

IDM Task Force

Draft document

The modified version of the document

«RECOMMENDATION.

***Estimation of electromagnetic and interference
environment at the point of location of
measurements in GNSS frequency bands»***

Dr. Stanislav Kizima

**ITU-expert, Deputy Director JOINT STOCK
COMPANY “SCIENTIFIC RESEARCH INSTITUTE OF
MICRO INSTRUMENTS-K”**

The purpose of recommendation:

The purpose of this Recommendation is to present a methodology of estimation of electromagnetic and interference environment at the point of measurements in GNSS frequency bands

This methodology can be used for spectrum protecting and interests of evaluation of propagation and reception conditions of GNSS signals

The recommendation was developed taking into account:

- 1. Peculiarity satellite navigation systems*
- 2. Peculiarity frequency band of GNSS*
- 3. Sensitivity of satellite navigation systems to the levels of electromagnetic noise and interference*

Direction of Recommendation:

- 1. Providing the solution of problems of monitoring of parameters of propagation medium and reception of GNSS signals.*
- 2. Operational analysis of the situation at the place of assessment.*
- 3. The actual detection of high levels of electromagnetic background noise and interference of propagation and reception of GNSS signals.*

Potential users of the Recommendation:

- *Operators of GNSS and organizations of responsible for solving problems of spectrum monitoring in frequency bands of GNSS*
- *Developers of technical equipment, complexes and systems of monitoring of parameters of propagation conditions and reception of GNSS signals*

The Recommendation technology:

- *Does not contradict the known approaches;*
- *Complements the known technology of radio monitoring.*

Known technology of radio monitoring:

- Known technology **is working** with one monitored emission (signal).
- Known technology **is working** in a narrow band of frequencies of the observed emission (signal).
- **The object of analysis** for known technologies are the parameters of the observed emission (signal).
- **The source data** for the known technologies is one received spectrum of the signal (emission).
- **The final result** for known technologies are parameters of emission and location of the observed radio source.

Novelty of Recommendation:

- The technology of Recommendation **is works** in a large frequency band with the entire set of observed emissions (signals).
- **The object of analysis** of Recommendation technology are the integral (generalized) parameters of entire set of observed emissions (signals) in a large frequency band.
- **The source data** for technology of Recommendation is plenty of spectra in the azimuthal directions with many of observed emissions (signals).
- **The final result** of the technology of Recommendation are General estimates about the presence of unwanted radio emissions and interference to the reception of GNSS signals.

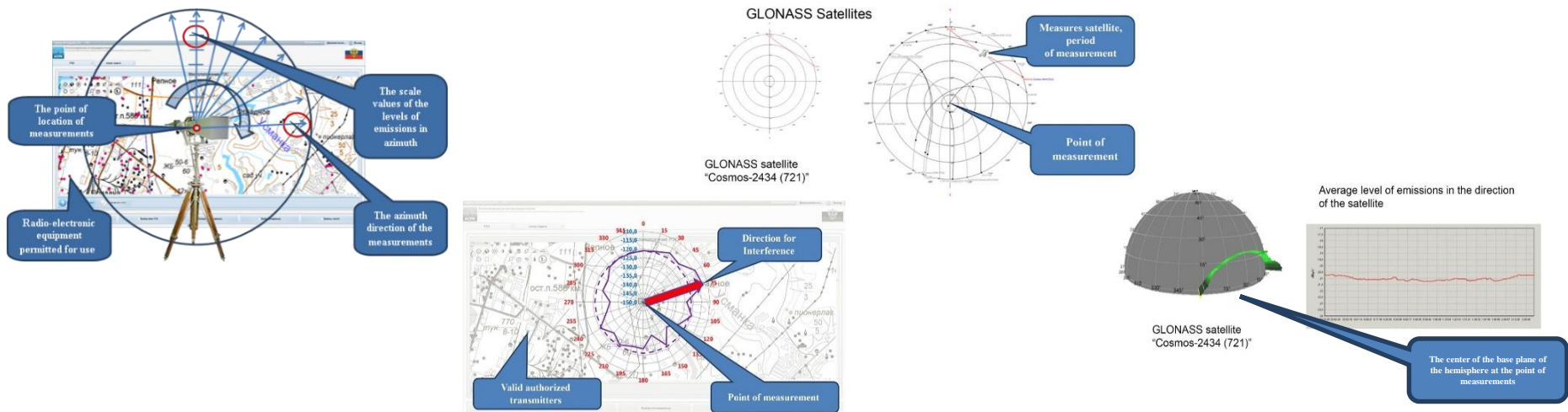
The main sections of the recommendations:

1. General description of technology of estimation of the electromagnetic environment and interference environment in the point of territory of measurements in GNSS frequency bands

1.1. Obtaining spectra of emissions and the definition of the generalized integral energy characteristics of total emissions in the observed radio band

1.2. Construction of diagrams of the spatial distribution of emissions and their directions of the arrival

1.3. Definition of criteria and production of General conclusions about the state of the electromagnetic and interference environment at the point of evaluation in a given band of radio frequencies



The main sections of the recommendations:

2. Requirements for radio monitoring equipment used to conduct measurements for the assessment of electromagnetic and interference environment in GNSS frequency bands

3. A practical example of measurement and assessment of electromagnetic and interference environment in a given frequency band at the point of measurements in the interest of spectrum protecting of GNSS

Final provisions

Reference documents

The draft Recommendation is based on reports from the ICG WG :

ICG Workshop on GNSS Spectrum Protection and interference Detection and Mitigation, Vienna, Austria 10 June 2015

presentation: *«Practical aspects of the evaluation of interference environment in the GNSS frequency bands. The analysis of the spatial distribution of emissions in the frequency bands of GNSS»*

ICG Experts Meeting on Global Navigation Satellite Systems Services. Vienna, Austria, 15 - 18 December 2015

presentation: *«On development of recommendations applicable to radio monitoring for the purposes of interference environment estimation in the radio frequency bands of GNSS»*

ICG WG-S. Global and Regional Navigation Satellite Systems, Signals and Services. Intersession Meeting. Vienna, Austria, 07-10 June 2016

presentation: *«On Development of Recommendations for estimation of electromagnetic environment and interference environment in GNSS frequency bands. Outline proposal on the Recommendations Content»*

The first version of the draft document:

- Was presented at the meeting IDM Task Force
10 May 2017 – ICG, IDM Task Force, Baska, Croatia - Presentation
- Was sent for consideration to the participants IDM Task Force
31 May 2017 - ICG, Sending first versions to participants IDM Force
- Was sent for consideration to the participants ITU WP 1C
*7 July 2017 - ITU, Working Party 1C «Spectrum monitoring»,
Presentation of the project (first version) document in a Report format*
- Was refined according to received comments and suggestions
*July - November 2017 - receive of comments and modification of the
project document*

The first version of the draft document:

Received comments and suggestions to the draft document

Comments and the proposed changes in document

All received comments and suggestions – 36

Substantive comments and suggestions:

<i>Addition</i>	<i>Explain, clarify</i>	<i>Editorial corrections</i>
2	22	12

The second version of the draft document:

- Was sent for consideration to the participants IDM Task Force
16 Nov 2017 - ICG, Sending second versions to participants IDM Force

Is propose:

- ❖ To continue work on the draft document. The second version draft document it is proposed to adopt for further consideration by IDM Task Force participants;
- ❖ It is proposed in the next step to consider the second version draft document and provide comments and suggestion;
- ❖ It is proposed at the next meeting IDM Task Force to consider the results of the work on the draft document;
- ❖ In case of positive results of the work and in case approval of the next draft document version at the next meeting IDM Task Force :

make the decision to give a draft document for consideration at the WG-S

In the draft decision of the IDM Task Force is invited to:

1. Take note of the report on the second version of the draft of document.
2. To the IDM Task Force to consider the second version of the draft document and to provide comments and suggestion.
3. To upgrade the draft document taking into account comments and suggestion.
4. The modified version of the draft document is to submit for consideration of the IDM Task Force.



International Committee on
Global Navigation Satellite Systems

Thank you for your attention

Dr. Stanislav Kizima
ITU-expert
Deputy CEO R&D centre for systems
and tools of measurement “Vector”
5314368@mail.ru
+7 916 531 43 68