either side of its threshold values *Et* can occur within vast territories, even exceeding zones of the confident coverage. Each small hill or hollow within such territories may or may not be considered as to be covered, although the corresponding field strength values may differ by a tiny amount.

On the other hand, it is quite possible to have heavily shaded sites within which the field strength deficit is of a great value. It is desirable to identify such uncovered sites for separating them from areas with a small field strength deficit. Without that some uncertainty in the determination of the real coverage zone borders will remain.

In order to include in confident coverage zones some parts of unconfident coverage areas, having a small deficit of field strengths, which does not have a noticeable impact on the performance of monitoring functions and thus at least slightly increase confident coverage zones, it is recommended to additionally carry out control calculations with threshold field strength values equal to *Et* - Δ, where Δ is a value from 1 to 3 dB. Especially it concerns joint DF and location coverage zones where the monitoring is the most efficient. Thus, the user has to decide what exact value of such small deficit of the field strength is acceptable. However, it can be assumed that a value of Δ up to 3 dB can be used.

In order to identify sites of the territory that are potentially out of coverage inside or at the edges of confident coverage zones, it is possible to carry out control calculations with Δ equals to 6-9 dB. If these sites appear to be really out of coverage by fixed monitoring stations of the considered network, in the process of monitoring they need a particular attention, for example, more often to send inside them mobile monitoring stations or time to time placing therein transportable monitoring stations.

Details of the above analysis with relevant illustrations are presented in [7], there are also given instructions to reduce the indentation of coverage zone borders by smoothing them.

2)   *To include the following source in the References section:*

7.   Pavlyuk (Pavliouk) A.P., Plossky A.Y. Adjusting borders of coverage zones associated with various spectrum monitoring functions. Znanstvena Misel Journal, No 17, April 2018. http://www.znanstvena-journal.com/en/archive-2/ (In Russian, translation into English is available by the address: http://www.ircos.ru/en/articles.html)

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