

ROLE OF ITU-R STUDY GROUP 1 IN WORLD-WIDE SPECTRUM MANAGEMENT ACTIVITIES

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ABSTRACT

The paper presents a review of activities of Study Group 1 *Spectrum management* of the Radiocommunication Sector of the International Telecommunication Union (ITU-R). Study Group 1 is now responsible for the overall development of principles and techniques for spectrum management and long-term strategies for effective spectrum use. Organizational and economic aspects of spectrum management have recently been included in the study programme. Currently, Study Group 1 consists of three Working parties (1A, 1B and 1C) and two Task Groups (1/8 and 1/9). Working parties are permanent organs of the Group and it is interesting to note that these same Working Parties have been in existence since 1970. They work on a long term basis with specific sets of Questions assigned to them by the Radiocommunication Assembly, whereas Task Groups have a short-term mandate to solve specific urgent problems that are usually related to inter-Study Group matters. Main activities of Working Parties and Task Groups are shortly described. Future activities of the Study group are also outlined.

INTRODUCTION

Study Group 1 *Spectrum management* of the Radiocommunication Sector of the International Telecommunication Union (ITU-R) is one of 10 Study Groups of the Sector a list of which can be found at the following page of the ITU website: <http://www.itu.int/ITU-R/study-groups/index.asp>. The page of the Study Group 1 itself is: <http://www.itu.int/ITU-R/study-groups/rsg1/index.asp>.

For this particular forum in New Delhi, it is certainly remarkable that Study Group 1, in its present format, was established at the XII-th Plenary Assembly of the former International Consultative Committee on Radio (CCIR), predecessor of ITU-R, in the same New Delhi in 1970, i.e. exactly 35 years ago! At that time three previously existing CCIR Study Groups: I (*Radio transmitters*), II (*Radio receivers*) and VIII (*International monitoring*) were combined in a new Study Group 1 *Spectrum utilization - Monitoring*. One of the authors of the paper started to work in Study Group 1 at about that time, as his first meeting with the Group was in Geneva in 1972. During these 35 years Study Group 1 several times changed its name but its general scope of activities remains the same – spectrum management in a broad sense of this word. The recent scope of activities covers the following main areas:

1 Development of principles and techniques for effective spectrum management, sharing criteria and methods, techniques for spectrum monitoring and long-term strategies for spectrum utilization and economic approaches to national spectrum management as well as, in association with the appropriate bodies of the ITU, facilitation of the collection and dissemination of information concerning computer programs prepared for the implementation of relevant Recommendations.

2 To provide assistance in matters within its competence to developing countries in cooperation with the ITU Telecommunication Development Sector (ITU-D).

3 Study a limited number of specific urgent Questions concerning inter-service sharing and compatibility referred to it by the Radiocommunication Assembly or thorough other ITU mechanisms.

4 Development of Recommendations or of Reports in the preparation to ITU-R World or Regional Radio Conferences creating a required technical basis for some items of the Conferences agendas.

Study Group 1, together with its Working Parties, Task Groups as well as with associated sub-groups, forms the basis of a world-wide spectrum management regime. Study Group 1 has made significant contributions to the ITU Radio Regulations as results of decisions of World Radiocommunication Conferences. The following are important examples: definitions of various types of interference, classification and designation of emissions, transmitter frequency tolerances, permissible power levels for spurious emissions, determination of necessary bandwidth, coordination methodologies for satellite and terrestrial radio systems etc. Currently in force, in the Spectrum Management (SM) series, there are about 90 ITU-R Recommendations as well as 5 ITU-R Reports. All of these were developed by Study Group 1. They are published by the ITU in hard copies and at CD-ROMs and also available on-line through an address: <http://www.itu.int/publications>.

Of significant importance, especially for developing countries, are three handbooks developed by Study Group 1: the Handbook on Computer-Aided Techniques for Spectrum Management (edition of 1999. A new version has been completed and should be published in 2005 or in the beginning of 2006); the Handbook on National Spectrum Management (edition of 1995. A new version has been completed and will be published in 2005) and the Handbook on Spectrum Monitoring (edition of 2002. The previous edition of 1995 was an ITU bestseller). Significant achievement of Study Group 1 in a relatively new field of its activities was publication in 2000 (with Addendum of 2003) ITU-R Report SM.2012-1 Economic aspects of spectrum management which for the first time considers the problem of increasing spectrum use efficiency from economical point of view.

WORKING PARTY AND TASK GROUP ACTIVITIES

Currently, Study Group 1 consists of three Working Parties (1A, 1B and 1C) and two Task Groups (1/8 and 1/9). Working Parties are permanent organs of the Group and it is interesting to note that these same Working Parties have been in existence since 1970 (only previously existed Working Party 1D was eliminated in 80-ies). They work on a long term basis with specific sets of Questions assigned to them by the Radiocommunication Assembly. List of current Questions can be obtained from abovementioned website page of Study Group 1.

Task Groups have short-term mandates to solve specific urgent problems that are usually related to inter-Study Group matters. Recommendation and Reports developed by Task Groups after completing its objectives are transferred to relevant Working Party for maintenance. All output documents of Working Parties, Task Groups and the Study Group itself are developed entirely on the basis of contributions received from ITU Member States or Sector Members a list of which can be found by the address: http://www.itu.int/cgi-bin/htsh/mm/scripts/mm.list?_search=SEC&_languageid=1. Main fields of Working Parties and Task Groups activities are given below.

Working Party 1A: Spectrum engineering techniques

Working Party 1A covers emission parameters influencing efficient spectrum use such as power, frequency stability, bandwidth, unwanted emissions of transmitters as well as sensitivity and selectivity of receivers, technical aspects of sharing, spectrum engineering, computer aided analysis, technical definitions, earth station coordination areas, technical spectrum efficiency etc.

Handbooks on National Spectrum Management and on Computer-Aided Techniques for Spectrum Management developed by relevant Groups of experts created by Working Party 1A cover spectrum management fundamentals, spectrum planning and engineering, frequency authorization, spectrum use, spectrum control and automation for spectrum management activities as well as implementation of computers for these purposes.. The Handbooks describe the key elements of spectrum management and is intended for the use by administrations of both developing and developed countries.

In response to Resolution 9 (WTDC-98), the "Joint Group on Resolution 9" has been established as a joint ITU-R/ITU-D group. In ITU-R these activities are mainly responsibilities of Working Party 1A. A primary objective of this group is to assist developing countries in fulfilling their national spectrum management functions. The Group has developed and distributed questionnaires on national spectrum management to Member States and to Sector Members with the key objective to identify specific problems that Developing Countries are experiencing in national spectrum management.

Working Party 1B: Spectrum management methodologies and economic strategies

WP 1B covers economic strategies in spectrum management, spectrum management methodology, national spectrum management organization, national regulatory framework, alternative approaches to spectrum management procedures, flexible frequency allocations, long-term strategies in spectrum use planning etc.

The useful radio spectrum is a limited natural resource hence the spectrum allocation process and the granting of frequency authorisations should be based on transparent and non-discriminatory practices which favour investments in radiocommunications. The “transparency” in the national spectrum management processes could be achieved by giving easy access to spectrum decision-making process through consultation mechanisms of all interested parties, industry and government departments, in national spectrum advisory committees.

The World Radiocommunication Conference - 2003 (WRC-2003) agreed in a new resolution “that studies be carried out by ITU-R to examine the effectiveness, appropriateness and impact of the Radio Regulations, with respect to the evolution of existing, emerging and future applications, systems and technologies, and to identify options for improvements in the Radio Regulations. Consequently, all these issues are being debated in Study Group I. Technological developments are running faster than can be regulated in detail in the Radio Regulations (RR) and may require reconsideration of regulatory issues.

The latest version of Report ITU-R SM.2012 developed by Working Party 1B describes the different economic approaches for spectrum management activities and contains information on administrations' experience regarding various economic aspects in application to spectrum management process. The Report also presents an analysis of the benefits of strategic development and the methods of technical support for national spectrum management. These approaches not only promote economic efficiency but can also promote technical and administrative efficiency. The Report is intended for use by administrations of both developing and developed countries in their development of strategies on economic approaches to national spectrum management and to the financing of this activity.

Working Party 1C: Spectrum monitoring

Spectrum monitoring serves as the eyes and ears of the spectrum management process. Its importance is continuously increases due to the accelerating expansion of terrestrial and satellite radiocommunication systems and of equipment that may cause interference, such as numerous computers and other unintentional radiators. The monitoring system provides a method of verification and “closes the loop” on the spectrum management process.

WP 1C covers the methods of measurements at a distance of emission parameters, spectrum occupancy, identification of emissions and location of sources harmful interference. Recently emphasis is given to measurement of emission parameters, direction finding and location of new digital transmission radio facilities. Last years the Group becomes pay greater attention to activities in the field of inspection of installations on compliance to licensed parameters, characteristics and conditions as well as to measurement of actual monitoring service areas.

A very popular Handbook in the ITU is the Handbook on Spectrum Monitoring. It has been developed by experts from WP 1C covering all essential features of spectrum monitoring techniques and activities including establishment of monitoring facilities. The principles governing this Handbook are showing that spectrum monitoring requires equipment, personnel, and procedures. The Handbook is an essential accessory for all administrations and spectrum monitoring agencies in the world, both for developing and developed countries.

Task Group 1/8: Compatibility between ultra-wideband devices (UWB) and radiocommunication services

Task Group 1/8 carries out relevant studies on Questions concerning the proposed introduction of UWB devices and the implications of compatibility with radiocommunication services. The studies should result in new Recommendations and Reports covering the following aspects of the subject:

- UWB characteristics
- UWB compatibility with radiocommunication services
- Spectrum management framework for introduction of UWB
- Measurement techniques of emissions from devices using UWB technology.

The last meeting of Task Group 1/8 is planned for October 2005 when drafts of these Recommendations and Reports should be adopted by the Task Group and than adopted by Study Group 1 and, after this, by Administrations of ITU Member States.

Task Group 1/9: Compatibility between passive and active services

Task Group 1/9 conducts studies on two specific agenda items of the next World Radiocommunication Conference of 2007 (WRC-07), Agenda items 1.20 and 1.21.

These concern the protection of the Earth exploration-satellite (passive) service from unwanted emissions of active services and the compatibility between the radio astronomy service and the active space services.

The studies should result in new Recommendations and, possibly, Reports covering the following issues:

All works should be completed well in advance WRC-07.

3. ACTIVITIES IN THE FIELD OF ASSISTANCE TO DEVELOPING COUNTRIES

Study Group 1 always paid great attention to assistance to developing countries. Development of abovementioned three Handbooks proves this statement/

Recently the Study Group continues to provide direct assistance to developing countries in cooperation with the ITU-D. In particular, since 1998, ITU-D and ITU-R established a joint activity to assist developing countries with their national spectrum management functions. This activity was established by Resolution 9 of the World Telecommunication Development Conference, Valetta, 1998 (WTDC-98) and a revision was adopted by WTDC-02 in Istanbul (see <http://www.itu.int/ITU-D/isap/WTDC-02FinalReport/index.html>). In ITU-R, Study Group 1 is responsible for these joint activities. The deliverables are: reports identifying the specific needs of developing countries in spectrum management; national spectrum management practices; information on the national uses of the spectrum; a database of spectrum management information and an on-line database of models of methods that administrations use to calculate fees for use of the spectrum. These additional activities will be also described in the paper.

4. CONCLUSION

Previous and current activities of Study Group 1 are shortly described above. But what is our future?

In the Strategic Plan for the ITU (see <http://www.itu.int/itunews/issue/2002/07/strategicplan.html>), in the section Strategic orientations and goals, a number of goals are identified that concern Study Group 1 activity. Particularly it can assist in bridging the international digital divide in information and communication technologies (ICT), by facilitating development of spectrum management regime for interconnected and interoperable networks and services to promote global connectivity. It will also continue to disseminate information and know-how to provide the membership, particularly developing countries, with capabilities to respond to the challenges of privatization, competition, globalization and technological change in the field of radio communication.

All these 35 years Study Group 1 mainly worked in the framework of a traditional “command and control” approach to spectrum management set forth by the Radio Regulations which accepts a postulate on scarcity and over-burdening of radio frequency resource while actually leaving large fraction of spectrum being not fully used or even unused at all. Newest trends in convergence of radio services, emerging multi-dimension adaptive radio systems capable dynamically share radio spectrum not only in frequency and space but also in time, code/modulation, polarization and other signal dimensions, put forward a goal to reconsider the basic concept and main procedures of spectrum management to considerably increase spectrum use efficiency and significantly simplify access of various users to the spectrum.

Study Group 1 is quite ready to play a leading role in the process of development of new spectrum management approaches and mechanisms meeting these requirements. In 2004 it adopted new Question ITU-R 229/1 *Improving the international spectrum regulatory framework* (text of the Question is available from the abovementioned website page of the Group) and started in-depth studies in this promising field.

Taking this opportunity, authorities of ITU-R Study Group 1 cordially invite radio science specialists to take part in these important and exciting activities of Study Group 1 by presenting their contributions through Administrations of ITU Member States or Sector Members.