

RECOMMENDATION ITU-R M.1634

Interference protection of terrestrial mobile service systems using Monte Carlo simulation with application to frequency sharing

(Question ITU-R 1/8)

(2003)

Summary

Sharing studies addressing the compatibility between different systems are often performed. Deterministic calculations, while being simple, do not always provide a complete picture of the interference scenarios that arise. This Recommendation refers readers to sources of information on the use of the Monte Carlo method of analysis and recommends the use of a probabilistic approach when assessing potential interference.

The ITU Radiocommunication Assembly,

considering

- a) that methodologies are needed for various types of information transmission to assure consistent use of parameters and their values for determining mobile service system interference protection criteria;
- b) that methodologies are needed for calculating interference due to spectrum sharing with other services to assure protection of the desired signal quality in the necessary bandwidth of a mobile service system;
- c) that deterministic interference calculations may not give a complete picture of the severity of the interference, for example, in terms of percentage of time;
- d) that deterministic calculations are simple but may result in important decisions being made which overlook potentially useful sharing opportunities;
- e) that probabilistic interference calculations can provide significantly improved insights that enable more informed decisions regarding use of radio spectrum;
- f) that detailed sharing studies to determine probability of interference may be performed as required on a case-by-case basis;
- g) that the Monte Carlo simulation methodology provides results in terms of their probability of occurrence or distributions;

h) that probabilistic and deterministic methods can be considered to develop coordination criteria for frequency sharing between terrestrial mobile systems and other radiocommunication services,

further considering

a) that ITU-R has studied the requirements for the Spectrum Engineering Advanced Monte Carlo Analysis Tool (SEAMCAT)¹ that may be applied to studies of interference to the mobile service;

b) that the SEAMCAT software program provides an implementation of the Monte Carlo methodology,

noting

a) that Report ITU-R SM.2028 contains a description of the Monte Carlo simulation methodology for the use in sharing and compatibility studies between different radio services and systems;

b) that Recommendation ITU-R M.1039 contains other statistical methodologies that can be used for sharing studies between the mobile service and mobile earth stations of non-GSO MSS,

recommends

1 that variations and probability distributions of parameters be included in studies of interference to terrestrial mobile service systems, to determine the sensitivity of probable interference due to assumed values for factors such as station geographic distributions, link operational duty cycles, fading, etc.;

2 that the Monte Carlo simulation analysis methodology may be used to calculate interference probability, among other suitable methodologies applicable to specific sharing scenarios, when performing studies of interference involving terrestrial mobile service systems;

3 that a determination and a sensitivity analysis of the probability of interference to terrestrial mobile service stations from other radiocommunication services can be performed using the above *recommends* and technical and operational characteristics from ITU-R Recommendations.

¹ SEAMCAT was developed by the group of European Conference of Postal and Telecommunications Administrations (CEPT), European Telecommunications Standardization Institute (ETSI) members, and international scientific bodies. SEAMCAT is publicly available along with relevant reference and user documentation at: <http://www.ero.dk>. It is also available on the ITU website at <http://www.itu.int/en/ITU-R/study-groups/rsg1/Pages/default.aspx>.