



**Cross-border frequency
coordination example
European HCM Agreement**

ITU Workshop on Arab Cross-Border Frequency Coordination
26 January 2017
Dubai

Examples: European HCM-Agreement

The web-site of the European Frequency Co-ordination Agreement.

The HCM-Agreement (Harmonized Calculation Method) can be accessed via the following link:

[Federal Network Agency | Managing Administration of the "HCM Agreement" | Map of Europe](#)

http://www.hcm-agreement.eu/http/englisch/verwaltung/index_europakarte.htm

Examples: European HCM-Agreement

Browser address bar: http://www.hcm-agreement.eu/http/englisch/verwaltung/index_

Page title: **HCM Agreement**

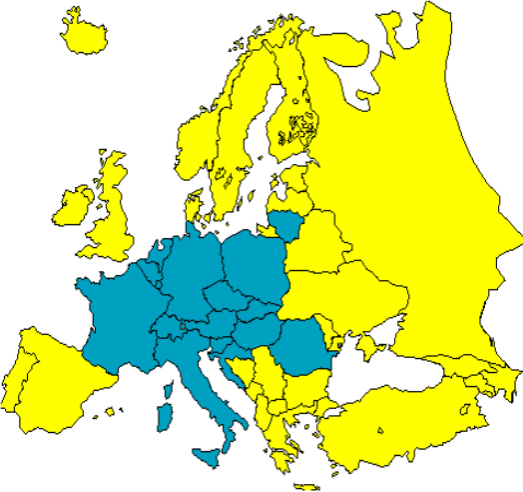
Navigation: [Deutsch](#) | [Français](#) | [Member Area](#)

Logo: Bundesnetzagentur

Imprint | [Imprint HCM Programs](#)

Contents

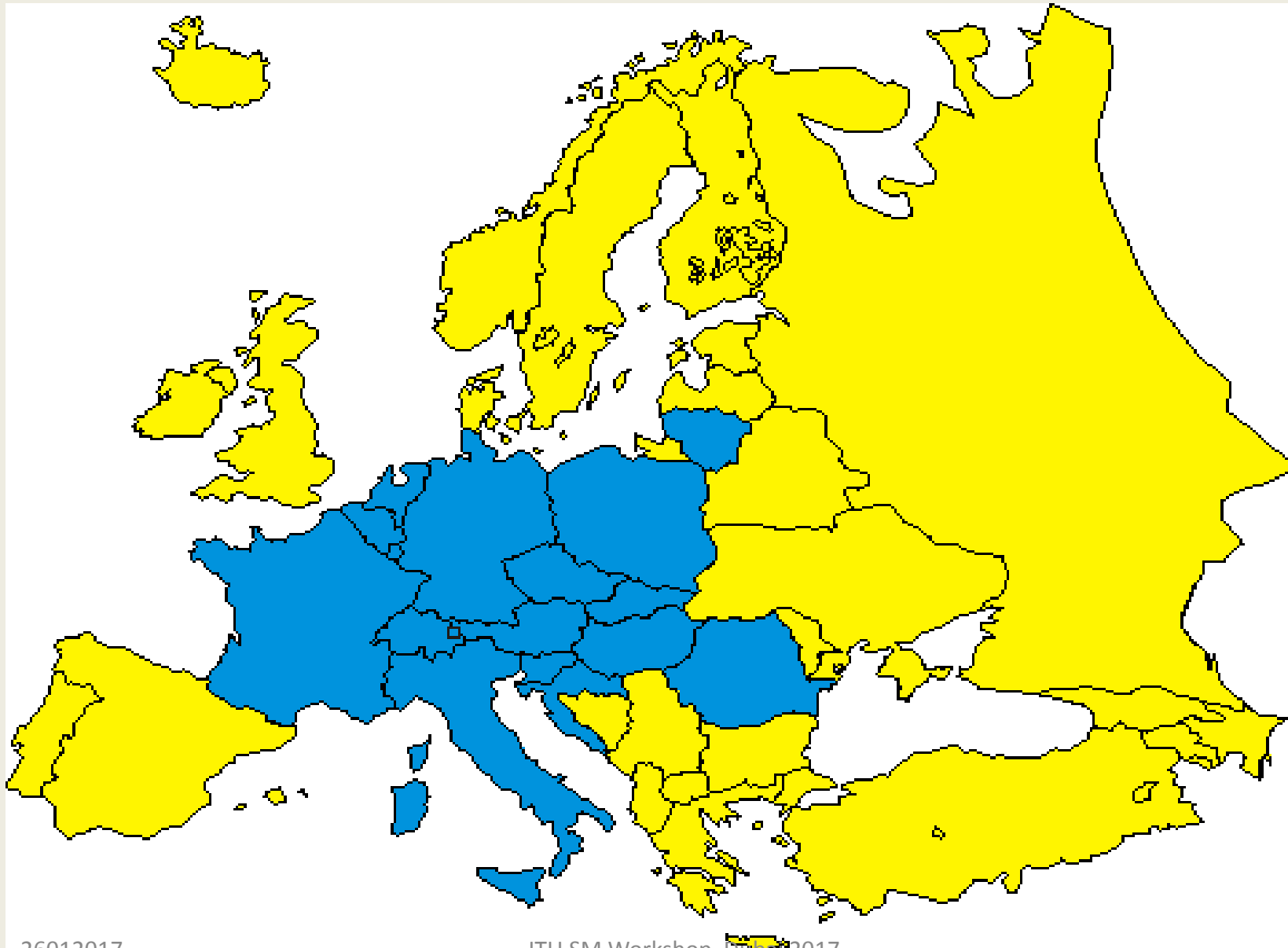
- [Map of Europe](#)
- [Administrative Address](#)
- [Text of the Agreement](#)
- [HCM, Programs](#)
- [HCM, Border Data](#)
- [HCM, Topographical Data](#)
- [HCM, Morphological Data](#)
- [History](#)
- [Frequency Co-ordination](#)
- [Managing Administration](#)
- [Links -national-](#)
- [Links -international-](#)



HCM Agreement is the official designation of the Agreement between the Administrations of Austria, Belgium, the Czech Republic, Germany, France, Hungary, the Netherlands, Croatia, Italy, Liechtenstein, Lithuania, Luxembourg, Poland, Romania, the Slovak Republic, Slovenia and Switzerland on the Coordination of frequencies between 29.7 MHz and 43.5 GHz for fixed service and land mobile service

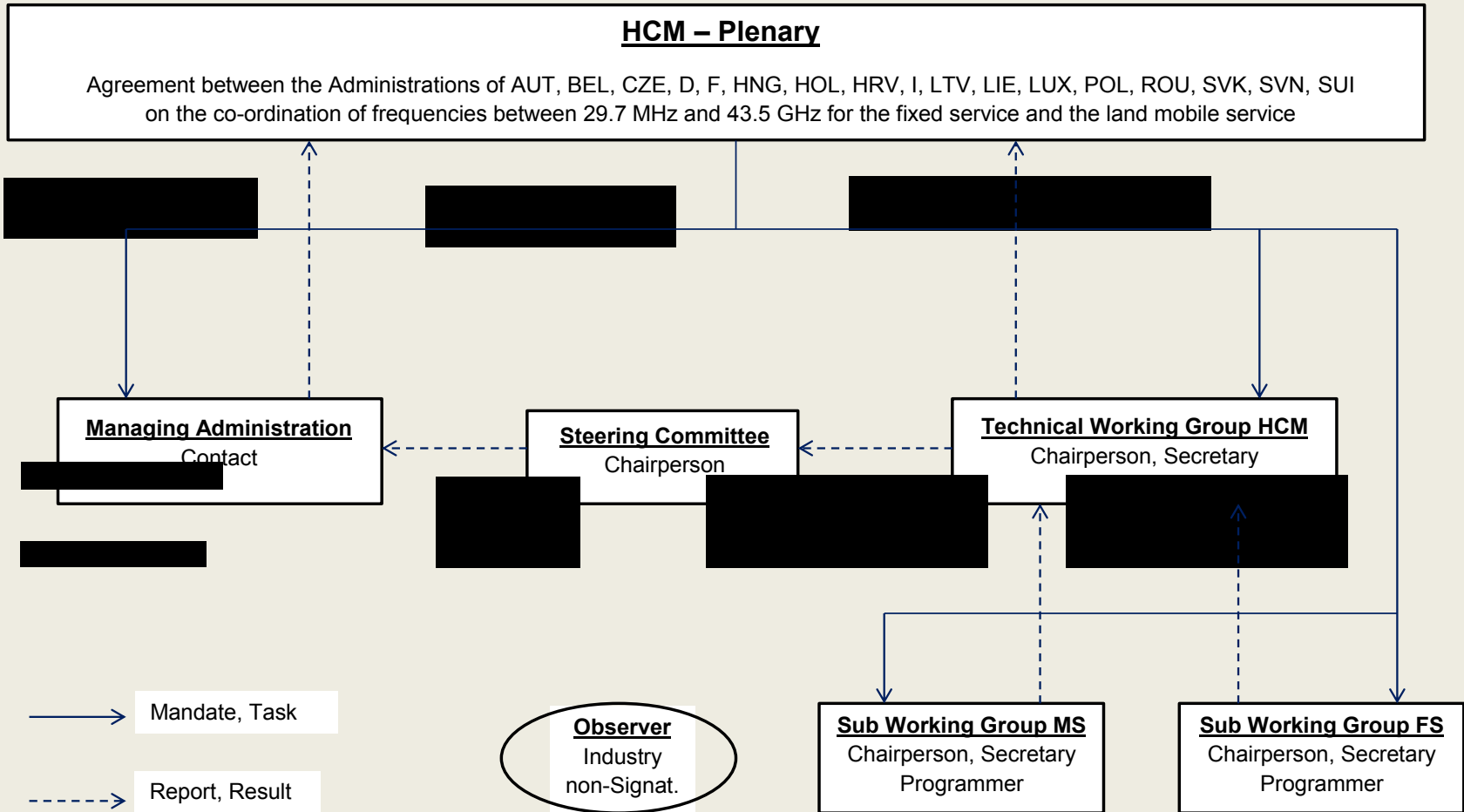
System tray: 12:59, 12.06.2015

The Members



Examples: European HCM-Agreement

Organisational structure of the HCM-Agreement



Examples: European HCM-Agreement

Information on the HCM web-site:

HCM programs

Legacy, test and official versions for fixed and mobile service

.EXE executable test program

.DLL calculation kernel accessible from surrounding programs

Source code, Documentation, User Guide and further tools

HCM Border data

Border data of various regions, border program, manuals

HCM Topo data

Height data of various regions, topo-viewer, manuals

HCM Morpho data

Morpho data of various regions, morpho-viewer, manuals

Examples: European HCM-Agreement

Structure and main features of the HCM-Agreement:

Main Text and fixed/mobile service specific Annexes

Main Text

17 Member Administrations (Signatories)

Frequency Range 29.7 MHz – 43.5 GHz

Fixed Service and Land Mobile Service

Definition of Frequency Ranges for fixed and mobile service

Definition of Frequency Categories

Establishment of Frequency Register and Exchange of Lists

Description of Technical Provisions

Description of Co-ordination Procedure

Status of co-ordinations prior to Agreement

Examples: European HCM-Agreement

Annexes:

Annex 1

Maximum permissible interference field strengths and maximum cross-border ranges of harmful interference for frequencies requiring coordination in the Land Mobile Service

Annex 2A

Data exchange in the Land Mobile Service

Annex 2B

Data exchange in the Fixed Service

Examples: European HCM-Agreement

Annex 3A

Determination of the correction factor for the permissible interference field strength at different nominal frequencies in the Land Mobile Service

Annex 3B

Determination of the Masks Discrimination and the Net Filter Discrimination in the Fixed Service

Annex 4

Propagation curves in the Land Mobile Service

Annex 5

Determination of the interference field strength in the Land Mobile Service

Examples: European HCM-Agreement

Annex 6

Coding instructions for antenna diagrams in the Land Mobile Service

Annex 7

Provisions on measurement procedures in the Fixed Service and the Land Mobile Service

Annex 8A

Method for combining the horizontal and vertical antenna patterns in the land mobile service

Annex 8B

Method for combining the horizontal and vertical antenna patterns in the Fixed Service

Examples: European HCM-Agreement

Annex 9

Threshold Degradation in the Fixed Service

Annex 10

Determination of the basic transmission loss in the Fixed Service

Annex 11

Trigger for co-ordination in the Fixed Service

Examples: European HCM-Agreement

Experience with the HCM-Agreement:

- Application of harmonized calculation method leads to reproducible results on both sides of the border
- In case of inconsistencies the HCM-Agreement provides guidance on resolution
- HCM-Agreement solid basis for a multitude of bi- or multilateral Agreements among Administrations
- Very low interference cases experienced in recent years
- Investigation showed that most cases were caused by deviating data between co-ordination database and real transmit parameters
- Permissible levels are rather conservative, therefore some tolerance in co-ordination triggers and status assignment based on calculations
- All Signatories contribute to the further development of the HCM-Agreement

Cross-border frequency coordination example: *Africa (HCM4A)*



István Bozsóki
Head of Division
BDT/IEE/SBD

ITU Workshop on Arab Cross-Border Frequency Coordination

26 January 2017

Dubai

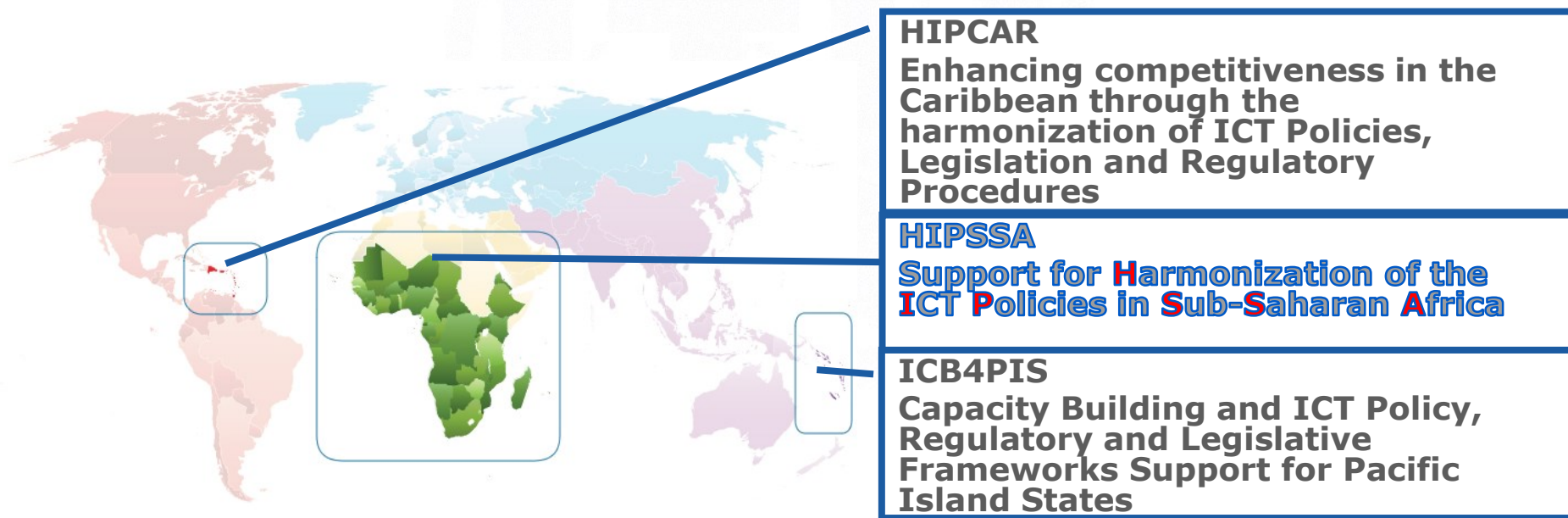
Harmonized Calculation Method for Africa (HCM4A)

- In Europe, the HCM Agreement involves 17 neighbouring countries coordinating frequencies at their borders and provides
 - ▶ For Fixed and the Land Mobile Services between 29.7 MHz and 43.5 GHz
 - ▶ Detailed administrative procedures and includes technical provisions
 - ▶ Free of charge HCM software (.dll) ensuring harmonised use of the calculation
- Objectives, benefits and limits of HCM for Africa (HCM4A)
 - ▶ Optimise spectrum usage by accurate interference field strength calculation
 - ▶ Establishment of models for computer-aided interference range calculations
 - ▶ Objectively predictable and transparent decisions: minimum turnaround times
 - Administrations co-ordinate frequencies before assigning them and ensure harmonised application of technical provisions
 - Rapid assignment of preferential frequencies and accelerated assessment of interference through data exchange
 - ▶ Detailed input data required from operators: geo data, antenna parameters...

HCM4A implementation by ITU-EC HIPSSA project

Project for Harmonization of ICT Policies in ACP

- ITU and European Commission launched a global project to provide “*Support for the establishment of harmonized policies for the ICT market in the ACP states*” end 2008
- Component of “ACP-Information and Communication Technologies” programme (ACP-ICT) within the framework of the 9th European Development Fund
- 3 regional sub-projects addressing specific needs of each region



Geographical modular implementation of priorities

Reflect sub-regional heterogeneity in terms of ICT market development and status of harmonization initiatives in four AU geographical regions

Global

- Comparison of regional harmonization initiatives
- Monitoring and evaluation / Regulatory benchmarking
- **Cross-border frequency coordination: harmonized calculation method for Africa (HCM4A)**
- Input to African Union's Open Access guidelines

Regional

West Africa

Central Africa

East Africa

Southern Africa

National

Advantages of a harmonized calculation method (HCM4A)

- **Based on HCM Agreement used in Europe**
- **Optimize** spectrum usage;
- **Prevent** harmful interferences;
- Confer an adequate **protection for stations**;
- Define **technical** provisions and **administrative** procedures;
- **Quick assignment** of preferential frequencies;
- **Transparent decisions** through agreed assessment procedures;
- Quick assessment of interference through **data exchange**.

HCM4A involves all for 4 sub regions

This project included performing a **survey** and a **comparative analysis** of existing administrative and technical procedures related to bilateral and multilateral cross-border frequency coordination agreements in 4 geographical sub-regions as defined by the AU (**Sub-Saharan Africa only!**)

- **Central Africa** [Burundi, Central African Republic, Chad, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Sao Tome and Principe];
- **East Africa** [Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Sudan, Tanzania, Uganda];
- **Southern Africa** [Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, Zimbabwe];
- **West Africa** [Benin, Burkina-Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Sierra-Leone, Senegal, Togo].

Team of ITU experts for HCM4A

- Under the management of the HIPSSA Project Team (Project manager and Project Coordinator)
- In close collaboration with the ITU regional Office for Africa and the ITU Division at HQ dealing with the matter (TND)
- Team of 5 experts
 - 4 Regional Experts (West, Central, East and Southern Africa)
 - 1 Senior Coordinator
- <http://www.itu.int/en/ITU-D/Projects/ITU-EC-ACP/HIPSSA/Pages/default.aspx>

Implementation of HCM4A in four phases

1. Assessment phase - Done

Review existing bilateral and multilateral cross-border frequency coordination agreements in Sub-Saharan Africa;

2. Multilateral agreement proposal - Done

Technical working group review the results of the assessment and propose a multilateral agreement

3. Validation workshop - Done

Adopt the draft agreement in line with the conclusion of the assessment

4. Signature - Interests

5. Development of HCM4A software

Develop and release software (.dll) based on HCM4A agreement and organize training workshops on the procedure. Insertion into the SMS4DC

Tasks in Phase 1 of HCM4A for the sub-regions

Request

- *Contact* details of the person, dealing with spectrum management matters, and who will be the HCM4A Focal Point (FP) in the relevant country for this project.

Tasks from the HCM4A Focal Point

- Fill in a questionnaire;
- Provide info on any bilateral/multilateral agreement;
- Provide current frequency register database format;
- Provide protection requirements for the different radio-communication services;
- Provide clarifications on the subject whenever the need arises.

Cross-border frequency coordination in Africa

Assessment Phase - Key questions (1/3)

- Does your country have a framework (administrative procedures and technical provisions) for cross-border frequency coordination? If so, please provide us an electronic copy.
- Does your country have one or more cross border frequency coordination agreements? If so, how many? Please provide us a sample electronic copy of each one.
- Please indicate in a tabular form the bands, the services, the neighboring country/countries involved and the periodicity how often your country experience interference problems or conduct frequency coordination across borders.

Cross-border frequency coordination in Africa

Assessment Phase - Key questions (2/3)

- Can you provide in a tabular form those bands, services, neighboring countries involved and priorities, that you consider requires frequency coordination across the different borders with neighboring countries?
- Does your country have a frequency register for storing the co-ordination results? If yes, please provide us an example on an electronic copy where all the fields considered are indicated.
- Indicate what type of ITU tools including databases you use and in which cases you use them for coordination or registration

Cross-border frequency coordination in Africa

Assessment Phase - Key questions (3/3)

- Indicate with certain detail any other tool used for coordination or interference resolution, whether self developed or purchased.
- Indicate in a tabular form the propagation models and/or methods used per bands and services.
- In cases where you use digital terrain data for interference calculations indicate:
 - the use of elevation and/or morphological data,
 - the type of geographical projection system do you use,
 - the level of the resolutions of the terrain data that you use close to the different borders
 - the point or line whereof the calculation is made

HCM4A implementation studies

- During the first phase of the project, ITU experts contacted various administrations in subSaharan Africa and compiled information related to cross border frequency coordination through a questionnaire.
- Based on the results of the first phase of the project, the ITU team prepared a draft HCM for Africa Agreement with relevant Annexes (HCM4A). The draft Agreement for Africa is an adapted version of the existing HCM for Europe. The Agreement deals with co-ordination of frequencies between 29.7 MHz and 43.5 GHz for the purposes of preventing mutual harmful interference to the Fixed and Land Mobile Services and optimising the use of the frequency spectrum on the basis of mutual agreements.
- The Draft HCM4A Agreement has a number of Annexes relating to Land Mobile and Fixed Service respectively.

The Agreement

- The Draft Agreement comprises of a Preamble and the following Articles :
 - Art 1 Definitions**
 - Art 2 General**
 - Art 3 Technical Provisions**
 - Art 4 Procedures**
 - Art 5 Report of harmful interference**
 - Art 6 Revision of the Agreement**
 - Art 7 Accession to the Agreement**
 - Art 8 Withdrawal from the Agreement**
 - Art 9 Status of coordinations prior to the Agreement**
 - Art 10 Languages of the Agreement**
 - Art 11 Entry into force of the Agreement**

The Annexes related to the Land Mobile Service

- Annex 1: Maximum permissible interference field strengths and maximum cross-border ranges of harmful interference for frequencies requiring co-ordination in the Land Mobile Service
- Annex 2A: Data exchange in the Land Mobile Service
- Annex 3A: Determination of the correction factor for the permissible interference field strength at different nominal frequencies in the Land Mobile Service
- Annex 4 Propagation curves in the Land Mobile Service
- Annex 5 Determination of the interference field strength in the Land Mobile Service
- Annex 6 Coding instructions for antenna diagrams in the Land Mobile Service
- Annex 7 Provisions on measurement procedures in the Fixed Service and the Land Mobile Service
- Annex 8A Method for combining the horizontal and vertical antenna patterns for the Land Mobile Service

The Annexes related to the Fixed Service

- Annex 2B Data exchange in the Fixed Service
- Annex 3B Determination of the Masks Discrimination and the Net Filter Discrimination in the Fixed Service
- Annex 7 Provisions on measurement procedures in the Fixed Service and the Land Mobile Service
- Annex 8B Method for combining the horizontal and vertical antenna patterns for the Fixed Service
- Annex 9 Threshold Degradation in the Fixed Service
- Annex 10 Determination of the basic transmission loss in the Fixed Service
- Annex 11 Trigger for co-ordination in the Fixed Service

Software tool for HCM4A

- Optimise spectrum usage by **accurate interference field strength calculations**;
- Establish **general parameters**, improvement and supplementation of technical provisions, individual restrictions;
- Establish **models** for computer-aided **interference range calculations**
- **Harmonise parameters**: objectively predictable towards transparent decisions

Workshop on HCM4A, Nairobi, October 2012

- There is a lack of specialised institutional framework to address the issue of frequency coordination
- There is no Regional Table of Frequency Allocations
- There is no common procedure for frequency coordination between Administrations
- There is a need to create at the national and regional level, permanent working groups to deal with frequency coordination at the borders
- There is a need for more concrete action on the part of subregional organisations, to support frequency coordination amongst the future beneficiaries of the HCM4A Project
- The final report of the HCM4A project should be presented to the concerned regional bodies
- The views of the regional economic bodies, the regional association of regulators and the regional association of consumers on the project should be obtained since some of these were not represented at this meeting even though they had been invited.
- HCM representative: Mr Herman TEINSMA

Draft Framework Agreement on HCM4A (comments consolidated in Nairobi Meeting with ATU and AUC)

- Comments
 - All comments have now been incorporated in the draft agreement.
 - The English and French texts of the Agreements have been reconciled by ITU.
 - Agreement dispatched by BDT Director to Sub-Saharan Africa for signature
 - 20 Indication of intention to sign the agreement received
- Issue of hosting Body for Secretariat of HCM4A
 - To be discussed

www.itu.int/en/ITU-D/Projects/ITU-EC-ACP/HIPSSA/Pages/default.aspx

REGIONAL OUTCOMES

3. Cross-border frequency coordination

HCM4A Sub-Saharan assessment report [[EN](#)] [[FR](#)]

HCM4A Central Africa assessment report [[EN](#)]

HCM4A East Africa assessment report [[EN](#)]

HCM4A Southern Africa assessment report [[EN](#)]

HCM4A West Africa assessment report [[EN](#)]

HCM4A Agreement [[EN](#)] [[FR](#)]

HCM4A Annexes to Agreement [[Annex 1](#)] [[Annex 2A](#)] [[Annex 2B](#)] [[Annex 3A](#)]

[[Annex 3B](#)] [[Annex 4](#)] [[Annex 5](#)] [[Annex 6](#)] [[Annex 6 App.1](#)] [[Annex 6 App.2](#)]

[[Annex 6 App.3](#)] [[Annex 6 App.4](#)] [[Annex 6 App.5](#)] [[Annex 7](#)] [[Annex 8A](#)]

[[Annex 8B](#)] [[Annex 9](#)] [[Annex 10](#)] [[Annex 11](#)]

Indication of intention (20) to sign the agreement

■ No Seychelles

■ Yes

| | |
|-------------------|--------------------------------|
| Benin | Ivory Coast |
| Burkina Faso | Kenya |
| Burundi | Mali |
| Cameroun | Niger |
| Congo | Rwanda |
| Gabon | Senegal |
| Gambia | South Sudan |
| Ghana | Togo |
| Guinee Bissau | United Republic of Tanzania |
| Guinee Equatorial | <i>Lesotho</i> |

Present progress

- Regional Agreement has not been signed yet, but sub-regional interest are there
- CRASA has indicated that they now have 4 countries who have expressed interest to this process.
- They shall be sending a communication to ITU to this effect and pledges to engage more countries to the commit to this process.
- CRASA welcomes the offer by ITU to conduct a 1-2 day workshop for the region and ITU's willingness to support to member states to develop a calculation method that can be incorporated in the national spectrum management systems

Workshops

- Asia-Pacific
 - NBTC, June 2016, Thailand
- Africa
 - CRASA, August 2016, Namibia
- Resolution 9
 - Presentations

Cross-border frequency coordination examples

Caribbean SM Task Force



István Bozsóki
Head of Division
BDT/IEE/SBD

ITU Workshop on Arab Cross-Border Frequency Coordination

26 January 2017

Dubai

Caribbean Spectrum Management Task Force

The specific objective of the Project is to deepen the harmonization of spectrum planning and management policies and practices across the Caribbean Region.

The key activities include

- Development of a regionally harmonized spectrum management plan to address minimisation of cross border interference, common approaches to digital broadcasting switchover, white spaces regulation and spectrum pricing
- Development of a National Frequency Allocation Table (NFAT) for each country and a Frequency Allocation Table (RFAT) for the Caribbean. The RFAT will facilitate the adoption of common frequencies and international protocols for disaster management and emergency telecommunications.

Division of the work into 4 parts

- Development of a National Frequency Allocation Table (NFAT) for each country involved in the project (8) and a Frequency Allocation Table (RFAT) for the Caribbean
- Common approaches to digital broadcasting switchover, white spaces regulation
- Harmonization of spectrum pricing
- Analysis of Cross Border Interference and the Report on Framework to Minimize Cross Border Interference – taking into account also the HCM and HCM4A
- Caribbean Spectrum Management Steering Committee

The background features a large, light blue watermark of the ITU logo, which consists of a globe with a satellite dish and the letters 'ITU' in a stylized font.

Thank you !

István Bozsóki
Head of Division
BDT/IEE/SBD
Istvan.bozsoki@itu.int