

Establishment of Harmonized Policies for the ICT Market in the ACP Countries

Cross-Border Frequency Coordination: A Harmonized Calculation Method for Africa (HCM4A)

**West Africa
Assessment Report**

HIPSSA Harmonization of
ICT Policies in
Sub-Saharan Africa



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HIPSSA

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Foreword

Information and communication technologies (ICTs) are shaping the process of globalisation. Recognising their potential to accelerate Africa's economic integration and thereby its greater prosperity and social transformation, Ministers responsible for Communication and Information Technologies meeting under the auspices of the African Union (AU) adopted in May 2008 a reference framework for the harmonization of telecommunications/ICT policies and regulations, an initiative that had become especially necessary with the increasingly widespread adoption of policies to liberalise this sector.

Coordination across the region is essential if the policies, legislation, and practices resulting from each country's liberalization are not to be so various as to constitute an impediment to the development of competitive regional markets.

Our project to 'Support for Harmonization of the ICT Policies in Sub-Sahara Africa' (HIPSSA) has sought to address this potential impediment by bringing together and accompanying all Sub-Saharan countries in the Group of African, Caribbean and Pacific States (ACP) as they formulate and adopt harmonized ICT policies, legislation, and regulatory frameworks. Executed by the International Telecommunication Union (ITU), co-chaired by the AU, the project has been undertaken in close cooperation with the Regional Economic Communities (RECs) and regional associations of regulators which are members of the HIPSSA Steering Committee. A global steering committee composed of the representatives of the ACP Secretariat and the Development and Cooperation – EuropeAid (DEVCO, European Commission) oversees the overall implementation of the project.

This project is taking place within the framework of the ACP Information and Telecommunication Technologies (@CP-ICT) programme and is funded under the 9th European Development Fund (EDF), which is the main instrument for providing European aid for development cooperation in the ACP States, and co-financed by the ITU. The @CP-ICT aims to support ACP governments and institutions in the harmonization of their ICT policies in the sector by providing high-quality, globally-benchmarked but locally-relevant policy advice, training and related capacity building.

All projects that bring together multiple stakeholders face the dual challenge of creating a sense of shared ownership and ensuring optimum outcomes for all parties. HIPSSA has given special consideration to this issue from the very beginning of the project in December 2008. Having agreed upon shared priorities, stakeholder working groups were set up to address them. The specific needs of the regions were then identified and likewise potentially successful regional practices, which were then benchmarked against practices and standards established elsewhere.

These detailed assessments, which reflect sub-regional and country-specific particularities, served as the basis for the model policies and legislative texts that offer the prospect of a legislative landscape for which the whole region can be proud. The project is certain to become an example to follow for the stakeholders who seek to harness the catalytic force of ICTs to accelerate economic integration and social and economic development.

I take this opportunity to thank the European Commission and ACP Secretariat for their financial contribution. I also thank the Economic Community of West African States (ECOWAS), West African Economic and Monetary Union (UEMOA), Economic Community of Central African States (ECCAS), Economic and Monetary Community of Central Africa (CEMAC), East African Community (EAC), Common Market for Eastern and Southern Africa (COMESA), Common Market for Eastern and Southern Africa (COMESA), Southern African Development Community (SADC), Intergovernmental Authority on Development (IGAD), Communication Regulators' Association of Southern Africa (CRASA), Telecommunication Regulators' Association of Central Africa (ARTAC), United Nations Economic Commission for Africa (UNECA), and West Africa Telecommunications Regulators' Association (WATRA), for their contribution to this work. Without political will on the part of beneficiary countries, not much would have been achieved. For that, I express my profound thanks to all the ACP governments for their political will which has made this project a resounding success.



Brahima Sanou
BDT, Director

Acknowledgements

The present document represents an achievement of a global activity carried out under the HIPSSA project (“Support to the Harmonization of ICT Policies in Sub-Saharan Africa”) officially launched in Addis Ababa in December 2008.

In response to both the challenges and the opportunities of information and communication technologies’ (ICTs) contribution to political, social, economic and environmental development, the International Telecommunication Union (ITU) and the European Commission (EC) joined forces and signed an agreement aimed at providing “Support for the Establishment of Harmonized Policies for the ICT market in the ACP”, as a component of the Programme “ACP-Information and Communication Technologies (@CP-ICT)” within the framework of the 9th European Development Fund (EDF). i.e., ITU-EC-ACP Project.

This global ITU-EC-ACP Project is being implemented through three separate sub-projects customized to the specific needs of each region: Sub-Saharan Africa (HIPSSA), the Caribbean (HIPCAR), and the Pacific Island Countries (ICB4PAC).

As members of the HIPSSA Steering Committee co-chaired by the African Union’s Commission (AUC) and the ITU, the African Union’s Commission (AUC) and the African Telecommunication’s Secretariat (ATU) provided guidance and support to the team of consultants who prepared the draft document: Mr Shola Taylor from Kemilinks International for the Assessment Report for Sub-Saharan Africa, Mr Hilaire Mbega for Central Africa, Mr Andrew Kisaka for East Africa, Mr Carlos Alais for Southern Africa, Mr Ahmed Boreau for West Africa and Mr Zoltan Zsuffa on HCM Europe. This draft document is to be reviewed, discussed and validated by broad consensus by participants of a workshop to be organised in collaboration with AUC and ATU.

ITU would like to thank the focal point delegates from the member states ICT and telecommunications ministries and regulators, from regional organisations’ commissions and secretariats and regulators associations among them the [Association of Regulators of Information and Communications Service of Eastern and Southern Africa \(ARICEA\)](#), [Association of African Telecommunications Regulators \(ARTAC\)](#), [Communication Regulators' Association of Southern Africa \(CRASA\)](#), [East African Community \(EAC\)](#), [East Africa Communications Organizations \(EACO\)](#), [Economic Community of Central African States \(ECCAS\)](#), [Economic Community of West African Countries \(ECOWAS\)](#), [Southern African Development Community \(SADC\)](#), and [West Africa Telecommunications Regulatory Assembly \(WATRA\)](#), for their hard work and commitment in contributing to the data collection efforts of this unprecedented study. The contributions from the AUC and ATU are gratefully acknowledged.

Without the active involvement of all of these stakeholders, it would have been impossible to produce a document such as this, reflecting the overall requirements and conditions of West Africa while also representing international best practice.

The activities have been implemented by Ms Ida Jallow, responsible for the coordination of the activities in Sub-Saharan Africa (HIPSSA Senior Project Coordinator), and Mr Sandro Bazzanella, responsible for the management of the whole project covering Sub-Saharan Africa, Caribbean and the Pacific (ITU-EC-ACP Project Manager) with the overall support of Ms Hiwot Mulugeta, HIPSSA Project Assistant, and of Ms Silvia Villar, ITU-EC-ACP Project Assistant. The work was carried out under the overall direction of Mr Cosmas Zavazava, Chief, Project Support and Knowledge Management (PKM) Department. The document was developed under the direct supervision of the then HIPSSA Senior Project Coordinator, Mr Jean-François Le Bihan, and has further benefited from the comments of the ITU Telecommunication Development Bureau’s (BDT) Technology and Network Development (TND) and ITU Radiocommunication Bureau (BR). Support was provided by Mr Andrew Rugege, Regional Director, ITU Regional Office for Africa Region. The team at ITU’s Publication Composition Service was responsible for its publication..

Executive Summary

In response to both challenges and opportunities of ICT's contribution to political, social, economic and environmental development, the International Telecommunication Union (ITU) and the European Commission (EC) joined forces and signed an agreement aimed at "Support for the Establishment of Harmonized Policies for the ICT market in the ACP" which is a component of programme "ACP-Information and Communication Technologies (@CPICT)" within the framework the 9th European Development Fund (EDF).

This agreement is being implemented with funding by the European Union through three separate sub-projects in order to customize it to specific needs of each region: Sub-Saharan Africa (HIPSSA), the Caribbean (HIPCAR) and the Pacific Island Countries (ICB4PIS).

HIPSSA's objective is to increase harmonization of ICT policies and regulation for the whole Sub Saharan Africa region and covers eight (8) subjects of which **spectrum management is one**.

Concerning this subject, HIPSSA decided to carry out a feasibility analysis to see if it is possible to implement a Harmonized Calculation Method (HCM) as what is made in Europe through HCM2008.

This Harmonized Calculation Method for Africa (HCM4A) aims to facilitate cross border frequency coordination among different countries in Africa.

The HCM4A software will be a technical tool to:

- To promote the use of harmonised ICT market policies and regulations in the area concerned and building human as well as institutional capacity in the field of ICT through a range of targeted training, education and knowledge sharing measures.
- Establish **general parameters**, improvement and supplementation of technical provisions, individual restrictions;
- Establish **models** for computer-aided **interference range calculations**
- **Harmonize parameters**: objectively predictable towards transparent decisions

Four (4) stages have been considered for implementing HCM4A:

- **Assessment phase**: Review existing bilateral and multilateral cross-border frequency coordination agreements in Sub-Sahara Africa;
- **Multilateral agreement proposal**: Technical working group reviews the results of the assessment and propose a multilateral agreement
- **Validation workshop**: Adopt the draft agreement in line with the conclusion of the assessment
- **Development of HCM4A software**: Develop or adapt a release software based on HCM4A agreement (if adopted) and propose training workshops on the software

Further to a call for application organized by the ITU in February 2011, regional experts, international expert and senior international expert had been selected to conduct an assessment study on existing cross-border frequency coordination mechanisms in Sub Sahara Africa (West, Central, East and Southern Africa) and a cost-benefit analysis of a pan-African multilateral agreement.

The regional experts in particular, the one in charge of West Africa region has been commissioned to perform a survey and a comparative analysis of existing administrative and technical procedures related to bilateral and multilateral cross-border frequency coordination agreements.

This report analyses the frequency coordination situation across borders in the following fifteen (15) West Africa countries:

Benin	Cape Verde	The Gambia	Guinea	Liberia	Niger	Senegal	Togo
Burkina-Faso	Cote d'Ivoire	Ghana	Guinea-Bissau	Mali	Nigeria	Sierra-Leone	

The report is divided in two parts:

- The part 1 presents the regional report of West Africa, considering the current regional initiatives towards harmonized cross border frequency coordination and provides a comparative analysis of the regional survey ending with conclusions and recommendations.
- The Part 2 presents the report of each country including a general profile of each of them, the spectrum management framework, the cross border frequency coordination agreement (structure, coordination procedures, administrative provisions, technical provisions, calculation method, frequency band covered) for each country and investigates the national table of frequency allocations.

The fundamental conclusion of the report is that West Africa does have a model of agreement, which needs to be reviewed, adapted and harmonized. This model does not contain calculation method and this absence must be completed by the development of a harmonized calculation method, which could take as a starting point the harmonized calculation method already operational in Europe.

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GLOSSARY

HIPSSA is a project under an International Telecommunication Union (ITU) and European Commission partnership covering all African, Caribbean and Pacific countries. The program was officially launched in December 2008. Its objectives are:

BEN	BENIN
BFA	BURKINA-FASO
CPV	CAPE-VERDE
CTI	COTE D'IVOIRE
GHA	GHANA
GMB	THE GAMBIA
GNB	GUINEA-BISSAU
GUI	GUINEA
LBR	LIBERIA
MLI	MALI
NGR	NIGER
NIG	NIGERIA
SEN	SENEGAL
SRL	SIERRA-LEONE
TGO	TOGO

INTRODUCTION

HIPSSA project for “Harmonization of ICT Policies in Sub-Sahara Africa” is building on the experienced gained with a pilot project funded by European Commission (EC) and ITU that led to the adoption of supplementary Acts for telecommunications to the ECOWAS Treaty.

It aims at developing and promoting harmonized policies and regulatory guidelines for the ICT market as well as building human and institutional capacity in the field of ICT through a range of targeted training, education and knowledge sharing measures.

This project will result in the creation of harmonized regional and national policy, legal and regulatory frameworks conducive to significant investments in the ICT infrastructures and services.

This project covers eight subjects as follows:

1. **Licensing** (guaranteeing technology neutral licensing);
2. **Universal service** (reviewing best practices for selection and funding of universal access or service providers);
3. **Spectrum management** (implementing a Harmonized Calculation Method for Africa, HCM4A: cross-border frequency coordination);
4. **Numbering** (regional numbering plans and planning guidelines);
5. **Interconnection** (defining guidelines for access to submarine cables, cost modelling and roaming);
6. **Cyber security** (cyber criminality and computer emergency response teams);
7. **Analogue to Digital Broadcasting Migration** (elaborating Regional strategies and national roadmaps);
8. **Statistics** (Monitoring and evaluation).

On the spectrum management subject, HIPSSA decided to carry out a feasibility analysis to see if it is possible to implement a Harmonized Calculation Method (HCM) as what is made in Europe through HCM2008.

The final purpose is to create a cross border frequency coordination multilateral agreement and tool to:

- Prevent and easily solve radio interference across borders,
- Take account of other neighbouring stations before putting their own stations into operation,
- Set an harmonized standard that all the countries involved accept on a mutually beneficial approach by consensus,
- Provide a solid basis for bilateral and multilateral agreements,
- To enable the creation of bilateral preferential frequency agreements at border zones: who can operate what and with which interference ranges.

Further to a call for application organized by the ITU in February 2011, regional experts, international expert and senior international expert had been selected to conduct an assessment study on existing cross-border frequency coordination mechanisms in Sub Sahara Africa (West, Central, East and Southern Africa) and a cost-benefit analysis of a pan-African multilateral agreement.

The regional experts including the one in charge of West Africa region have been commissioned to perform a survey and a comparative analysis of existing administrative and technical procedures related to bilateral and multilateral cross-border frequency coordination agreements.

The mission had been conducted in three stages as follows:

1. Designing a common template for survey and comparative analysis;
2. Setting up a list of focal points and collecting data for a Sub-regional survey and comparative analysis;
3. Finalizing of the study.

The mission led to a report, which is divided in two parts:

- The part 1 presents the regional report of West Africa, considering the current regional initiatives towards harmonized cross border frequency coordination and provides a comparative analysis of the regional survey ending with conclusions and recommendations.
- The Part 2 presents the report of each country including a general profile of each of them, the spectrum management framework, the cross border frequency coordination agreement (structure, coordination procedures, administrative provisions, technical provisions, calculation method, frequency band covered) for each country and investigates the national table of frequency allocations.

The report provides:

- A comprehensive review of all national cross border coordination experiences in West Africa;
- A quick review of regional harmonization initiatives; and
- A comparative analysis in summary tables or figures.

The report has, under annex and per country, the list of:

- Answers to the questionnaire;
- Cross border frequency coordination agreements; and
- National table of frequency allocations.

Main Findings

The survey of existing cross border frequency coordination in ECOWAS region reveals that this region does not have a global multilateral framework for cross border coordination. But member states, through the unique body in charge of coordination, started to establish cross border frequency coordination agreements.

These cross border frequency coordination agreements, acting as cross border frequency coordination framework, are either bilateral or multilateral.

These agreements, which have similarities in their structures, can lead to the establishment of **a model of agreement** at the regional level.

However, this model of agreement would present insufficiencies if it weren't supported by a calculation method for a commonly accepted evaluation of field strength. In addition to this shortcoming, it is important to note among other things the absence of coordination procedures for predefined frequencies' category and the absence of traceability of coordinated frequencies due to the inexistence of frequency registers.

These limits of the existing agreements could explain the persistence of interferences at borders sometimes in frequency bands, which have already been subject of agreement.

Nevertheless, the survey shows that the majority of ECOWAS member states, even if they do not have adapted tools especially digital terrain model, began to acquire system for spectrum management and monitoring.

Thus, the majority of the systems in possession of the countries are a combination of two couples of providers: ARGUS and SCORPIO for spectrum monitoring and [for spectrum management SPECTRA and ASMS.

To conclude, this shows that ECOWAS member states engaged are in a converging process of, to a certain extent, harmonised tools and methods even if methods present shortcomings.

It is therefore crucial to take advantage of this momentum and support ECOWAS member states to adopt a multilateral cross border frequency coordination framework. In order to bring such a process to completion it has to fit in the broader harmonization effort as set in spectrum related matters by the Supplementary Act A/SA.5/01/07 of ECOWAS.

This act, should it be pointed out, recommends, member states to establish a common methodology for documenting and monitoring spectrum, sharing as necessary the costs of developing software tools.

As a matter of fact this type of software tools already exists.

It's the Harmonized Calculation Method (HCM), which has already been introduced in Europe and is available for free. However its procedures and methods to avoid harmful interference may need to be adapted to West Africa realities.

It should also be noted that the success of the appropriation of HCM for Africa requires a significant training component.

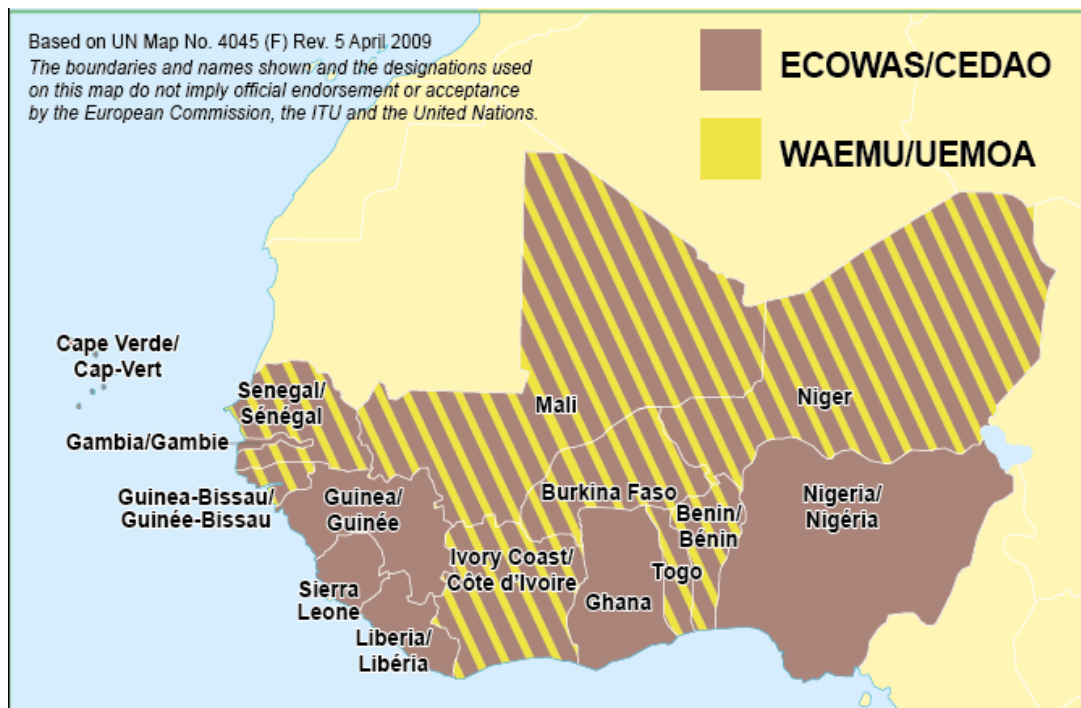
Part 1: Regional Report

West Africa or Western Africa is the westernmost region of the African continent. Western Africa region as defined by the African Union includes the following sixteen (16) countries and an area of approximately 5 million km².

- Benin
- Burkina Faso
- Cape Verde
- Cote d'Ivoire
- The Gambia
- Ghana
- Guinea
- Guinea-Bissau
- Liberia
- Mali
- Mauritania
- Niger
- Nigeria
- Senegal
- Sierra Leone
- Togo

With the exception of Mauritania, all of these countries are members of the Economic Community of West African States, ECOWAS¹.

Figure 1: Member States of ECOWAS



The Economic Community of West African States (ECOWAS) is a regional group which treaty was signed on May 28, 1975. The protocols launching ECOWAS were signed in Lomé, Togo on November 5, 1976.

Its mission is to promote economic integration in "all fields of economic activity, particularly industry, transport, telecommunications, energy, agriculture, natural resources, commerce, monetary and financial questions, social and cultural matters"².

¹ www.en.wikipedia.org/wiki/West_Africa

² www.comm.ecowas.int/sec/index.php?id=about_a&lang=en

In telecommunications area, ECOWAS treaty in its article 33 lay out that “Member states shall:

- *develop, modernize, coordinate and standardize their national telecommunications networks in order to provide reliable interconnection among Member States;*
- *complete, with dispatch, the section of the pan African telecommunications network situated in West Africa;*
- *coordinate their efforts with regard to the operation and maintenance of the West African portion of the pan African telecommunications network and in the mobilization of national and international financial resources”.*

In parallel to this regional organization, there is another regional economic organization formed by eight (8) West Africa French speaking countries (*Benin, Burkina-Faso, Côte d’Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo*).

The West African Economic and Monetary Union (WAEMU) was founded on 10 January 1994. The Treaty, in its article 4, mandates WAEMU, among others things, “*to harmonize and coordinate national policies, by the implementation of unified actions and possibly of common policies particular in the following fields: human resources, transport and telecommunications, environment, agriculture, energy, industry and mines*”.

In telecommunications area, ECOWAS and WAEMU have an association of regulatory authorities, which are respectively WATRA (West Africa Telecommunications Regulators Assembly) and CRTEL (Comité des Régulateurs de Télécommunications des États membres de l’UEMOA).

WATRA “*focuses on the need for West Africa to evolve a harmonized regulatory identity to boost investment and investor confidence and to more effectively regulate and monitor telecommunications service*”³.

CRTEL supports “*exchanges and cooperation between its members in order to promote regional integration, networks development and intra-community trade*”.⁴

On 23 March 2006 WAEMU adopted measures to harmonize laws and regulations and to set up consultation structures for regulators, providers and operators. These measures are composed in six (6) directives called “WAEMU directives”. It’s article 3 of the **Directive n°06/2006/CM/UEMOA** which deals with cross border frequency coordination.

ECOWAS also got involved in this issue and six (6) Supplementary Acts were signed by member states on 19 January 2007. The objective is to harmonize Telecommunication/ICT policy and regulatory framework. Its **Supplementary Act A/SA.5/01/07** deals with spectrum management.

ITU, through its project on Harmonization of the ICT Policies in Sub-Saharan Africa (HIPSSA), is supporting the ECOWAS harmonization program, including the transposition of the Community Acts.

As part of its effort to develop a sustainable regional West African telecommunications/ICT market, ECOWAS accords priority attention to satisfy a need in telecommunication infrastructure.

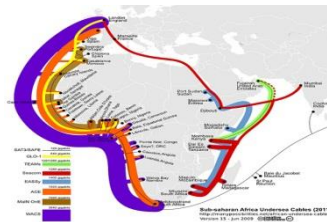
³ www.watra.org ;

⁴ Décision N°09/2006/CM/UEMOA du 23 mars 2006 portant création du Comité de régulateurs nationaux de télécommunications des États membres de l’UEMOA.

Figure 2: ECOWAS Regional Broadband Infrastructure



Figure 3: West Africa Submarine cables



1 Regional initiatives towards harmonized cross border frequency coordination

This part describes the regional initiatives on cross border frequency coordination framework with an emphasis on ECOWAS's view.

1.1 WAEMU

Spectrum planning, management and monitoring were introduced in the form of co-operation between countries. The above mentioned article 3 of the **Directive n°06/2006/CM/UEMOA** recommends countries to:

- Adopt rules for spectrum planning in particular for coherent National Table of Frequency Allocations;
- Set up simplified procedures for cross border frequency coordination between Member States;
- Organize mechanism to share spectrum management tools and equipment.

1.2 ECOWAS

ECOWAS's **Supplementary Act A/SA.5/01/07** aims at harmonizing the regulatory framework on spectrum management of its fifteen (15) countries.

This Act is a complete recommendation which deals with the role of the authority responsible of spectrum, spectrum plan, and cross border frequency coordination and associated tools.

1.1.1 Harmonizing regulatory framework

It's done through the article 4, which requires Member states to *“define a common framework for economically efficient spectrum management with a view to meeting the objective of liberalizing ICT market within ECOWAS”*.

1.1.2 Authority responsible of spectrum management

The role of national regulatory authority is described in article 12 but article 13 provides for more details on procedures when a Member States has more than one entity, which deals with spectrum management. Article 13 suggests that:

“members states shall ensure that, in those countries of the ECOWAS zone that manage the radio spectrum according to the multijurisdictional model, an inter-departmental committee is established with the following rules of operation:

- a) The committee shall in the first instance establish a policy agenda and guidelines for regulations;*
- b) The committee shall comprise members of key government agencies involved in spectrum management as well as key non-governmental stakeholders;*
- c) Officials records shall be kept of meetings of the committee and be made public, except where this may compromise national security interests;*
- d) Government representatives on the committee shall be appointed by a high level member for government for a period not exceeding five years renewable only once”*.

1.1.3 Spectrum plan

The conformity with the global and regional regulatory framework is mandatory as per article 10, which requires *“Member states to manage spectrum in ways to promote flexibility while respecting ITU international Allocations”*.

Article 16 suggests the *“[...] establishment of a national table of frequency allocation in each country”*.

1.1.4 Cross border frequency coordination

Cross border frequency coordination is interviewed on two levels: National and Regional.

On National level, article 11 asks *“members states to establish a framework which permits the effective coordination of all spectrum use, at the national, regional and international levels and to promote the merging of separate regulatory bodies dealing with spectrum use in the broadcasting and telecommunications spheres”*.

On Regional level, article 14 asks *“Members states to establish a special ECOWAS committee comprising the spectrum management bodies of each ECOWAS Member state with the task of defining common approach to spectrum management”*.

This committee shall examine the spectrum assignments and allocations of the ECOWAS countries and recommend a harmonized policy for promoting broadband wireless access service provision across the region.

1.1.5 Associated tools

Sharing tools is recommended through article 15 and article 16. Article 15 recommends “Member states to establish, possibly under the auspices of ECOWAS a common methodology for documenting and monitoring spectrum, sharing as necessary the costs of developing a software tool for that purpose”.

Article 16 suggests “Member states to establish a common framework for developing a public database of technical and locational information about radiocommunication system”.

Some of these recommendations have not been set up due to the lack of resources. For example, the special committee should report its findings by June 2007. This report never comes up.

2 Regional cross border frequency coordination agreements

Cross border frequency coordination is carried out through bilateral and/or multilateral meetings. These meetings came up either to a formal agreement or to arrangements. In this case, the minutes of meeting are acting as an agreement.

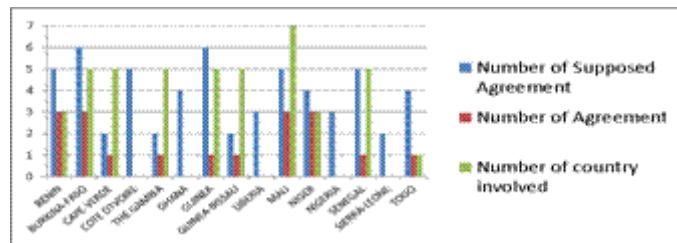
The minutes of meetings are usually specific solutions for interferences cases, which are occurring. At the difference of agreements, which plan arrangements for a certain number of frequency bands, these minutes take generally only into account one specific frequency band.

The table below shows that except Cote d’Ivoire, Ghana, Liberia, Nigeria and Sierra-Leone, others ECOWAS member states understood the need for cross border frequency coordination even if they could not have agreement with all of their neighbouring countries.

Table 1: cross border coordination agreements within ECOWAS zone

	BEN	BFA	CPV	CTI	GMB	GHA	GUI	GNB	LBR	MLI	NGR	NIG	SEN	SRL	TGO
Number of supposed agreement	5	6	2	5	2	4	6	2	3	5	4	3	5	2	4
Number of agreement	3	3	1	0	1	0	1	1	0	3	3	0	1	0	2
Number of country involved	3	3	5	0	5	0	5	5	0	7	3	0	5	0	2

Figure 4: Cross Border Coordination Diagram



Cross border frequency coordination agreement are divided into a **multilateral agreements** between Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mali and Senegal and **bilateral agreements** between Benin vs Burkina-Faso, Benin and Niger, Benin and Togo, Burkina-Faso and Mali, Burkina-Faso and Niger, Burkina-Faso and Togo and Mali and Niger.

Table 2: Agreement in ECOWAS zone

signed with	BEN	BFA	CPV	CTI	GMB	GHA	GUI	GNB	LBR	MLI	NGR	NIG	SEN	SRL	TGO
BEN		Green				Red					Green	Red			Green
BFA	Green			Red		Yellow				Green	Green				Green
CPV					Green		Blue	Blue		Blue			Green		
CTI		Red				Yellow	Red		Red	Red					
GMB			Green				Blue	Blue		Blue			Green		
GHA	Red	Yellow		Yellow											Yellow
GUI			Blue	Red	Blue			Green	Red	Green			Green	Red	
GNB			Blue		Blue		Green			Blue			Green		
LBR				Red			Red							Red	
MLI		Green	Blue	Red	Blue		Green	Blue			Green		Green		
NGR	Green	Green								Green		Red			
NIG	Red										Red				Red
SEN			Green		Green		Green	Green		Green					
SRL							Red		Red						
TGO	Green	Green				Yellow						Red			

AGREEMENT EXIST	MEETING REPORT AS AGREEMENT	AGREEMENT NECESSARY DON'T EXIST	AGREEMENT NOT NECESSARY BUT EXIST
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The content of the existing multilateral agreement is almost identical to the one of the various bilateral agreements. The main difference is the “*report of harmful interference*”, which does not exist in the multilateral agreement.

For member states such as Benin, Burkina-Faso, Mali and Togo which have several bilateral agreements, an effort of homogenization of their agreements have to be made in order to facilitate the task of spectrum managers.

Table 3: Comparison between agreements

	Number of Agreement	Frequency Bands	Agreement Harmonize	Definitions	Administrative Provisions	Technical Provisions	Coordination Procedures	Report of Harmful Interference
BEN	3	0 - 30 GHz	No	Yes	Yes	Yes	No	Yes
BFA	3	0 - 30 GHz	No	Yes	Yes	Yes	No	Yes
CPV	1	0 - 30 GHz	Yes	Yes	Yes	Yes	No	No
CTI	0							
GMB	1	0 - 30 GHz	Yes	Yes	Yes	Yes	No	No
GHA	0							
GUI	1	0 - 30 GHz	Yes	Yes	Yes	Yes	No	No
GNB	1	0 - 30 GHz	Yes	Yes	Yes	Yes	No	No
LBR	0							
MLI	3	0 - 30 GHz	No	Yes	Yes	Yes	No	Yes/No
NGR	3	0 - 30 GHz	Yes	Yes	Yes	Yes	No	Yes
NIG	0							
SEN	1	0 - 30 GHz	Yes	Yes	Yes	Yes	No	No
SRL	0							
TGO	2	0 - 30 GHz	No	Yes	Yes	Yes	No	Yes

Table 3 summarizes the agreement structure, which could be as follows:

1. Definitions (must include “Frequency categories” existing in bilateral agreement);
2. Technical provisions;
3. Report template of harmful interference (must be included in multilateral agreement);
4. Administrative provisions (follow-up of the agreement, revision of the agreement, language of the agreement, communication with the ITU, frequency register and focal point designation).

3 Regional survey comparative analysis

3.1 Regional Cross border coordination responsibilities

Fourteen (14) member states of ECOWAS have one (1) body responsible for cross border frequency coordination except Nigeria, which, due to its political configuration, seems to have more than one (1) body.

Member states respect supplementary acts article 12 and 13 which require one (1) body responsible for cross border frequency coordination and in the case where it’s not possible (Nigeria case), procedure must be set up (what Nigeria did).

Figure 5: Number of coordination body per country

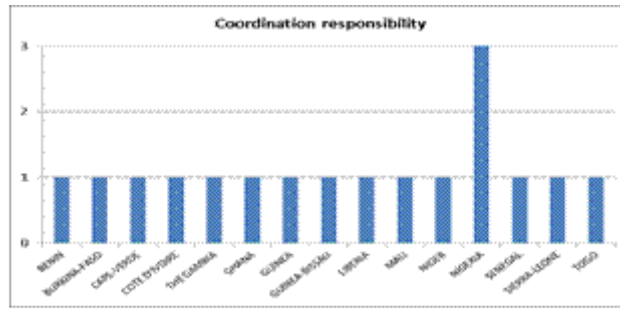


Table 4: Coordination Body

BEN	BFA	CPV	CTI	GMB	GHA	GUI	GNB	LBR	MLI	NGR	NIG	SEN	SRL	TGO
ATRPT	ARCE	ANAC	ATCI	PURA	NCA	ARPT	ICGB	LTA	CRT	ARM	FMIC, NCC, NBC	ARTP	NATCOM	ARPT

3.2 Regional Cross Border Frequency Coordination Framework

The article 14 of Supplementary acts asks “Members states to establish a special ECOWAS committee comprising the spectrum management bodies of each ECOWAS Member state with the task of defining common approach to spectrum management”. As a recall, this committee had not been installed yet. As per consequence, there is no regional framework for spectrum management in particular for frequency coordination.

The table 5 below gives the situation of the coordination frameworks. It appears that for the majority of Member States, the agreement (if it exists) constitute the formal framework to address cross border frequency coordination except in the case of Cote d’Ivoire and Togo which mentioned coordination frameworks for which they could not provide any reference.

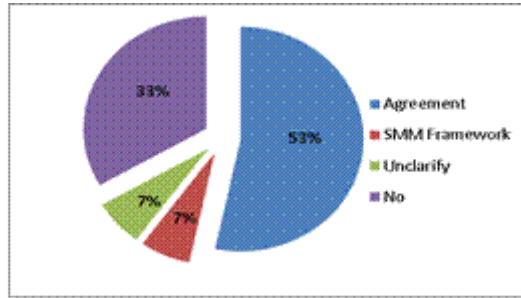
Table 5: Description of cross border frequency coordination framework per country

BEN	BFA	CPV	CTI	GMB	GHA	GUI	GNB	LBR	MLI	NGR	NIG	SEN	SRL	TGO
No	AGMT ⁵	No	Yes	AGMT	AGMT	AGMT	AGMT	No	AGMT	AGMT	No	AGMT	No	SMMF ⁶

⁵ Agreement as coordination framework;

⁶ Spectrum Management and Monitoring Framework as coordination framework

Figure 6 : Distribution of regional cross border frequency coordination



To conclude, it could be considered that there is no coordination framework apart from those listed here. This lack of a general coordination framework could be seen as a real opportunity.

As a matter of fact, if member states would harmonize their respective cross border frequency coordination agreements, it would result in a de facto operational coordination framework for the region. In addition, this would fulfil the objectives and the requirements set by Supplementary Act’s articles 4 and 11.

3.3 Regional Table of Frequency Allocations

West Africa does not have a regional table for frequency allocation. But, the article 10 and article 16 of the Supplementary Act require member states to establish National Tables of Frequency Allocation complying with ITU recommendations.

Table 6 and Figure 7 show that 73% of member states have a National Table of Frequency Allocations. Member States such as Benin, The Gambia and Nigeria have their NTFAs currently under development; this ratio could reach 93%. However, only 36% of Member States have their NTFA complying with the requirements of the ITU Region I 2008 table of allocations as shown in Figure 8.

Table 6: NTFA comparison

	Status	Edition	Compliant ITU Region I, 2008 edition	Covered	Difference	Observations
BEN	DE ⁷					Being edited
BFA	E ⁸	2008	Yes	0 - 1000 GHz		
CPV	E	2008	Yes	9 kHz - 1000 GHz		
CTI	E	2006	No	9 kHz - 1000 GHz		need to be updated
GMB	DE					Under Development
GHA	E			9 kHz - 400 GHz		
GUI	E	2005				need to be updated
GNB	DE					
LBR	E	2010	Yes	9 kHz - 400 GHz		
MLI	E	2003	No	9 kHz - 30 GHz		need to be updated
NGR	E	2010	Yes	9 kHz - 1000 GHz		
NIG	DE					Being edited
SEN	E	2006	No	9 kHz - 300 GHz		need to be updated
SRL	E			9 kHz - 64 GHz		
TGO	E	2006	No	9 kHz - 100 GHz		need to be updated

Figure 7: Percentage of Member states which have a NTFA

National Table of Frequency Allocation

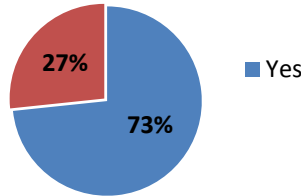
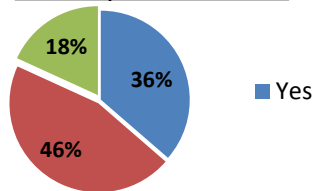


Figure 8: Percentage of NTFA compliant to ITU-RR

NTFA Compliant ITU-R RR 2008



⁷ Don't Exist ;
⁸ Exist

3.4 Coordination Procedures

As mentioned above, there is no common framework for spectrum management at the regional level. Therefore, there is no common approach for frequency coordination procedures. Moreover, agreements that act as cross border frequency coordination frameworks do not have real coordination procedures.

3.5 Interference problems and cross border frequency coordination experiences

The majority of member states indicated to facing interferences at the borders. The figure below shows that frequency band allocated to broadcasting service, mobile service of 2nd and 3rd generations corresponds to the band for which cross border frequency coordination is primarily required. It should be noted that all the bands listed below have already been subject to meeting or agreement.

Figure 9: Frequency band requiring coordination

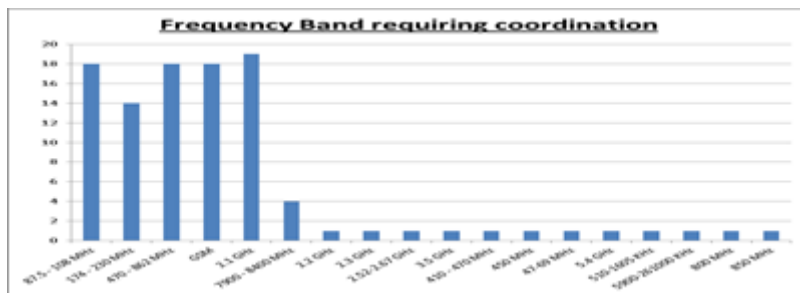
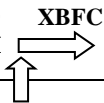


Table 8 : Frequency band and countries requesting coordination

NEED WITH 	BEN	BFA	CPV	CTI	GMB	GHA	GUI	GNB	LBR	MLI	NGR	NIG	SEN	SRL	TGO
BEN		X				X						X			
BFA	X			X		X				X	X				X
CPV													X		
CTI															
GMB													X		
GHA															
GUI															
GNB															
LBR															
MLI		X		X			X				X		X		
NGR	X	X								X		X			
NIG	X										X				
SEN			X		X		X	X		X					
SRL							X		X						
TGO	X	X				X						X			

This problem is to be analysed on two (2) levels. Firstly, the persistence of interferences within agreed frequency bands and secondly interferences in new frequency bands.

In the first case, the notification of interference in agreed frequency bands means either that the agreement is not respected or the agreement did not take into account adequate technical parameters, calculation method and procedures

In the second case, the notification of interference means that the authorities responsible of coordination were not prospective enough to identify then integrate frequency band in the agreement.

In all cases, the persistence of interference in member states, which have agreements, questions the effectiveness of the agreements in their current structure and content.

In some cases the motivation to solve interferences is distinct to the adoption of an agreement. It's the case of The Gambia who is forced to re-assign frequency to its national operator.

To conclude, the resolution of interferences is generally successful but time consuming according to the approach used. In comparison, interference at Benin and Togo borders took two (2) weeks where as interference at The Gambia and Senegal borders took six (6) months.

It should be noted that the majority of member states do not have reliable data on interference because, for member states, frequency register to store relative information's on coordinated frequencies do not exist.

3.6 Analysis of different data exchange format used in the region

Regarding data exchange, information, which is mandatory in the existing agreements, both bilateral and multilateral, have similar formats and are as follows:

- Owner;
- Category of the station;
- Number of stations;
- Type of station (Base or mobile);
- Frequency;
- Longitude and latitude;
- Location;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

3.7 Analysis of Tools and Databases used in the region

The presentation of this part relates to ITU tools, tools, which were purchased or self-developed, digital terrain data and propagation models, which are used for spectrum management and monitoring by West Africa Countries.

3.8 ITU Tools

The table 8 gives the situation of ITU tools used by West African countries.

Table 9: Situation of ITU Tools in West Africa

	BEN	BFA	CPV	CTI	GMB	GHA	GUI
Tools in possession	SMS4DC	SMS4DC	SMS4DC	SMS4DC	SMS4DC, GE84, WISFAT	TerRaNotices	TerRaNV, TerRaQ, RRC06
Used	Yes	Yes	No	Yes	Yes	Yes	Yes

	GNB	LBR	MLI	NGR	NIG	SEN	SRL	TGO
Tools in possession	SMS4DC, WINBASMS	No	No	SMS4DC	No	Not described	No	GE84
Used	Yes	No	No	No	No	Yes	No	Yes

It could be necessary to exclude Guinea and Togo in this evaluation because these countries spontaneously did not mention in the first place having these tools.

Thus, from figure 10 it appears that more than 2 countries on 4 (53%) have tools developed by ITU. Among ITU tools, SMS4DC represents the tool that countries should have as a default for spectrum monitoring (figure 10). Nevertheless results of this survey show that nowadays countries have invested in spectrum management and monitoring activities. However, Figure 11 shows that only 71% of countries, which have SMS4DC, effectively use it.

Figure 10: Percentage of Country with ITU Tools

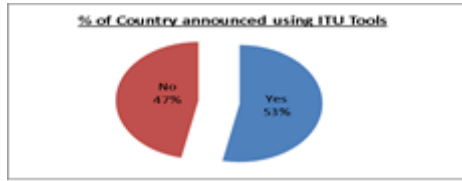


Figure 11: Percentage of ITU Tools being used

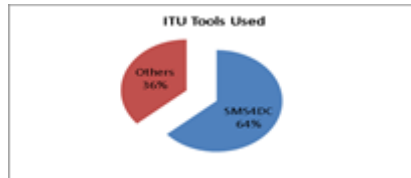
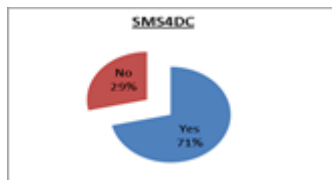


Figure 12: Percentage of SMS4DC effective use



This current situation in West Africa is interesting because of the challenges faced by ITU tools, which are adaptability and training. It is therefore important that this project make use of the lessons learned from the past in order to provide adapted ITU tools and appropriate training.

3.9 Purchased or Self Developed Tools

The table 9 gives the situation of purchased tools in West Africa.

Table 10: Purchased Tools used

		BEN	BFA	CPV	CTI	GMB	GHA	GUI	GNB
Spectrum Tools	Management	SPECTRA	ASMS	SPECTRA	IRIS		ICS TELECOM		
	Monitoring	ARGUS	8068, SCORPIO	ARGUS			8067B, SCORPIO	ARGUS	

		LBR	MLI	NGR	NIG	SEN	SRL	TGO
Spectrum Tools	Management			ASMS	Yes	SPECTRA		
	Monitoring			8067B, SCORPIO	Yes	ARGUS		

Figure 13: % of Countries with Purchased Tools

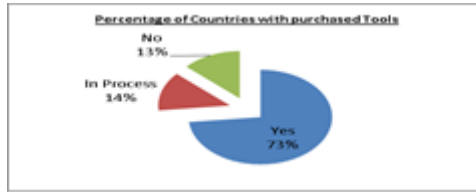
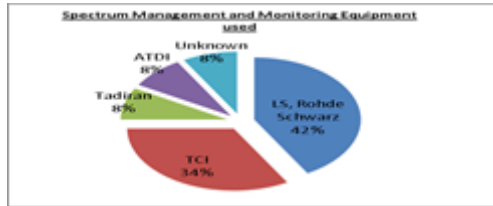


Figure 14: Type of Purchased Tools



About 87% of countries use equipment for spectrum management that confirms the tendency announced previously which is related to countries interest in spectrum management and monitoring activities.

ARGUS and SCORPIO are mostly tools used for spectrum monitoring whereas SPECTRA and ASMS are used for spectrum management. In addition, there are others tools such as spectrum analysers, frequency counters, etc.

In all cases, it seems that two (2) manufacturers share the market (LS – ROHDE & SCHWARZ and TCI with respectively 42% and 34 %).

It would thus be convenient for ITU to think about the legal approach so that these manufacturers could have the possibility to integrate HCM4A as that is made with HCM.

3.10 Digital Terrain Data

Only 20% of the countries (Burkina Faso, Ghana and Senegal) use digital terrain data. Two of them have the same geographical projection system (WGS84) with terrain resolutions between 20 meters to 200 meters.

Besides Senegal, which communicated the coordination line located at the border, most of the countries have the coordination area as the zone whereof interference calculation is made.

Table 11 : Digital Terrain Characteristics

	Elevation / Morphological Data	Geographical projection System	Resolution of Terrain Data	Point / Line whereof calculation is made
BEN	No	No	No	Coordination area
BFA	Yes	WGS 84	90 m	Coordination area
CPV	No	WGS 84	1:10000	
CTI	No	No	No	No
GMB	No	No	No	No
GHA	Elevation and Morphological dots	49 DBMS	90 m	No
GUI	No	No	No	Coordination area
GNB	No	No	No	Coordination area
LBR	No	No	No	No
MLI	No	No	No	Coordination area
NGR	No	No	No	Coordination area
NIG	No	No	No	No
SEN	Yes	WGS 84	200 m v 20 m	Line located @ border
SRL	No	No	No	No
TGO	No	No	No	Coordination area

Some countries use JPG (or BMP) maps or map incorporated within SMS4DC.

3.11 Propagation Model

The Table 11 lists propagation model used in West Africa. ITU-R P.525, ITU-R P.530 and ITU-R P.1546 are the most used models.

Table 12: Propagation Model use

	ITU-R P.370	ITU-R P.452	ITU-R P.525	ITU-R P.530	ITU-R P.567	ITU-R P.618	ITU-R P.1546	ITU-R P.1818	Free Space	Okumura -Hata	Walfish-Ikegami	Longley -Rice	Sky Wave
BEN													
BFA							Mobile, Broadcasting						
CPV		x		x	x	x	x	x	x	x	x	x	x
CTI													
GMB			Fixed	Fixed			Terrestrial Services						
GHA			Broadcasting, Mobile, WLL										
GUI													
GNB	x	x		x		x	x		x	x			
LBR													
MLI			Fixed	Fixed			Mobile, Broadcasting						
NGR							Mobile, Broadcasting						
NIG													
SEN			Fixed	Fixed			Mobile, Broadcasting						
SRL													
TGO							Mobile, Broadcasting						

4 Observations

It is important to report:

- the cooperation of all the countries to provide response to the questionnaire even if the speed of data collection varies from a country to another;
- the availability of sub regional organizations to share their opinions relating to this project.

The data of certain countries such as Nigeria must be re-examined since time did not allow, as it was the case for the other countries, to check the coherence and the reliability of their response.

5 Regional conclusions and recommendations

The West African survey of the cross border frequency coordination was successful in general even if the responses of certain countries are not very developed and must be thoroughly analysed. This diagnosis enabled the identification of the bodies responsible for international coordination and, except Nigeria; all the countries have only one body.

The majority of the countries have national table of frequency allocation, which, sometimes deserve to be updated. For all these countries, there is no national framework for frequency coordination.

In fact, a cross border frequency coordination agreement (if it exists) is used as reference framework. The region has multilateral and bilateral agreement. These agreements, practically, have the same structure and contents. This model of agreement could be structured into four (4) parts, which are:

- Definitions;
- Technical provisions;
- Report of Harmful Interference;
- Administrative provisions;

But, this model of agreement must be reviewed and a fifth part, entitled “*Coordination Procedures*”, non-existent in the model could complete the structure. In addition, this model has a data exchange format and, the survey indicated that Internet (e-mail) is the suitable method for data transmission.

It had been noted that the majority of the countries do not have frequency registers to store the results of coordination. However, the majority of the countries have or are going to have spectrum management and monitoring systems. In addition, it was shown that tools from ITU deserve adaptability and more training.

Finally, the survey made possible to raise the insufficiencies of agreements since there is a persistence of interference in agreed frequency bands. This situation poses the need for a method to calculate and evaluate field strength (power) in order to prevent harmful interference.

Consequently, taking into account the fact that on the regional level, ECOWAS, through its supplementary acts, required a common coordination framework, it is necessary to encourage the countries to work for an effective cooperation. This cooperation passes by the design of a harmonized model for cross border frequency coordination.

This common framework must be composed by the reviewed model of agreement and a harmonized calculation method (which is lacking). This design must also be followed by a phase of training in order to help the countries to adapt this new tool for a better exploitation.

6 Contact

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7 Annex

7.1 Annex 1:

ECOWAS'S SUPPLEMENTARY ACT A/SA.5/01/07.

7.2 Annex 2

DIRECTIVE N° 06/2006/CM/UEMOA ORGANISANT LE CADRE GENERAL DE COOPERATION ENTRE LES AUTORITES NATIONALES DE REGULATION EN MATIERE DE TELECOMMUNICATIONS.

Part 2: National Reports

Benin

1 Introduction

1.1 Country profile

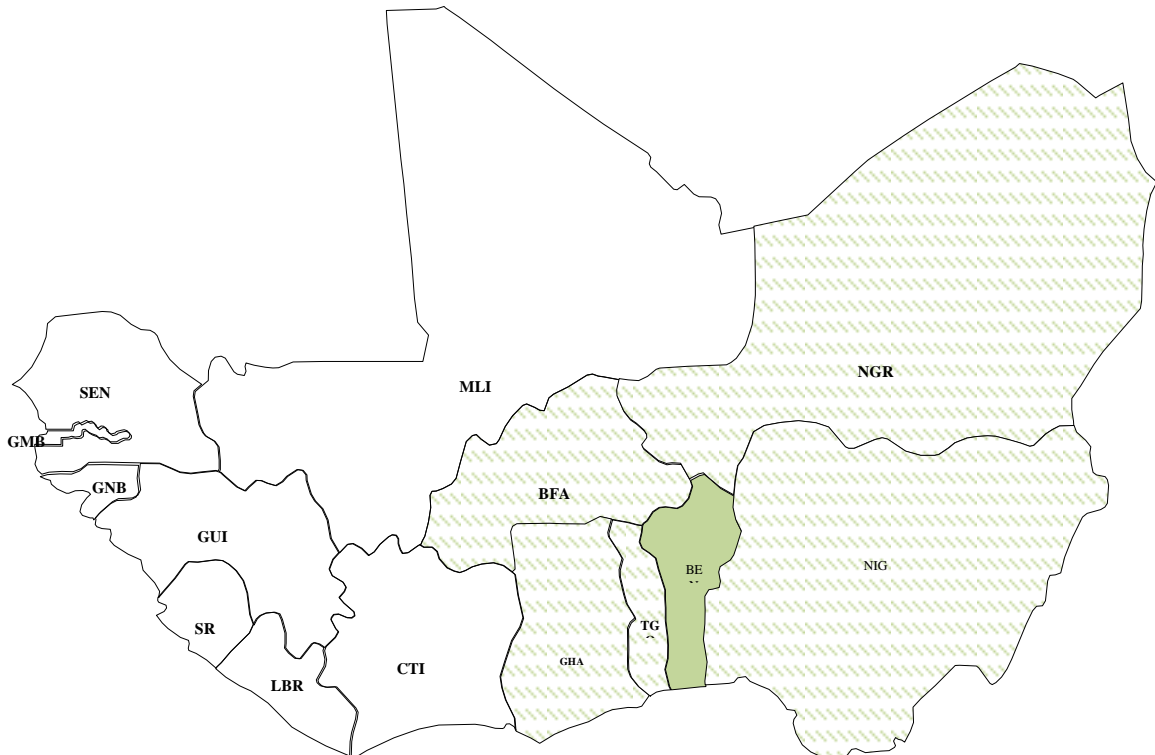
The Republic of Benin is a country with a surface area of 112 620 km², located in Western Africa in the tropical area between the Equator and the tropic of Cancer. To the south it is bordered by the Atlantic Ocean. To the northwest it is bordered by Burkina Faso and Niger, to the west by Togo and to the east by Nigeria.

Benin is part of the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS).

Benin macro-economic statistics⁹ are as follows:

- Population 8,934,985 inhabitants;
- GDP per capita US \$ 744.90;
- GDP per capita growth 0.63%;
- Inflation, consumer prices 2.16%;
- Inflation, GDP deflator 1.17%

Figure 15: Benin and its neighboring countries



⁹ <http://data.worldbank.org>

1.2 Brief telecommunication / broadcasting profile

The telecommunication and broadcasting sector in Benin is characterized by its lack of a legal framework and adequate and uniform regulation, this despite the existence of regulatory authorities (ATRPT and HAAC).

The “*Autorité Transitoire de Régulation des Postes et Télécommunications (ATRPT)*” takes care of the regulation of telecommunication and the Internet, while the High Authority for Audiovisual Communication (HAAC) takes care of the regulation of radio and television broadcasting contents.

The functions of the Transitional Regulatory Board are, among other things:

- to decide on the issuing of licenses and approval ;
- to define the technical prescriptions applicable to the telecommunication network and terminal equipment in view of guaranteeing their interoperability, number portability and the proper use of radio electric frequencies and telephone numbers.

The HAAC is independent of any political authority, any political party, association or pressure group of any nature whatsoever. Its task is, among other things, to ensure the freedom and protection of the press as well as all the means of mass communication in respect of the law. In addition, the HAAC is responsible for the use and allocation of frequencies devoted to radio and television broadcasting.

The telecommunication and broadcasting sector in Benin is marked by the presence of the following role players:

- One (1) fixed-line network operator (BÉNIN-TÉLÉCOMS SA). It is a public operator. This company is currently being privatized;
- Five (5) GSM operators, of which four are private (GLO MOBILE, MTN, ETISALAT and BBCOM) and one (LIBERCOM) belongs to the incumbent operator;
- Internet access providers;
- Various radio and television stations.

2 National Spectrum Management Framework

2.1 Legislative basis

ATRPT is responsible for radio frequency management in terms of Ordonnance 2002-002 on 31 January 2002 establishing the fundamental principles of the telecommunication legal regime of Benin.

2.2 National Table of Frequency Allocations

ATRPT are working out on the “*Plan National d’Attribution des Fréquences (PNAF)*”. The project is at its final stage. This PNAF contains the national table of frequency allocation (NTFA). This NTFA is compliant to ITU- Region 1 table of frequency allocation. An electronic copy of PNAF will be sent when adopted.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ATRPT is responsible for frequency coordination. This responsibility is extended to all services (Fixe, Mobile, Broadcasting, Satellite, Maritime, etc.) and for any use (Civil as well as military). As a consequence, there is no challenge on spectrum management.

Regarding cross border frequency coordination agreement, ATRPT had signed three (3) bilateral agreements with Burkina – Faso (November 2010), Niger (November 2010) and Togo (December 2010).

3.2 Bilateral / Multilateral agreement

According to the response to the questionnaire, Benin does not have a framework (administrative procedures, technical provisions, frequency register to store coordination results, etc.) for cross border frequency coordination.

However, ATRPT had signed three (3) bilateral cross border frequency coordination agreements as mentioned in the previous paragraph.

Frequencies in the bands listed below which concern Fixed, Land Mobile and Broadcasting Services shall be coordinated under the terms of these agreements.

Table 13: Frequency Bands under the terms of agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
452 – 470 830 – 840 / 875 – 885	CDMA
880 – 890/925 – 935 890 – 915/935 – 960 1710 – 1785 / 1805 – 1880	GSM
1755 – 1805/2110 – 2160 1920 – 1980 / 2110-2170	UMTS / FDD
1900 – 1920 2010 – 2025	UMTS / TDD
2500 – 2690	WLAN, IMT, MMDS
3400 – 3600	BLR, IMT
6425 – 7110	Microwave
7125 – 7725	
7900 – 8400	
10700 – 11700	
12750 – 13250	
14500 – 15350	
17700 – 19700	
21200 – 23600	
24500 – 26500	
27500 – 29500	

These agreements are mainly structured on:

1. Frequency categories;
2. Report of harmful interference;
3. Coordination procedures;
4. Administrative provisions;
5. Technical provisions;
6. Exchange information and Focal Point.

Attached to these agreements as annexes, there are specific technical provisions, which detail minimal conditions for a station to operate within each frequency band.

– Frequency categories

This part defines the following terms shown in the table hereafter.

Table 14: Terms definition

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions
penetration distance	distance beyond which the service ensured by a transmitter of the neighbouring country must be inoperative
coordination area	a zone adjacent to two countries' border, with a certain distance deep in each country's interior.
harmful interference	any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

– Report of harmful interference

The three (3) Agreements are mentioning that the Administration affected must report harmful interference to its counterpart for solving within a delay of thirty (30) days.

– Coordination procedures

Agreements with Burkina and Niger do not have coordination procedure. It is only the signed agreement between Benin and Togo who spells out the coordination procedure.

However, this procedure is just limited to the transmission of information. It is not taking into account steps to follow in case of predefined frequency categories coordination.

– Administrative provisions

Administrative procedures give details on the following items: follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.

– Technical provisions

Agreements authorize Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are:

- In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;
- In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.

However, technical provisions described in annex are applicable.

– Exchange information and Focal Point

Agreements require each administration to exchange information and to designate its focal Point.

Focal points are:

Table 15: Focal Point

Country	Focal Point
Benin	Géraud-Constant AHOKPOSSI aconstant@atrpt.bj +229 21 31 01 65 +229 95 63 35 71
Burkina Faso	Pousbilo OUEDRAOGO pousbil@arce.bf +226 50 37 53 60 +226 70 26 84 08
Niger	Salou Abdou DORO salou.abdou@ties.itu.int +227 20 73 90 08 +227 93 82 64 00
Togo	Not specified

3.3 Interference experience

As cross border frequency coordination agreements are recently signed, it is possible that ATRPT does not have reliable data which can allow coordination or interference cases to be qualified as successful or unsuccessful.

Nevertheless, at the time when ATRPT responded, interference with Togo had been notified. It concerned mobile service (GSM and DCS). It took less than 2 weeks to solve the problem. The procedure followed is the operator on the Benin side who was experiencing the interference made some measurements and some minor changes. The Togolese side was informed of the issue. This interference had been solved successfully.

But, as ATRPT express the needs of cross border frequency coordination with Nigeria and Ghana, it's possible there are unsolved cases of interferences. The needs concern mobile (GSM, DCS and 3G) and broadcasting services.

Table 16: Frequency band and Service requiring coordination

GE06	Broadcasting	Ghana, Nigeria
GSM, DCS	Mobile	Ghana, Nigeria
3G	Mobile	Ghana, Nigeria

3.4 Data Exchange Format

ATRPT has a “*le Fichier National des Fréquences (FNF)*”, acting as a National Frequency File. For le FNF, format differs according to the service. But common fields are as follows:

- Owner;
- Service;
- Transmitting frequency;
- Receiving frequency;
- Latitude and longitude;
- City;
- License Number;
- Duration;
- Observations.

For the exchange of information, which is mandatory as per the coordination agreements, there are two (2) different formats: one for Niger and another for both Burkina Faso and Togo. The difference between these formats is Basic Station Information Code (BSIC) information, which is added to Burkina-Faso and Togo.

Common fields are:

- Owner;
- Category of the station;
- Number of stations;
- Type of station (Base or mobile);
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Angle of elevation;
- Antenna height.

In the perspective of cross border frequency coordination framework, paper, CD/DVD and mail are said to be suitable transmission methods for information exchange between Benin and its neighbouring countries¹⁰.

¹⁰ Different agreement announced only mail as transmission method.

3.5 Tools and database used

The only tool in possession by ATRPT is SMS4DC. This software lately acquired from BDT is used for interference calculation and coordination. Instead of digital terrain data, ATRPT is using SMS4DC Maps.

It's important to keep in mind that ATRPT launched a call for tenders to purchase automatic spectrum management system as well as spectrum monitoring system. LS and ROHDE & SCHWARZ are chosen. Both the spectrum management and the monitoring systems will be installed before end of this year.

4 Observation

Benin does have one entity which deals with cross border frequency coordination. On the other hand, Benin does not have:

- A National Table of Frequency Allocations;
- A framework for cross border frequency coordination;
- Procedures for predefined frequency category;
- Calculation method to evaluate if the power of a site will cause problems or not.

5 Conclusion and Recommendations

Benin starts to deal with cross border frequency coordination. However, efforts must be realized in order to supplement an appropriate framework by the development and the adoption of adequate procedures.

This can be achieved through a harmonized framework for the whole ECOWAS zone.

6 Contact

For this study, Géraud-Constant AHOKPOSSI and Aurelie ADAM SOULE had been contacted.

The focal point is:

Géraud-Constant AHOKPOSSI,
 Chef Division des opérations
 ATRPT, 01BP 2034 Cotonou
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7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Benin

7.2 Cross border frequency coordination agreement

Annex 2, Cross border frequency coordination agreement between Benin with Burkina Faso;

Annex 2bis, Cross border frequency coordination agreement between Benin with Niger;

Annex 2ter, Cross border frequency coordination agreement between Benin with Togo.

Burkina-Faso

1 Introduction

1.1 Country profile

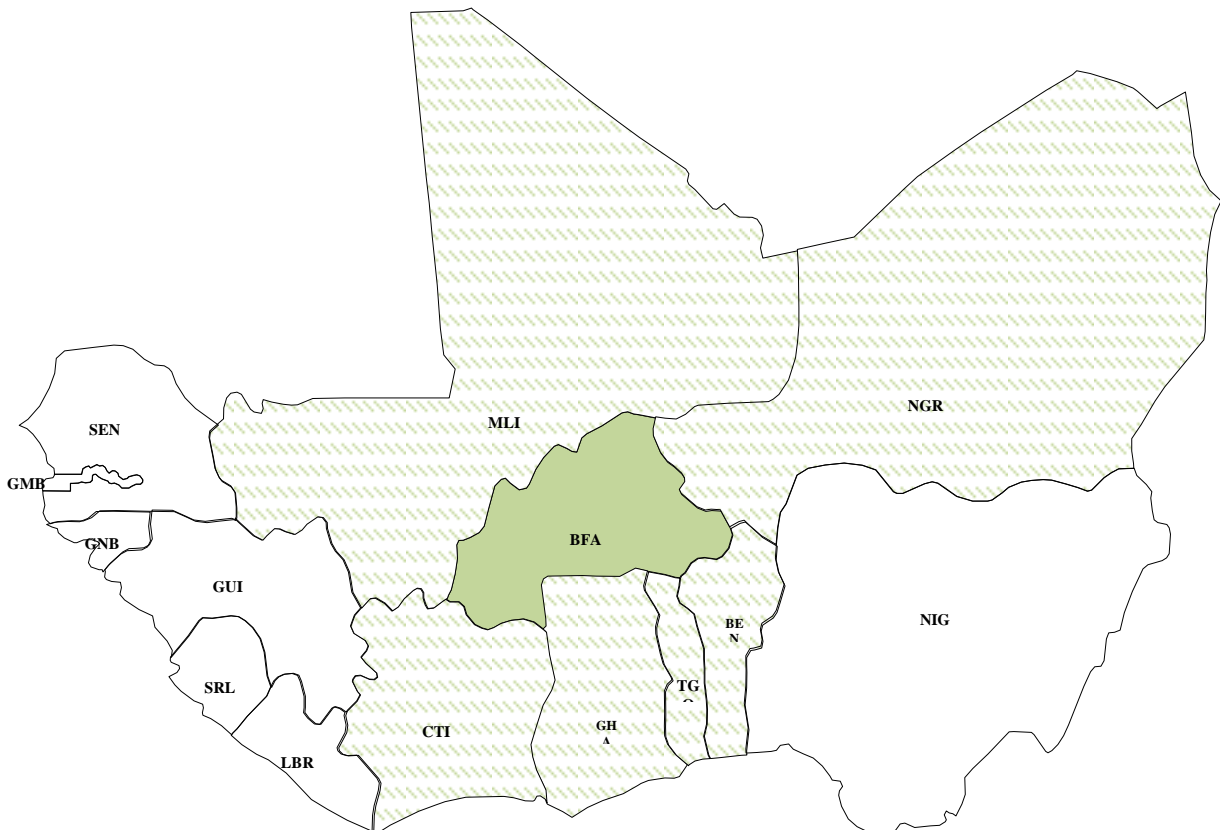
The republic of Burkina-Faso is a country with a surface area of 274 000 km² located in Western Africa in the tropical area between the Equator and the tropic of Cancer. Burkina-Faso has six neighbouring countries. To the North, it is bordered by Mali, to the East by Niger, to the southeast by Benin, to the South by Ghana and Togo, to the southwest by Cote d'Ivoire.

Burkina-Faso is part of the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS)

Burkina-Faso macroeconomic statistics¹¹ are as follows:

- Population 15,756,927 inhabitants;
- GDP per capita US \$ 516.65;
- GDP per capita growth 0.06%;
- Inflation. consumer prices 2.61%;
- Inflation. GDP deflator 3.08%.

Figure 16: Burkina Faso and its neighboring countries



¹¹ www.data.worldbank.org;

1.2 Brief Information and Communication Technology profile

a) Ministère des Postes et des Technologies de l'Information et de la Communication, MPTIC¹²

The Ministry des “*Postes et des Technologies de information et de la Communication*” translates the will of the Government to seize all opportunities that offer information and communication technology for the economic and social development of Burkina Faso. For this reason, the Ministry takes care of:

- creation of ICT infrastructures;
- promoting ICT;
- spectrum management and monitoring.

b) Regulatory authorities

Two (2) independent organs ensure the regulation of Telecommunications and Broadcasting in Burkina Faso. They are:

- Autorité de Régulation des Communications Electroniques, ARCE;
- Conseil Supérieur de la Communication, CSC.

i. Autorité de Régulation des Communications Electroniques

The law n°61-2008/AN enacted in November 27, 2008 set up the Electronic Communications Regulatory Authority (ARCE). ARCE's role is basically to approve interconnection agreements among operators, settle disputes, and organize invitations to compete with a view to the granting of any licences (fixed and mobile telephony, radio).

ii. Conseil Supérieur de la Communication

The “*Conseil Supérieur de la Communication*”¹³ guarantees the honouring of legislative and regulatory texts that protect and organize the freedom of communication. The “*Conseil Supérieur de la Communication*” is an administrative authority which was created on 01 August 1995 in accordance with the clauses of Act no. 56/93/ADP of 30 December 1993 bearing on IT.

c) Operators

The telecommunication and broadcasting sector in Burkina Faso is marked by the presence of the following role players:

- For Fixed Services: ONATEL, incumbent operator, owned (51%) by MAROC TELECOM;
- For Mobile Services: TELMOB (ONATEL's subsidiary), AIRTEL BURKINA, TELECEL BURKINA;
- For Broadcasting Service: Télévision Nationale de Burkina, five (5) private television channels and two (2) MMDs operator.
- For Internet Services: ONATEL's FASONET.

2 National Spectrum Management Framework

2.1 Legislative basis

ARCE is responsible for radio frequency management in terms of telecommunications Law 051/98/AN, enacted in December 1998.

¹² www.mptic.gov.bf

¹³ www.csi.bf

2.2 National Table of Frequency Allocations

ARCE had edited, in 2008, the National table of Frequency allocation (NFTA). Since 2010, this NFTA had been updated in order to take into account new allocation due to the introduction of new system or technology (International Mobile Telecommunications - IMT for example). NFTA's 2010 edition that will be adopted soon is fully compliant to ITU-R Region I table of allocation as indicated by the example in the table below.

ITU-R RR 2008 REGION I		BURKINA-FASO		
BAND	SERVICE	BAND	SERVICE	APPLICATIONS & INFORMATION
148-149,9 MHz	FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (earth to space) 5.2095.218 5.219 5.221	148-148,4 MHz	FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (earth to space) 5.2095.218 5.219 5.221	PMR/PAMR ECC/DEC/(06)06 T/R 25-08 EN 300 086 ERC/DEC/(99)06 EN 301 721 paired to 152,6-153,0 MHz
		148,4 – 149 MHz	FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (earth to space) 5.2095.218 5.219 5.221	PMR/PAMR ECC/DEC/(06)06 T/R 25-08 EN 300 086 ERC/DEC/(99)06 EN 301 721paired to 153,0-154,5 MHz

NFTA include national footnotes describing terms and conditions under which frequency band should be used. These footnotes take into account remarks within ITUR-R region I footnotes related to the frequency band.

ITU-R RR 2008 REGION I		BURKINA-FASO		
BAND	SERVICE	BAND	SERVICE	APPLICATIONS & INFORMATION
148-149,9 MHz	FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (earth to space) 5.2095.218 5.219 5.221	148-148,4 MHz	FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (earth to space) 5.2095.218 5.219 5.221 BFA.003	PMR/PAMR ECC/DEC/(06)06 T/R 25-08 EN 300 086 ERC/DEC/(99)06 EN 301 721 paired to 152,6-153,0 MHz
		148,4 – 149 MHz	FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (earth to space) 5.2095.218 5.219 5.221 BFA.003	PMR/PAMR ECC/DEC/(06)06 T/R 25-08 EN 300 086 ERC/DEC/(99)06 EN 301 721 paired to 153,0-154,5 MHz

Technical interfaces regulation (radio-frequency channel arrangement, standard, etc ..) used by ARCE are strictly compliant to ITU-R recommendation.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ARCE is the unique body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as military).

By giving cross border frequency coordination function to ARCE only, Burkina-Faso will facilitate cross border frequency coordination procedures; this decision is in conformity with article 11 subparagraphs 2 of ECOWAS supplementary acts who recommend ECOWAS countries to have one (1) body dealing with cross border frequency coordination.

3.2 Bilateral / Multilateral agreement

Burkina-Faso does not have specific cross border frequency coordination procedures apart from those envisaged by coordination agreements. There are minutes of meetings acting as bilateral agreement for GSM and broadcasting service and three (3) agreements which covered terrestrial services from 87.5 MHz to 30 GHz.

Minutes of meetings concern Togo (August 2003, January 2005) and Ghana (January 2005). These minutes are curative solutions to solve harmful interference that had been notified at the border. Within these minutes, *penetration distance*, *coordination area*, *power* and their associated values not to be exceeded are defined. Minutes do not have any procedure.

The agreements concern Mali (January 2010), Benin (November 2010) and Niger (November 2010). Frequencies in the bands listed below which concern Fixed, Land Mobile and Broadcasting Services shall be coordinated under the terms of these agreements.

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
452 – 470 830 – 840 / 875 – 885	CDMA
880-890/925-935 890 – 915/935 – 960 1710 – 1785 /1805 – 1880	GSM
1755 – 1805/2110 – 2160 1920 – 1980 /2110 – 2170	UMTS / FDD
1900 – 1920 2010 – 2025	UMTS / TDD
2500 – 2690	WLAN, IMT, MMDS
3400 – 3600	BLR, IMT
6425 – 7110	Microwave
7125 – 7725	
7900 – 8400	

Frequency Band (MHz)	Applications
10700 – 11700	
12750 – 13250	
14500 – 15350	
17700 – 19700	
21200 – 23600	
24500 – 26500	
27500 – 29500	

These agreements are mainly structured on:

1. Frequency categories;
2. Report of harmful interference;
3. Coordination procedures;
4. Administrative provisions;
5. Technical provisions;

Exchange information and Focal Point.

Attached to these agreements as annexes, there are specific technical provisions which detail minimal conditions for a station to operate within each frequency band.

– Frequency categories

This part defines the following terms shown in the table hereafter:

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions
penetration distance	distance beyond which the service ensured by a transmitter of the neighbouring country must be inoperative
coordination area	a zone adjacent to two countries' border, with a certain distance deep in each country's interior.
harmful interference	any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

– Report of harmful interference

Within agreement with Benin and Niger, it is said that the Administration affected must report harmful interference to its counterpart for solving within a delay of thirty (30) days.

With Mali, there is no report of harmful interference.

– Coordination procedures

Agreements are mainly based on the fact that an administration which has been granted a preferential right may put stations operating on preferential frequencies into use without prior coordination. The Administration using the preferential frequencies must inform (using the exchange format) the other Administration.

There is no procedure (**for other predefined frequency category**) which described, for example, at least steps for:

- circulate a request for co-ordination to all Administrations affected for their comment;
- Ask (the Administration affected) for information within a certain delay upon receipt of the request for co-ordination;
- Evaluate (the Administration affected) information in accordance with the provisions of the Agreement and notify the requesting Administration of the outcome;
- Notify (to the Administration affected) any coordinated frequency assignment as soon as the corresponding station is put into operation but not later than a certain delay upon approval
- Notify (the Administrations affected) of any change on the technical characteristics of stations registered in the frequency register.

– Administrative provisions

Administrative procedures give details on the following terms: follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.

– Technical provisions

Agreements authorize Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are:

- In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;
- In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.

However, technical provisions described in annex are applicable. These technical provisions consist of a limitation of the field strength and the antenna height.

– Exchange information and Focal Point

Agreements require each administration to exchange information and to designate its focal Point. Focal points are:

Country	Focal Point
Burkina Faso	Pousbilo OUEDRAOGO pousbil@arce.bf +226 50 37 53 60 +226 70 26 84 08
Benin	Géraud-Constant AHOKPOSSI aconstant@atrpt.bj +229 21 31 01 65 +229 95 63 35 71
Mali	Ibrahim Belco MAIGA belco@crt.ml +223 20 23 14 90 +223 66 76 59 88
Niger	Salou Abdou DORO salou.abdou@ties.itu.int +227 20 73 90 08 +227 93 82 64 00

3.3 Interference experience

Burkina Faso used to report interference originated from Ghana on FM frequency band. There is also interference notification on HF frequency band. GSM coordination with preferential frequency approach can be considered as successful.

Burkina Faso expresses the needs of cross border frequency coordination as it’s described in the table below.

Band (MHz)	Service	Neighboring Country	Priority
87.5 – 108	Broadcasting	Cote d'Ivoire, Ghana, Togo, Benin, Niger, Mali	H
174 – 230	Broadcasting		H
470 – 862	Broadcasting		
880 – 890/925 – 935	GSM		H
890 – 915/935 – 960	GSM		H
1710 – 1785 /1805 – 1880	GSM		H
1920 – 1980 /2110 – 2170	UMTS / FDD		H
1880 – 1920	UMTS / TDD		H

Announcing GSM, FM and TV frequency bands at borders where agreements are signed suppose either that all the notified interferences are not solved or agreements are ineffective due to the lack of procedures.

3.4 Data Exchange Format

Even if ARCE do not have a frequency register, “Exchange of information” is mandatory as per the coordination agreement.

There are two (2) different formats for exchange of information: one for Benin and another for both Mali and Niger. The difference between these formats is the field called Base Station Identity Code (BSIC) which is added to Benin.

Common fields are:

- Owner;
- Category of the station;
- Number of stations;
- Type of station (Base or mobile);
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

Mail is said to be suitable transmission methods for information exchange between Burkina-Faso and its neighbouring countries.

3.5 Tools and database used.

ARCE purchased SMS4DC and TCI system for spectrum management and monitoring. ARCE is using SMS4DC's digital terrain data with CGS_WGS84 as geographical projection system. The resolution is 90 m. ITU-R P.1546 directives are used for propagation prediction. Coordination area is the zone whereof calculation is made.

4 Observation

Burkina-Faso does have:

- one entity which deals with cross border frequency coordination;
- an updated National Table of Frequency Allocation.

Burkina-Faso does not have:

- a framework for cross border frequency coordination;
- procedures for predefined frequency category;
- calculation method to evaluate if the power of a site will cause problems or not

5 Conclusion and Recommendations

Burkina-Faso clearly understood the economic issues related to cross border frequency coordination by meeting, since 2003, some neighbouring countries on the subject.

However, even if efforts were made, it is necessary to raise some insufficiencies related such as:

- the absence of procedures;
- certain frequency band are not covered by the agreements;
- the non-harmonization of agreements;
- the absence of calculation method to evaluate the requests for coordination.

6 Contact

For this study, Pousbilo OUEDRAGO and Arnaud DAMIBA had been contacted. The focal point is:

Arnaud DAMIBA
Chef du Service des Opérateurs Mobiles
ARCE - Burkina Faso
Office: +226 50375360
Mobile: +226 78819297 / +226 70174808
a.damiba@arce.bf

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Burkina Faso;

7.2 Cross border frequency coordination agreement

Annex 2, Cross border Frequency Coordination Agreement between Burkina Faso and Benin;

Annex 2bis, Cross border Frequency Coordination Agreement between Burkina Faso and Niger;

Annex 2ter, Cross border Frequency Coordination Agreement between Burkina Faso and Togo;

Annex 2quater, Minutes of meeting between Burkina Faso and Ghana.

7.3 National Table of Frequency Allocations

Annex 3, Burkina Faso's National Table of Frequency Allocations.

Cape Verde

1 Introduction

1.1 Country profile

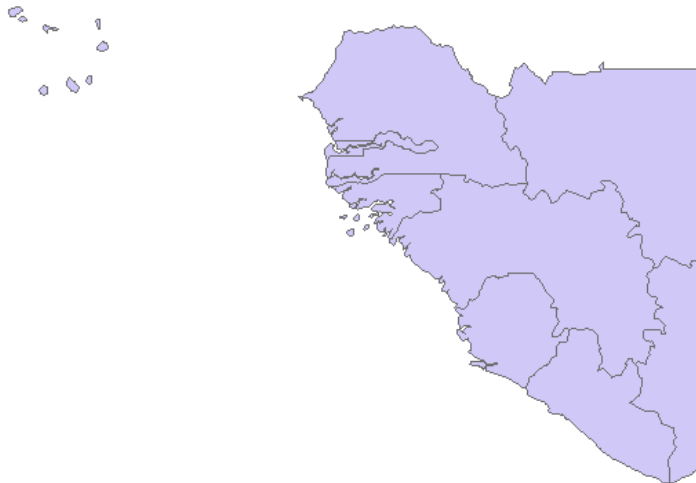
The Republic of Cape Verde, located in the North Atlantic Ocean, is an archipelago some 500 km off the western coast of sub Saharan Africa. It consists of ten islands and covers a land area of 4 033 km².

Cape Verde is part the Economic Community of West African States (ECOWAS).

Cape Verde macroeconomic statistics¹⁴ are as follows:

–	Population	505,606
–	GDP per capita	US \$ 3064.24
–	GDP per capita growth	1.38 %
–	Inflation, consumer prices	0.98 %
–	Inflation, GDP deflator (annual %)	3.78 %.

Figure 17: Cape Verde and its neighboring countries



1.2 Brief Information and Communication Technology profile

a) ICT Ministry

The Ministry responsible for the communication sector is the Ministry of Infrastructure and Marine Economy. This Ministry is endowed with the following responsibilities:

- propose, coordinate and implement policies on telecommunications and postal communications;

¹⁴ www.data.worldbank.org

- propose and implement, in coordination with the Foreign Minister, policy measures, actions and programs for planning and managing the relations of Cape Verde with all the international entities specialized in their areas of intervention, namely International Maritime Organization (IMO), the International Telecommunication Union (ITU) and Universal Postal Union (UPU).

b) Regulatory authorities

ANAC created by Decree-Law No. 31/2006 of June 19th, 2006, is an entity endowed with administrative and financial autonomy and its own assets. ANAC is responsible to regulate communications sector by guaranteeing network access under conditions of transparency and equality, ensuring application and supervision of laws, regulations and technical requirements, processing public consultation and manifestations.

c) Operators

The telecommunication and broadcasting sector in Cape Verde is marked by the presence of the following role players:

- For Fixed Services
- Cape Verde Telecom, incumbent operator;
- For Mobile Services
- Cape Verde Movel and T+ Telecomunicações;
- For Broadcasting Service, Pay TV operators
- Cape Verde Multimedia and Boom Multimedia;
- For Internet Services
- Cape Verde Multimedia, Cape Verde Wifi, Cabocom and CABOTLC.

2 National Spectrum Management Framework

2.1 Legislative basis

ANAC is responsible for radio frequency management in terms of Decree No. 7 / 2005 of November 28th, 2005 and Decree-Law No 10/2009 of April 20th, 2009.

2.2 National Table of Frequency Allocations

The *Agencia Nacional das Comunicacoes (ANAC)* had edited, in 2008, the *Quadro Nacional De Atribuição De Frequências (QNAF)* acting as the National table of Frequency allocation (NFTA).

QNAF is covering frequencies band from 9 kHz to 1000 GHz.

QNAF adhered to definitions, principles of frequency allocation recommended in the ITU RR article 5 and to recommendations and foot notes provided for ITU Region I Table of Frequency Allocations.

A snapshot of QNAF is shown in the table below.

Table 17: Cape Verde NFTA's snapshot

ITU-R RR 2008 REGION I ALLOCATION		APPLICATIONS IN CAPE-VERDE	NOTA
459 – 460 MHz	FIXED MOBILE 5.209, 5.271, 5.286, 5.286A, 5.286B, 5.286C, 5.286E	FIXED	
460 – 470 MHz	FIXED MOBILE Meteorological-Satellite (space-to-Earth) 5.287, 5.288, 5.289, 5.290	MOBILE	Channel arrangement for 450 MHz
470 – 790 MHz	BROADCASTING 5.149, 5.291A, 5.294, 5.296, 5.300, 5.302, 5.304, 5.306, 5.311, 5.312	BROADCASTING	Band IV (470-582 MHz) Band IV/V (470-786 MHz))
790 – 862 MHz	FIXED BROADCASTING 5.312, 5.314, 5.316, 5.319, 5.321	FIXED BROADCASTING	Band V (582-822 MHz)
862 – 890 MHz	FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 5.319, 5.323		

QNAF does not have national footnotes.

Technical interfaces regulation (radio-frequency channel arrangement, standard, etc ..) used by ANAC are strictly compliant to ITU-R recommendations.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ANAC is the unique body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as military).

By giving cross border frequency coordination function to ANAC only, Cape Verde is facilitating cross border frequency coordination procedures; this decision is also in conformity with article 11 subparagraphs 2 of ECOWAS supplementary acts who recommend ECOWAS “Members states to promote the merging of separate regulatory bodies dealing spectrum use in the broadcasting and telecommunications spheres”.

3.2 Bilateral / Multilateral agreement

As Cape Verde is located 500 km to the West African coast, there is no administrative procedure for cross border frequencies. However, Cape Verde signed, in August 2009, a multilateral cross border agreement between **Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mali, Mauritania and Senegal**.

This multilateral agreement cover frequency band from *87.5 MHz to 30 GHz*. Frequencies in the bands listed below which concern Fixed, Land Mobile and Broadcasting Services shall be coordinated under the terms of these agreements.

Table 18: Frequency band under the terms of the agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
136 – 174 410 – 470	PMR
452 – 470 830 – 840 / 875 – 885	CDMA
880 – 890/925 – 935 890 – 915/935 – 960 1710 – 1785 /1805 – 1880	GSM
1755 – 1805/2110 – 2160 1920 – 1980 /2110 – 2170	UMTS / FDD
1900 – 1920 2010 – 2025	UMTS / TDD
2500 – 2690	WLAN, IMT, MMDS
3400 – 3600	BLR, IMT
6425 – 7110	Microwave
7125 – 7725	
7900 – 8400	
10700 – 11700	
12750 – 13250	
14500 – 15350	
17700 – 19700	
21200 – 23600	
24500 – 26500	
27500 – 29500	

The multilateral agreement is mainly structured on:

1. Definitions;
2. Administrative provisions;
3. Technical provisions.

Attached to this agreement there are seven (7) annexes. Six (6) annexes described specific technical provisions which detail minimal conditions for a station to operate within each frequency band. Annex 7 is related to the *exchange of information* and *focal point*.

1) **Definitions**

This part defines terminologies applicable under the agreement. Terms are *frequency categories*, *coordination area* and *harmful interference*.

– Frequency categories

Three (3) types of frequencies are defined as described in the table below.

Table 19: Predefined Frequency Category

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions

– Coordination area

Coordination area is defined as a zone adjacent to two countries’ border, with a certain distance deep in each country’s interior.

– Harmful interference

Harmful interference is any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service.

2) **Administrative provisions**

Administrative provisions give details on the following terms: follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.

3) **Technical provisions**

Agreements authorize Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are: *In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;*

- In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.

However, technical provisions described in annex are applicable. These technical provisions consist of a limitation of the field strength and the antenna height.

3.3 Exchange information and Focal Point

The multilateral agreement requires each administration to exchange information on the frequencies that they have assigned every three (3) months. Each country designed focal point as follows:

Table 20: Focal Point per country

Country	Focal point
Cape Verde	David GOMES david.gomes@anac.cv +2382613069
The Gambia	Rodine S. RENNER rsr@pura.gm +220 996 23 33
Guinea	Habib TALL modihabib@yahoo.fr + 224 60 59 84 86
Guinea Bissau	Pedrinho SA icgb@mail.bissau.net +245 660 72 52
Mali	Ibrahim Belco MAIGA belco@crt.ml +223 223 14 90
Senegal	Pape Ciré CISSE pc.cisse@artp.sn +221 77 6470461

3.4 Interference experience

Cape Verde faces interference from Senegal FM and VHF TV frequency bands.

Table 21: Frequency band, service and neighbouring country required frequency coordination

Band (MHz)	Service	Neighboring Country	Priority
87.5 – 108	Broadcasting	Senegal	H
174 – 223			

This situation is a proof that the agreement did not define all necessary procedures to be followed to solve and prevent in subsequent way interferences at borders.

3.5 Data Exchange Format

ANAC do not have a frequency register. But as it's said in part 3.2.4, "Exchange of information" is mandatory as per the coordination agreement. Information to be transmitted to other Administration is as follows:

- Owner;
- Category of the station;
- Number of stations;

- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

Mail is said to be suitable transmission methods for information exchange between Cape Verde and other Administrations.

3.6 Tools and database used

ANAC do not use ITU tools. But, tools from *LS Telcom* and *Rohde & Schwarz* are used, respectively, for spectrum management and spectrum monitoring.

Models or methods used for propagation prediction are *ITU-R P.452*, *ITU-R P.530*, *ITU-R P.567*, *ITU-R P.618*, *ITU-R P.1546*, *ITU-R P.1818*, *Free Space*, *Okumura-Hata*, *Walfish-Ikegami*, *Longley-Rice* and *Sky Wave*.

ANAC do not use (have) elevation and/or morphological data's software for interference calculation and coordination. However, *WGS84* is used as geographical projection system for maps with *1:10000* resolutions.

4 Observation

Cape Verde does have a converged regulator (Telecommunication and Broadcasting) as recommended by ECOWAS.

Cape Verde has a National Frequency Table of Allocation (NFTA).

Cape Verde do not have formal frequency coordination framework and associated tools (frequency register, elevation and/or morphological data's software, etc...). However, multilateral agreement is acting as frequency coordination framework. But, this multilateral agreement does not prevent Cape Verde for interference yet. In addition, it does not have, among others things, procedures for predefined frequencies category and calculation method.

5 Conclusion and Recommendations

Cape Verde, regarding cross border frequency coordination, has started an outline of elaborating a framework. This framework should be completed with:

- predefined frequencies category's procedures for the requests for coordination;
- calculation method to evaluate the requests for coordination.

6 Contact

For this study, David GOMES and Mrs Ana LIMA had been contacted. The focal point is:

David GOMES

Agência Nacional das Comunicações

+2382613069

david.gomes@anac.cv

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Cape Verde

7.2 Cross border frequency coordination agreement

Annex 2, multilateral cross border frequency coordination agreement;

Annex 2bis, multilateral cross border frequency coordination agreement annexes;

7.3 National Table of Frequency Allocations

Annex 3, Cape Verde's National Table of Frequency Allocations.

Côte d'Ivoire

1 Introduction

1.1 Country profile

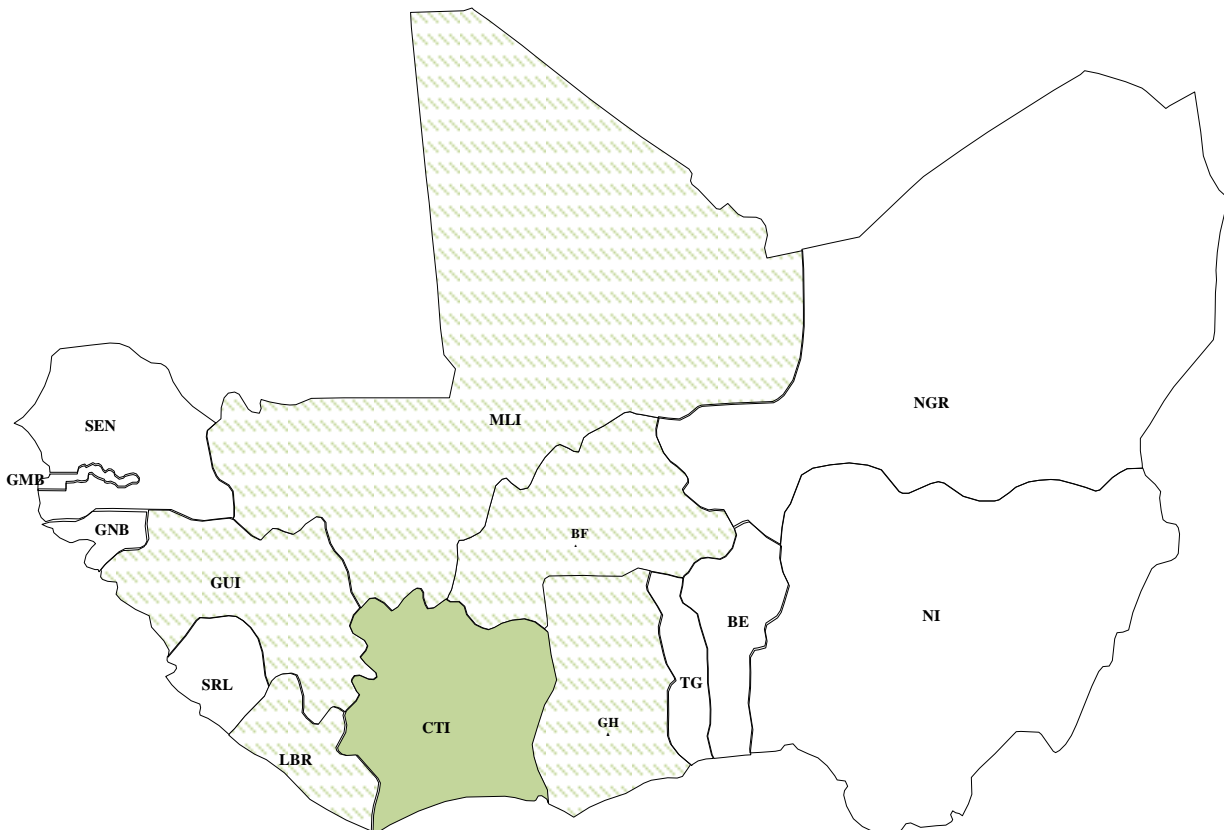
The republic of **Cote d'Ivoire** is a country with a surface area of 322,462 km² located in Western Africa in the tropical area between the Equator and the tropic of Cancer. Cote d'Ivoire shares a 584 km border with **Burkina Faso** to the North East, 532 km with **Mali** to the North West, 668 km with **Ghana** to the East, 610 km with **Guinea** and 716 km with **Liberia** to the West.

Cote d'Ivoire is part of the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS).

Côte d'Ivoire macroeconomic statistics¹⁵ are as follows:

- Population 21,075,010 inhabitants;
- GDP per capita US \$1105.77;
- GDP per capita growth 1.22%;
- Inflation, consumer prices 1.03%;
- Inflation, GDP deflator 1.31%.

Figure 18: Cote d'Ivoire and its neighbouring countries



¹⁵ www.data.worldbank.org

1.2 Brief Information and Communication Technology profile

a) ICT Ministry

The Telecommunications Code which guarantees general Telecommunication principles gives the Ministry of New Information and Communication Technologies the charge of drawing up the general policy of the government for the sector.

b) Regulatory authorities

Three (3) independent organs ensure the regulation of Telecommunications and Broadcasting in Côte d'Ivoire. They are:

- ATCI (Agence des Télécommunications de Côte d'Ivoire);
 - CTCI (Conseil des Télécommunications de Côte d'Ivoire) and ;
 - CNCA (Conseil National de la Communication Audiovisuelle).
- i. ATCI

by the Telecommunications Code of 1995, the legal status of ATCI underwent modification under order no. 98-441 of 4 August 1998. ATCI exercises the competence, right and obligation devolved to the administration in accordance with article 51 of the Telecommunications Code. Its goals are, among other things, to:

- Enforce the Telecommunication regulation texts;
- Define the principles and authorize the pricing of services that are provided under the monopoly regime;
- Issue Telecommunication service operating licenses;
- Award terminal equipment agreements;
- Ensure spectrum management and monitoring;
- Contribute to the exercise of State tasks relating to public Defence and Security.

ii. CTCI

Created by act no. 095-526 of 07 July 1995 supporting the Telecommunications Code, CTCI, an independent administrative high authority, has a semi-jurisdictional competency and is competent for the conciliation and arbitration of disputes in the sector.

Thus, it renders decisions on petitions of conflicting operators either between them or with the ATCI. These decisions are published in the official newspaper and in the majority of cases aim to restore equal treatment between operators and users.

iii. CNCA

CNCA is the regulation authority for the broadcasting sector (television and radio only) in Côte d'Ivoire. Its goals are, among others things, to:

- Guarantee and ensure the freedom and the protection of the audio-visual communication in the respect of the law;
- Support and guarantee pluralism in audio-visual space.

c) Operators

The telecommunications sector in Cote d'Ivoire is structure as follows:

- For Fixed Service, two (2) operators, COTE D'IVOIRE TELECOM and AROBASE TELECOM;
- For Mobile service, seven (7) licenses had been granted but only five (5) operators are offering service for the market;

- For TV service, two (2) operators, RTI and SEDACI CANAL+ HORIZONS;
- For Internet Service, two (2) providers.

2 National Spectrum Management Framework

2.1 Legislative basis

ATCI is responsible of radio frequency management in terms of loi n° 95-526 du 7 juillet 1995 portant code des télécommunications.

2.2 National Table of Frequency Allocations

ATCI had edited, in 2006, the *Tableau National de Repartition du Spectre des Fréquences (TANARES)* acting as the National table of Frequency allocation (NFTA). *TANARES* which is covering frequencies band from 9 kHz to 1000 GHz has three (3) columns:

- its first column RR 2000 edition Region I allocation;
- its second column contains national allocation;
- its third column contains some observations.

TANARES does not have national footnotes.

In addition, as it's shown in table hereafter, *TANARES* is not fully compliant to ITU-R RR 2008 edition.

Table 22: Cote d'Ivoire NFTA's snapshot

ITU-R RR 2008 REGION I	TANARES		
	ITUR-RR 2000 REGION 1	COTE D'IVOIRE ALLOCATION	NOTES
470 – 790 MHz BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.302 5.304 5.306 5.311A 5.312	470 – 790 MHz BROADCASTING 5.149, 5.291A, 5.294, 5.296, 5.300, 5.302, 5.304, 5.306, 5.311A, 5.312	BROADCASTING 5.311 5.149	GE 89 PLAN
790 – 862 MHz FIXED BROADCASTING MOBILE except aeronautical mobile 5.316B 5.317A 5.312 5.314 5.315 5.316 5.316A 5.319	790 – 862 MHz FIXED BROADCASTING 5.312 5.314 5.315 5.319 5.321 5.316	FIXED BROADCASTING 5.316	– AROBASE TELECOM, WLL CDMA 2000, downlink (824,030-834,330 MHz)

ITU-R RR 2008 REGION I	TANARES		
	ITUR-RR 2000 REGION 1	COTE D'IVOIRE ALLOCATION	NOTES
862 – 890 MHz FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 5.319 5.323	862 – 890 MHz FIXED MOBILE except aeronautical mobile BROADCASTING 5.319 5.322 5.323	FIXED MOBILE except aeronautical mobile BROADCASTING	– AROBASE TELECOM, WLL CDMA 2000 uplink (869,030 –874,330 MHz) – EGSM, 880 – 890 MHz

However, Technical interfaces regulation (radio-frequency channel arrangement, standard, etc ..) used by ATCI are strictly compliant to ITU-R recommendation.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ATCI is the unique body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as military).

By having a unique entity for cross border frequency coordination in particular and spectrum management and monitoring in general, Cote d'Ivoire is following ECOWAS supplementary acts article 11 subparagraphs 2 who recommend ECOWAS *“Members states to promote the merging of separate regulatory bodies dealing spectrum use in the broadcasting and telecommunications spheres”*.

3.2 Bilateral / Multilateral agreement

Cote d'Ivoire does not have cross border frequency coordination framework. But, efforts were tried to reinforce the regulation via meetings dealing with this aspect. Thus, two (2) meetings were held as follows:

- Multilateral meeting between Cote d'Ivoire, Burkina-Faso, Guinea and Mali in and ;
- Bilateral meeting between Cote d'Ivoire and Ghana in 2010.

Recently (May 2010), a cross border frequency coordination agreement was signed with Ghana.

Multilateral meeting between Cote d'Ivoire, Burkina-Faso, Guinea and Mali concerned GSM frequency band.

Within minutes of meetings, these values as follows are fixed:

Table 23: Technical parameter retained

Parameter	Value
Coordination area	25 km
Penetration distance	10 km
Field strength	-95 dBm

Bilateral meeting between Cote d’Ivoire and Ghana, which concern FM and TV, does not retain any technical parameter.

Agreement signed in May 2010 is only for GSM services and it’s based on sharing frequency principle. It’s structured in:

1. Purpose;
2. Channel sharing at borders;
3. Technical provisions
4. Administrative provisions.

Without defining technical parameters, technical provisions give values for penetration distance and field strength.

It also announces a calculation method for field strength.

Table 24: Technical parameter included in the agreement

	Parameter	Value
Preferential frequency	Penetration distance	10 km
	Field strength	-102 dBm at 3 m above the ground
Non preferential frequency	Field strength	-102 dBm at 3 m above the ground

Administrative provisions give details on the following terms: follow-up of the agreement, revision of the agreement and language of the agreement.

3.3 Interference experience

The minutes of meeting with Ghana said that there is “a FM frequency received in Cote d’Ivoire territory which does not appear in Ghana GE 84 frequencies assignments”. This situation reveals an uncontrolled of frequencies assignments and could also indicate a lack of visibility on interferences notifications.

Cote d’Ivoire expresses the needs of cross border frequency coordination as it’s described in the table below.

3.4 Data Exchange Format

ATCI does not have any format for data exchange as there is not a formal cross border frequency coordination agreement.

3.5 Tools and database used.

ATCI had used SMS4DC and have had spectrum management and monitoring system from TADIRAN.

But, unfortunately, recent events in Cote d’Ivoire succeeded to the destruction of equipment and tools.

Thus, it is difficult to come to a conclusion about the existence of tools for spectrum management and monitoring.

4 Observation

Cote d'Ivoire does have a unique regulator for cross border frequency coordination both for telecommunication and broadcasting.

Cote d'Ivoire has a National Frequency Table of Allocation, which needs to be updated in order to take into account last modifications of the International Radio Regulation.

Cote d'Ivoire does not have formal frequency coordination framework.

Thus, there is not bilateral and/or multilateral agreement with administrative and technical provisions, procedures, calculation method and all necessities.

Cote d'Ivoire must replace part of its software and equipment of spectrum management and monitoring.

5 Conclusion and Recommendations

There is a lack of spectrum management framework in Cote d'Ivoire, particularly for cross border frequency coordination. Cross border frequency coordination diagnostic is characterized by, among others things:

- The absence of agreement with neighbouring countries;
- The absence of procedures to handle interferences;
- The absence of calculation method to evaluate field strength.

In conclusion, Cote d'Ivoire did not follow the regional dynamics, which led countries to sign cross border frequency coordination agreements.

It is recommended that Cote d'Ivoire sets up or contributes to set up a cross border frequency coordination framework.

6 Contact

For this study, Koffi SIMON and Kouamé BINI had been contacted.

The focal point is:

Koffi SIMON Membre RRB, Directeur des Radiocommunications

Agence des Télécommunications de Côte d'Ivoire - ATCI

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koffisimon@yahoo.fr

+22507093292

+22520344973

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Cote d'Ivoire

7.2 Cross border frequency coordination agreement

Annex 2, Minutes of meeting between Cote d'Ivoire, Burkina Faso, Guinea and Mali;

Annex 2bis, Minutes of meeting between Cote d'Ivoire and Ghana;

7.3 National Table of Frequency Allocations

Annex 3, Côte d'Ivoire's National Table of Frequency Allocations.

The Gambia

1 Introduction

1.1 Country profile

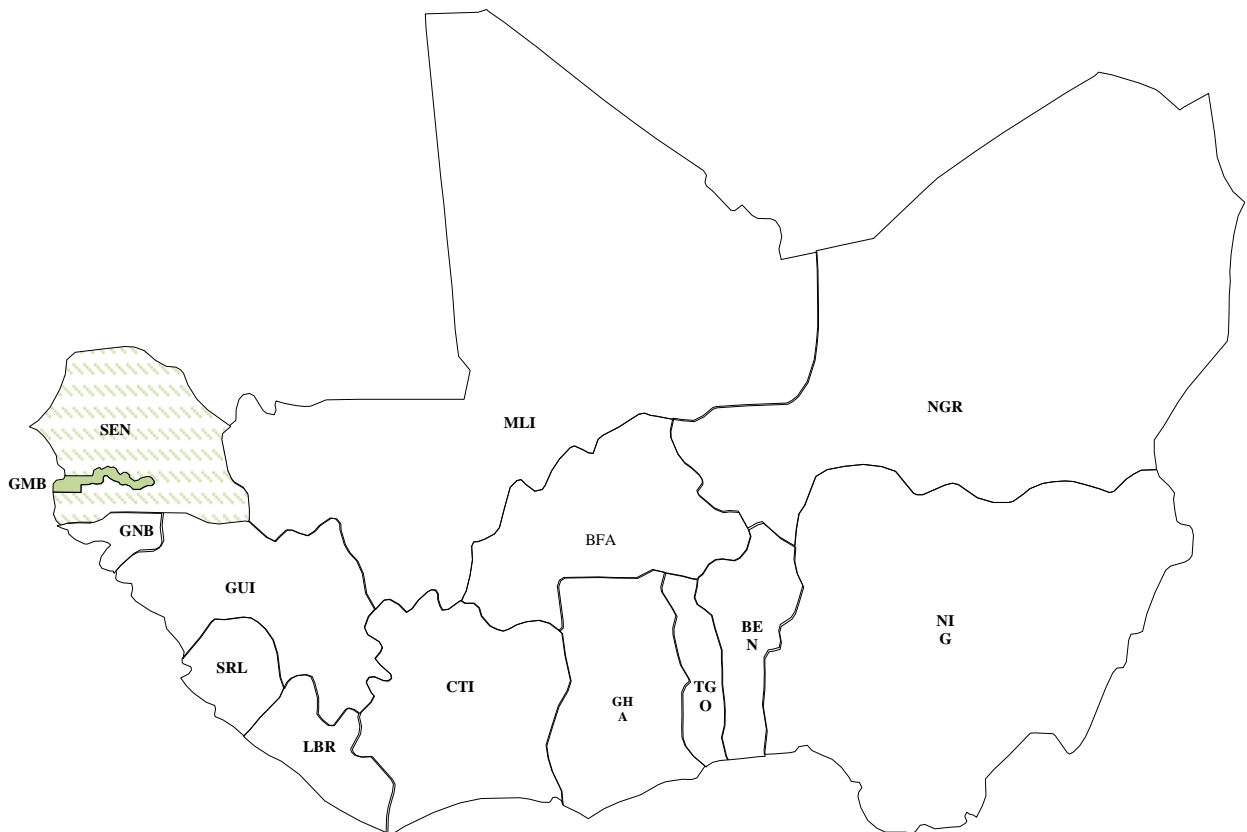
The Gambia is a country located on the west coast of Africa with a total area of 11,632 km². The Gambia is surrounded on three sides by **Senegal**, extending inland at widths varying from 24 to 48 kilometers along the River Gambia.

The Gambia is part of the Economic Community of West African States (ECOWAS).

The Gambia macroeconomic statistics¹⁶ are as follows:

- Population 1,705,212 inhabitants;
- GDP per capita US \$ 430.14;
- GDP per capita growth 1.84%;
- Inflation, consumer prices 4.55%;
- Inflation, GDP deflator 2.36%.

Figure 19: The Gambia and its neighboring country



¹⁶ www.data.worldbank.org ;

1.2 Brief Information and Communication Technology profile

1.2.1 Ministry of Information & Communication Infrastructure¹⁷

The Ministry shall formulate the general policy of the information and communications sectors in The Gambia in consultation with the Authority and other stakeholders in the sectors as provided for in this Act, including a biennial national strategic plan for the sector in accordance with the policy.

1.2.2 Regulatory authorities

The Gambia Public Utilities Regulatory Authority Act, 2001 provides for the establishment of PURA, a multi-sector regulatory authority, to regulate the activities of providers of certain public utilities amongst them energy services (electricity, petroleum and gas), communications services (telecommunications, broadcasting and postal services), water and sewerage services and transport services (on land, water and in the air). PURA regulates the technical aspect of the radio and television broadcasting services in The Gambia.

1.2.3 Operators

The Telecommunications sector industry consists of a fixed network operator; GAMTEL and four (4) mobile operators GAMCEL, AFRICELL, COMIUM and the latest entrant QCELL. GAMTEL offers fixed lines services. Whilst the mobile operators GAMCEL, AFRICELL, COMUIM and QCELL respectively provide GSM cellular voice and data services with countrywide coverage.

Data Services comprises of the Internet services provided by the commercial ISPs. There were six (6) commercial ISPs:

- *GAMTEL's ISP;*
- *Netpage*
- *QuantumNet;*
- *Connexion Solution*
- *Lanix*
- *Unique solution*

All the ISPs channelled their Internet traffic through one international data gateway owned by GAMTEL. Some of the ISPs already had wireless access infrastructure configured for high speed Internet services.

For broadcasting sector, there are twenty-two (22) FM sound broadcasting stations countrywide, comprising of both commercial and community stations. There is one national television station, one MMDS station and one operator who is the agent for Multichoice (DSTV) in South Africa.

¹⁷ www.moici.gov.gm

2 National Spectrum Management Framework

2.1 Legislative basis

PURA is responsible of radio frequency management in terms of The Gambia Public Utilities Regulatory Authority Act, 2001.

2.2 National Table of Frequency Allocations

PURA is currently developing The Gambia National Table of Frequency Allocation (NFTA). When its development is completed, 100 % of NFTA will be similar to the ITU-R, RR 2008 Table of Frequency Allocations.

There is not a Regional Table of frequency Allocation. But, Gambia signed ITU-R regional plans such as GE84, GE89 and GE06.

Frequencies channels arrangements used by PURA are strictly compliant to ITU-R recommendation as it's shown within table 1.

Table 25: Example of frequency channel arrangement's reference

Bands	Sub - bands	Reference
6 GHz	5850 – 6425 MHz	Rec. UIT-R F.383
	6430 – 7110 MHz	Rec. UIT-R F.384
8 GHz	7 725 – 8 275 MHz	Rec. UIT-R F.386
	8 275 – 8 500 MHz	
11 GHz	10,7 – 11,7 GHz	Rec. UIT-R F.387
13 GHz	12,75 – 13,25 GHz	Rec. UIT-R F.497
15 GHz		Rec. UIT-R F.636
18 GHz	17,7 – 19,7 GHz	Rec. UIT-R F.595

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

PURA is the unique body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as government). But, there is an exception for the military where they collaborate with PURA.

The collaboration is that military applies for frequencies through the Ministry of Communication indicating the number of channels or a band of frequencies who in turn sends the application to PURA for assignment.

With a unique entity for cross border frequency coordination in particular and spectrum management and monitoring in general, The Gambia follows ECOWAS supplementary acts article 11 subparagraphs 2 who recommend ECOWAS “Members states to promote the merging of separate regulatory bodies dealing spectrum use in the broadcasting and telecommunications spheres”.

3.2 Bilateral / Multilateral agreement

The Gambia does have a multilateral cross border frequency coordination agreement. Acting as cross border frequency coordination framework, this agreement is signed in August 2009 between **Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mali, Mauritania and Senegal**.

This multilateral agreement cover frequency band from 87.5 MHz to 30 GHz. Frequencies in the bands listed below which concern Fixed, Land Mobile and Broadcasting Services shall be coordinated under the terms of these agreements.

Table 26: Frequency band under the terms of the agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
136 – 174 410 – 470	PMR
452 – 470 830 – 840 / 875 – 885	CDMA
880-890/925-935 890-915/935-960 1710-1785 /1805-1880	GSM
1755 – 1805/2110-2160 1920 – 1980 /2110-2170	UMTS / FDD
1900 – 1920 2010 – 2025	UMTS / TDD
2500 – 2690	WLAN, IMT, MMDS
3400 – 3600	BLR, IMT
6425 – 7110	Microwave
7125 – 7725	
7900 – 8400	
10700 – 11700	
12750 – 13250	
14500 – 15350	
17700 – 19700	
21200 – 23600	
24500 – 26500	
27500 – 29500	

The multilateral agreement is mainly structured on:

- 1) Definitions;
- 2) Administrative provisions;
- 3) Technical provisions.

Attached to this agreement there are seven (7) annexes. Six (6) annexes describe specific technical provisions, which detail minimal conditions for a station to operate within each frequency band. Annex 7 is related to the *exchange of information* and *focal point*.

1) **Definitions**

This part defines terminologies applicable under the agreement. Terms are *frequency categories*, *coordination area* and *harmful interference*.

– Frequency categories

Three (3) types of frequencies are defined as described in the table below.

Table 27: Predefined Frequency Category Coordination area

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions

Coordination area is defined as a zone adjacent to two countries’ border, with a certain distance deep in each country’s interior.

– Harmful interference

Harmful interference is any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

2) **Administrative provisions**

Administrative provisions give details on the following terms: follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.

3) **Technical provisions**

Agreements authorize Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are:

- *In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;*
- *In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.*

However, technical provisions described in annex are applicable. These technical provisions consist of a limitation of the field strength and the antenna height.

3.3 Exchange information and Focal Point

The multilateral agreement requires each administration to exchange information on the frequencies that they have assigned every three (3) months.

Each country designed focal point as follows:

Table 28: Focal Point per country

Country	Focal point
Cape Verde	David GOMES david.gomes@anac.cv +2382613069
The Gambia	Rodine S. RENNER rsr@pura.gm +220 996 23 33
Guinea	Habib TALL modihabib@yahoo.fr + 224 60 59 84 86
Guinea Bissau	Pedrinho SA icgb@mail.bissau.net +245 660 72 52
Mali	Ibrahim Belco MAIGA belco@crt.ml +223 223 14 90
Senegal	Pape Ciré CISSE pc.cisse@artp.sn +221 77 6470461

3.4 Coordination procedures

Beside the multilateral agreement, there is a coordination procedure. This procedure consists of directly contacting Senegal's regulator whenever a set of frequencies is going to be used near the border. A Memorandum of Understanding (MoU) was signed. Thus, technical visits, discussion on spectrum issues and exchange information are conducted.

3.5 Interference experience

Gambia had dealt and solved two (2) cases of harmful interference at its borders. These interferences concerned GAMTEL and SONATEL (Standard GSM) and AFRICELL and SUDATEL (Extended GSM).

In the GSM 900 band, the problem was solved after six months by GAMCEL disabling automatic roaming on all pre-paid subscribers. For AFRICELL case, after about three months of communicating with Senegal's regulator, the reassignment of new channels to AFRICELL solved the problem.

Because of the geographical location of The Gambia, frequency bands listed in table 2 are considered as requiring cross border frequency coordination.

3.6 Data Exchange Format

PURA does not have a frequency register. But, an excel file does exist. This file details channel arrangement for each frequency band. When a channel is assigned, a field indicates its user. Some frequency plan within this file does have additional information such as *localization, power, antenna height, etc.*

Regarding the “Exchange of information” described in the agreement, data format to be used to communicate with the other Administration is detailed as follows:

- Owner;
- Category of the station;
- Number of stations;
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

Mail is said to be suitable transmission methods for information exchange between The Gambia and other Administrations.

3.7 Tools and database used.

ITU GE84 PLN1.4 and WISFAT software are used by PURA. PURA had acquired SMS4DC version 2.0 from ITU but yet to fully utilize it as parameters needed are gradually being collected. PURA is the stage of collecting data to populate the required fields.

The Gambia does not have an automatic spectrum management and monitoring system yet. Others tools like digital terrain model and digital elevation model are not available also. However, propagation models indicated in table below are used.

Table 29: Propagation Model

Service	Propagation Model
Fixed service, 3 – 30 GHz (calculation of free-space attenuation)	ITU-R P. 525
Point to point, Fixed service, 3 – 30 GHz (Propagation data and prediction methods required for the design of terrestrial line-of-sight systems)	ITU-R P.530
Terrestrial services, 3 – 30 GHz (Method for point-to-area predictions)	ITU-R P. 1546

4 Observation

The Gambia has one entity which deals with cross border frequency coordination.

The Gambia does not have a National Table of Frequency Allocation yet.

Cross border frequency coordination framework is based on a multilateral agreement which remains incomplete and not very effective.

Multilateral agreement is characterized by the lack of procedures. Even additional procedure defined on a case-by-case basis remains ineffective considering time and methods used to solve interferences.

Multilateral agreement does not also have calculation method to predict or evaluate interferences.

5 Conclusion and Recommendations

There is a lack of spectrum management framework in The Gambia, particularly for cross border frequency coordination.

Understanding early the stakes of multilateral agreement, The Gambia would gain more if there exist, at the regional level, a regulation framework for cross border frequency coordination.

6 Contact

For this study, Rodine S. RENNER had been contacted.

The focal point is:

Rodine S. RENNER

Spectrum Manager

In charge of the Management and Monitoring of the National Spectrum.

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+220 331 13 33

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from The Gambia;

7.2 Cross border frequency coordination agreement

Annex 2: Multilateral cross border frequency coordination agreement between Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mali and Senegal;

Annex 2bis: Multilateral cross border frequency coordination agreement annex;

7.3 Other document

Annex 4: Frequency Plan.

Ghana

1 Introduction

1.1 Country profile

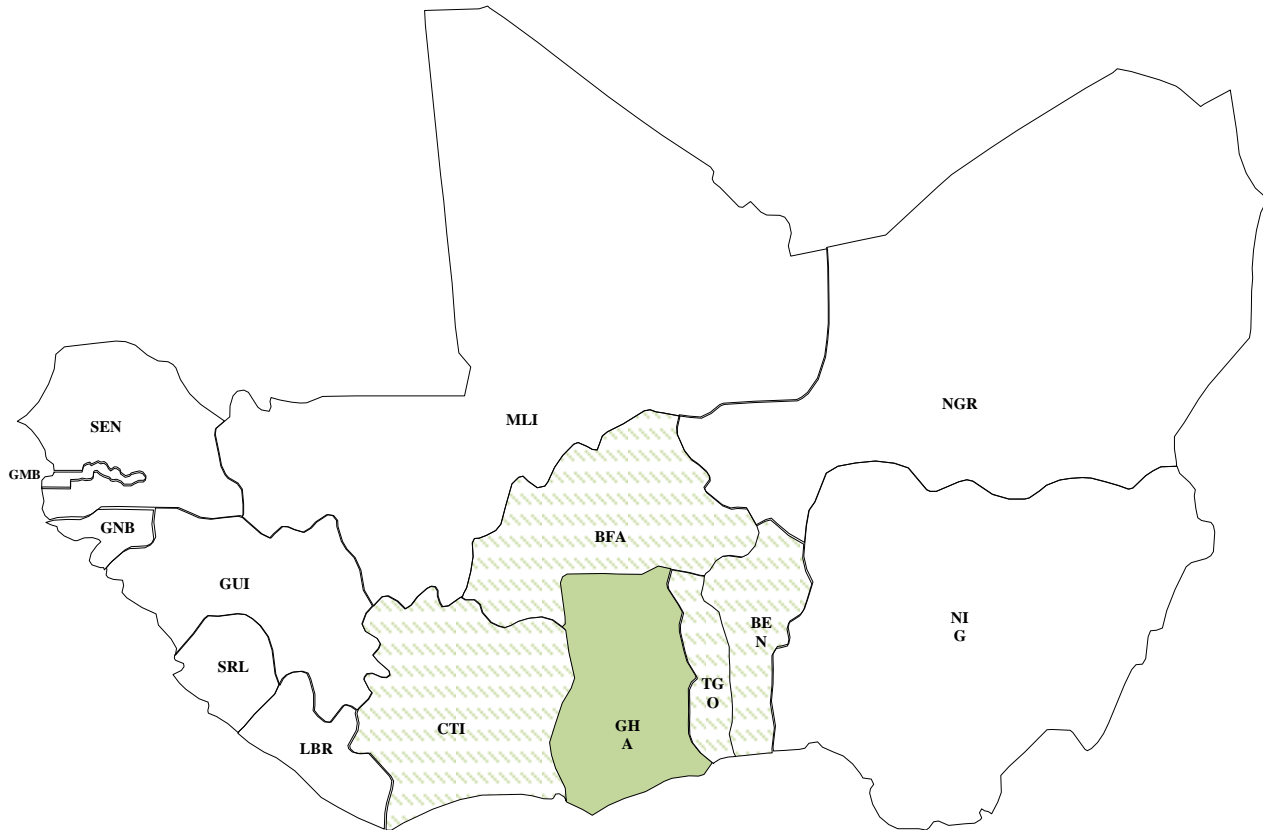
Ghana covers a land area of 238,537 km² and shares boundaries with the Atlantic Ocean to the south and three (3) countries; Burkina Faso in the north, Togo in the east and Cote d'Ivoire in the west.

Ghana is part of the Economic Community of West African States (ECOWAS).

Ghana macroeconomic statistics¹⁸ are as follows:

- Population: 23,837,261 inhabitants;
- GDP per capita: US \$ 1097.83
- GDP per capita growth: 2.52%
- Inflation, consumer prices (annual): 19.25%.

Figure 20: Ghana and its neighboring countries



¹⁸ www.data.worldbank.org ;

1.2 Brief Information and Communication Technology profile

a) ICT Ministry

The Ministry is primarily responsible for the definition and elaboration of Government policy regarding telecommunications. In this role, the Ministry shall periodically review the effectiveness and success of the present policy, and consider amendments and updates as appropriate.

The Ministry shall participate in a consultative capacity in all public regulatory proceedings in an open and transparent manner. The Ministry shall also be responsible for monitoring development of the telecommunications sector and progress toward achieving the objectives of the policy.

b) Regulatory authorities

Two (2) independent organs ensure the regulation of Telecommunications and Broadcasting in Ghana. It is:

- National Communications Authority, NCA;
 - National Media Commission, NMC.
- i. National Communications Authority

The 769th Act of the parliament of the Republic of Ghana establishes the National Communications Authority as the central body to license and regulate communications activities and services. The objects of the Authority are as follows:

- to ensure that there are provided throughout Ghana as far as practicable communications services as are reasonably necessary to satisfy demand for the services;
- to ensure that communications system operators achieve the highest level of efficiency in the provision of communications services and are responsive to customer and community needs;
- to promote fair competition among persons engaged in the provision of communications services;
- to advise the Minister and the Minister for Information on policy formulation and development strategies for the communications industry;
- to grant license for the operation of communication system as defined in section 44;
- to assign, allocate and regulate the use of frequencies in conformity with international requirements pursuant to any relevant treaties, protocols or conventions to which Ghana is signatory.
- to prepare and review National Frequency Allocation Plan;
- to designate standards of communications equipment;

The National Communications Authority shall also regulate the radio spectrum designated or allocated for use by broadcasting organizations and providers of broadcasting services in accordance with the standards and requirements of the International Telecommunications Union and its Radio Regulations as agreed to or adopted by the Republic of Ghana.

ii. National Media Commission – NMC

The 449th Act of the parliament of the Republic of Ghana established the National Media Commission (NMC) in 7th July 1993.

The National Media Commission exists to ensure that there is the promotion of free, independent and responsible media. It ensures that the state owned media is independent from government control. The National media Commission's objectives are:

- promote and ensure the freedom and independence of the media for mass communication or information;
- take all appropriate measures to ensure the establishment and maintenance of the highest journalistic standards in the mass media, including the investigation, mediation and settlement of complaints made against or by the press or other mass media;
- insulate the state owned media from government control;
- perform other functions as may be prescribed by law not inconsistent with the Constitution.

c) Operators

The Telecommunications sector industry consists of nine (9) operators:

- Kasapa;
- Millicom;
- Scancom;
- Onetouch;
- Zain;
- GT/Vodafone;
- Westel;
- Ghana Telecom;
- Zain.

2 National Spectrum Management Framework

2.1 Legislative basis

NCA is responsible of radio frequency management in terms of National Communication Authority Act, 2008, Act 769.

2.2 National Table of Frequency Allocations

NCA developed Ghana's National Table of Frequency Allocation (NFTA). This NFTA is covering frequencies band from 9 kHz to 400 GHz. It has three (3) columns:

- its first column titled "Frequency Band";
- its second column titled "Ghana's allocation services" contains service that was allocated to the associated frequency band;
- its third column contains some "Remarks".

Ghana's NFTA is about similar to ITU-R RR 2008 Table of Frequency Allocations as it's shown in the snapshot below.

Table 30: Ghana's National Table of Frequency Allocation snapshot

Frequency band	Ghana's allocation to services	Remarks
156.5625 – 156.7625 MHz	FIXED	
	MOBILE except aeronautical mobile (R)	
	MOD 5.22	
156.7625 – 156.8375 MHz	MARITIME MOBILE (distress and calling)	
	MOD 5.111 MOD 5.226	
156.8375 – 174 MHz	FIXED	
	MOBILE except aeronautical mobile	
	MOD 5.226 5.229 ADD 5.4C02	
174 – 223 MHz	BROADCASTING	
223 – 230 MHz	BROADCASTING	
	Fixed	
	Mobile	
470 – 790MHz	BROADCASTING	
	5.149, 5.311A	
790 – 806MHz	BROADCASTING	
806 – 862MHz	FIXED	
	MOBILE except aeronautical mobile ADD 5.XXX	

A Regional Table of frequency Allocation does not exist.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

NCA is the unique body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as government). As per consequent, there are no challenges because the same body handles spectrum management.

The Republic of Ghana follows ECOWAS supplementary acts article 11 subparagraphs 2 who recommend ECOWAS “Members states to promote the merging of separate regulatory bodies dealing spectrum use in the broadcasting and telecommunications spheres”.

3.2 Bilateral / Multilateral agreement

For Ghana, when there is a need for coordination with any neighbouring countries, a meeting is arranged with the administration and at the said meeting, arrangements are drawn and administrations involved sign to it. So, instead of cross border frequency coordination agreement, it's minutes of report which define arrangement between administrations.

Minutes of report are listed in the table below.

Table 31: Minutes of Report

Country involved	Period	Service	Decision
Burkina-Faso, Togo	2002	TV and FM	Identification of frequencies which cause interferences or not
Togo	2004	GSM	Field strength measurement
Burkina-Faso, Togo	2005	TV, FM and GSM	Definition of penetration distance and coordination area
Togo	2009	GSM	measurement on GSM Frequency

With Cote d'Ivoire, Ghana signed an agreement in May 2010. This agreement is only for GSM services and it's based on sharing frequency principle. It's structured on:

1. Purpose;
2. Channel sharing at borders;
3. Technical provisions;
4. Administrative provisions.

Without defining technical parameters, technical provisions give values for penetration distance and field strength. It also announces a calculation method for field strength but gives only its value.

Table 32: Technical parameter included in the agreement

	Parameter	Value
Preferential frequency	Penetration distance	10 km
	Field strength	-102 dBm at 3 m above the ground
Non preferential frequency	Field strength	-102 dBm at 3 m above the ground

Administrative provisions give details on the *following terms: follow-up of the agreement, revision*. This agreement does not have predefined category frequency.

3.3 Coordination procedure

Procedure put in place by Ghana is only to handle interference (not to prevent) and consists in informing the neighbouring country. Therefore, a meeting is requested, with the involvement of all the stakeholders; an arrangement is drawn and administrations involved sign it.

3.4 Interference experience

Due to its geographical localization, Ghana dealt with harmful interference at its borders as it's shown in table 2. These interferences concerned *FM, TV and GSM* frequency band. However, as Benin is claiming a request to cross border frequency coordination in 3G band, probably due to harmful interference occurring at its border, we can assume that cross border frequency coordination is needed for other services.

Table 33: Frequency for which cross border coordination is needed

Band (MHz)	Service	Neighbouring country
87.5 – 108	Broadcasting	Benin, Burkina-Faso, Côte d'Ivoire, Togo
174 – 230	Broadcasting	
470 – 862	Broadcasting	
890 – 915/935-960	GSM	
1710 – 1785 /1805-1880	GSM	
1900 – 2110	3G	Benin

3.5 Data Exchange Format

NCA does have a frequency register in a paper version.

Agreement and minutes of meeting do not mention an *exchange of information* between Administrations. Consequently, there is not a specific and uniform format for exchange of information between Ghana and its neighbouring countries.

In addition, a suitable method had not been defined such as *internet, CD/DVD or paper* to transmit information.

3.6 Tools and database used.

Terra Notices is used by NCA. In addition NCA has a spectrum monitoring system (SMS) purchased from *TCI* and an automatic spectrum management system (ASMS) from *ATDI ICS Telecom*. NCA uses digital terrain data with these characteristics:

Table 34: Characteristics of digital terrain

Geographical projection system	49DMS
Resolution of the terrain data	90 m

NCA use propagation models indicated in table below are used.

Table 35: Propagation Model

Service	Propagation Model	Diffraction Model	Subpath Attenuation
Broadcast bands	ITU-R 525	Deygout 94 method	Standard
WIMAX/WLL/BWA	ITU-R 525	Deygout 94 method	Standard
GSM/LTE	ITU-R 525	Deygout 94 method	Standard

4 Observation

Ghana has one entity which deals with cross border frequency coordination. Ghana has a National Table of Frequency Allocation.

There is not a framework for cross border frequency coordination. Interferences are treated on a case-by-case basis. The procedure is to ask for a meeting wherein arrangement is made on a few parameters.

There is neither exchange of information nor a calculation method to evaluate if the power of a site will cause problems or not.

5 Conclusion and Recommendations

The lack of cross border frequency coordination framework exposes Ghana to interference challenges with neighbouring countries.

Ghana should move to the way of establishing a cross border frequency coordination framework wherein measurements points and levels that may trigger coordination are be defined. Procedures to determine and calculate these parameters must be described and developed within this framework.

6 Contact

For this study, Florence MARTEY, Bernard AMISSAH-OCRAN, Isaac LAREYA and Emmanuel ANDOH had been contacted.

The focal point is:

Florence MARTEY
 Chief Manager, Engineering
 National Communications Authority – NCA
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7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Ghana;

7.2 Cross border frequency coordination agreement

Annex 2: Minutes of meeting between Ghana, Burkina Faso and Togo;

Annex 2bis: Minutes of meeting between Ghana and Togo;

Annex 2ter: Minutes of meeting between Ghana and Togo;

Annex 2quater: Minutes of meeting between Ghana and Togo;

7.3 National Table of Frequency Allocation

Annex 3: Ghana National Table of Frequency Allocation.

Guinea

1 Introduction

1.1 Country profile

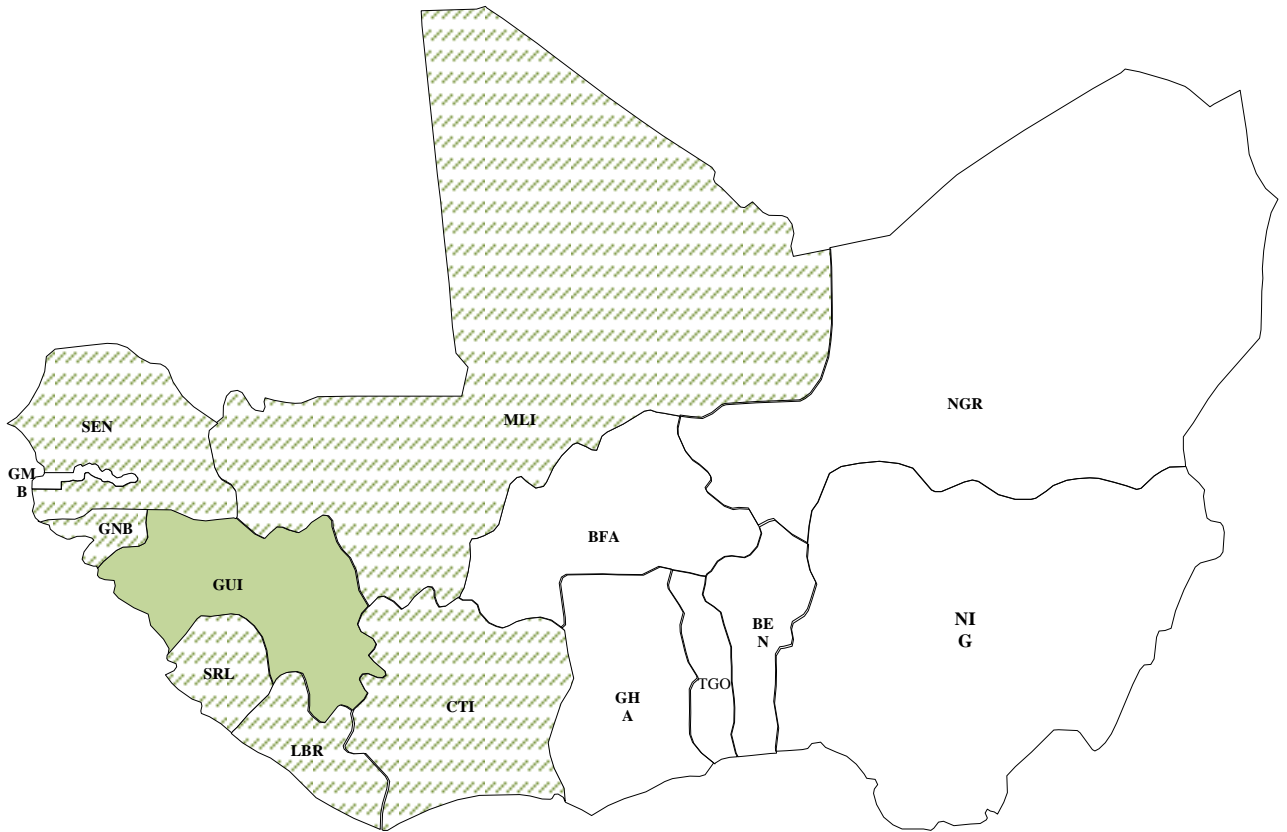
The Republic of Guinea, called “Guinea Conakry”, is on the Atlantic coast of West Africa. It is surrounded by Guinea-Bissau (385 km), Senegal (330 km), Mali (858 km), Côte d’Ivoire (610 km), Liberia (563 km), Sierra Leone (652 km) and the Atlantic Ocean.

Guinea is part of the Economic Community of West African States (ECOWAS).

Guinea macroeconomic statistics¹⁹ are as follows:

- Population: 10,068,724 inhabitants;
- GDP per capita: US \$ 407.50
- GDP per capita growth: -2.61%
- Inflation, consumer prices (annual): 4.68%.

Figure 21: Guinea and its neighboring countries



¹⁹ www.data.worldbank.org ;

1.2 Brief Information and Communication Technology profile

a) ICT Ministry

The Ministry is responsible for the definition and elaboration of telecommunications and Posts policy in particular the universal service strategy. The Ministry is also responsible for monitoring development of the telecommunications sector and progress toward achieving the objectives of the policy.

b) Regulatory authorities

Two (2) independent organs ensure the regulation of Telecommunications and Broadcasting in Guinea. It is:

- Autorité de Régulation des Postes et des Télécommunications - ARPT;
- Haute Autorité de la Communication - HAC.
- i. Autorité de Régulation des Postes et des Télécommunications – ARPT

The “*Autorité de Régulation des Postes et des Telecommunications – ARPT*” is created by the law “L/017” and “L/018/2005/AN” in September 8th, 2005. ARPT has the role of regulate Posts and Telecommunications sectors by ensuring the respect of law and legal framework, guaranteeing a non-discriminatory access and a continuity of service in order to protect the different actors of the market.

- ii. Haute Autorité de la Communication – HAC

The “*Haute Autorité de la Communication*” is created by the media law n°2010/003. It has the role of guaranteeing and ensuring freedom and protection of media. It takes care of the respect of the deontology and the equitable access of the political parties, associations and the citizens.

c) Operators

The telecommunications sector in Guinea is structure as follows:

- the incumbent operator, SOTELGUI which offers fixed services;
- five (5) mobile operators, SOTELGUI’s subsidiary company, AREEBA, INTERCEL, CELLCOM and ORANGE;
- some Internet Service providers.

The state broadcaster, “*Radiodiffusion-Television Guinéenne (RTG)*” retains its monopoly on television in Guinea. Satellite television is available, but is not widely accessed.

2 National Spectrum Management Framework

2.1 Legislative basis

ARPT is responsible of radio frequency management in terms of law “L/017” and “L/018/2005/AN” in September 8th, 2005.

2.2 National Table of Frequency Allocations

ARPT had developed a National Table of Frequency Allocation (NFTA) in 2005 with the assistance of ITU. This NFTA must be updated in order to take in account recent modification occurred in the Radio Regulation, edition 2008.

There is no Regional Table of frequency Allocation. But, Guinea signed ITU-R regional plans such as *GE84*, *GE89* and *GE06*.

There is no information about frequency band channel arrangement.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ARPT is the responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as government). As a consequent, there are no challenges because the same body handles spectrum management.

3.2 Bilateral / Multilateral agreement

Guinea does have a multilateral cross border frequency coordination agreement. Acting as cross border frequency coordination framework, this agreement is signed in August 2009 between **Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mali, Mauritania and Senegal**.

This multilateral agreement cover frequency band from 87.5 MHz to 30 GHz. Frequencies in the bands listed below which concern Fixed, Land Mobile and Broadcasting Services shall be coordinated under the terms of these agreements.

Table 36: Frequency band under the terms of the agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
136 – 174 410 – 470	PMR
452 – 470 830 – 840 / 875 – 885	CDMA
880 – 890/925 – 935 890 – 915/935 – 960 1710 – 1785 /1805 – 1880	GSM
1755 – 1805/2110 – 2160 1920 – 1980 /2110 – 2170	UMTS / FDD
1900 – 1920 2010 – 2025	UMTS / TDD
2500 – 2690	WLAN, IMT, MMDS
3400 – 3600	BLR, IMT
6425 – 7110	Microwave
7125 – 7725	
7900 – 8400	
10700 – 11700	
12750 – 13250	
14500 – 15350	

Frequency Band (MHz)	Applications
17700-19700	
21200-23600	
24500-26500	
27500-29500	

The multilateral agreement is mainly structured on:

- 1) Definitions;
- 2) Administrative provisions;
- 3) Technical provisions.

Attached to this agreement there are seven (7) annexes. Six (6) annexes described specific technical provisions which detail minimal conditions for a station to operate within each frequency band.

Annex 7 is related to the *exchange of information* and *focal point*.

1) Definitions

This part defines terminologies applicable under the agreement. Terms are *frequency categories*, *coordination area* and *harmful interference*.

– Frequency categories

Three (3) types of frequencies are defined as described in the table below.

Table 37: Predefined Frequency Category

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions

– Coordination area

Coordination area is defined as a zone adjacent to two countries' border, with a certain distance deep in each country's interior.

– Harmful interference

Harmful interference is any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

2) Administrative provisions

Administrative provisions give details on the following terms: follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.

3) Technical provisions

Agreements authorize Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are:

- In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;
- In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.

However, technical provisions described in annex are applicable. These technical provisions consist of a limitation of the field strength and the antenna height.

3.3 Exchange information and Focal Point

The multilateral agreement requires each administration to exchange information on the frequencies that they have assigned every three (3) months.

Each country designed focal point as follows:

Table 38: Focal Point per country

Country	Focal point
Cape Verde	David GOMES david.gomes@anac.cv +2382613069
The Gambia	Rodine S. RENNER rsr@pura.gm +220 996 23 33
Guinea	Habib TALL modihabib@yahoo.fr + 224 60 59 84 86
Guinea Bissau	Pedrinho SA icgb@mail.bissau.net +245 660 72 52
Mali	Ibrahim Belco MAIGA belco@crt.ml +223 223 14 90
Senegal	Pape Ciré CISSE pc.cisse@artp.sn +221 77 6470461

3.4 Coordination procedure

There is no coordination procedure to handle interferences.

3.5 Interference experience

Guinea does not have record on interference experience.

3.6 Data Exchange Format

ARPT does not have a frequency register.

Regarding “*Exchange of information*”, it had been described in the agreement. Data format to be transmitted to other Administration is detailed as follows:

- Owner;
- Category of the station;
- Number of stations;
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

Mail and *paper* are said to be suitable transmission methods for information exchange between Guinea and other Administrations.

3.7 Tools and database used.

TerRaNV, *TerRaQ*, *RRC06* are used by ARPT. ARPT is about to acquire ARGUS for Rohde & Schwarz. There is no indication on propagation model that is used.

4 Observation

Guinea has one entity which handles cross border frequency coordination. Guinea does not have an updated National Table of Frequency Allocation. Guinea does not have a framework for cross border frequency coordination.

5 Conclusion and Recommendations

Guinea followed the regional movement by signing multilateral cross border frequency coordination agreement. However, procedures, methods (*calculation method*) and tools (*software program, digital terrain data, etc.*), which will have to supplement this agreement, do not exist.

It is recommended that Guinea pursue its efforts towards setting up procedures, methods and to acquire tools for better spectrum management.

6 Contact

For this study, Moustapha DIABY, Koly CAMARA, Alseny CAMARA had been contacted. The focal point is:

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 Autorité de Régulation des Postes et Télécommunications – ARPT
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 +22462211021 / +22460214454

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Guinea;

7.2 Cross border frequency coordination agreement

Annex 2: Multilateral agreement between CPV, GMB; GUI, GNB, MLI and SEN;

Annex 2bis: Multilateral agreement annexes;

Guinea-Bissau

1 Introduction

1.1 Country profile

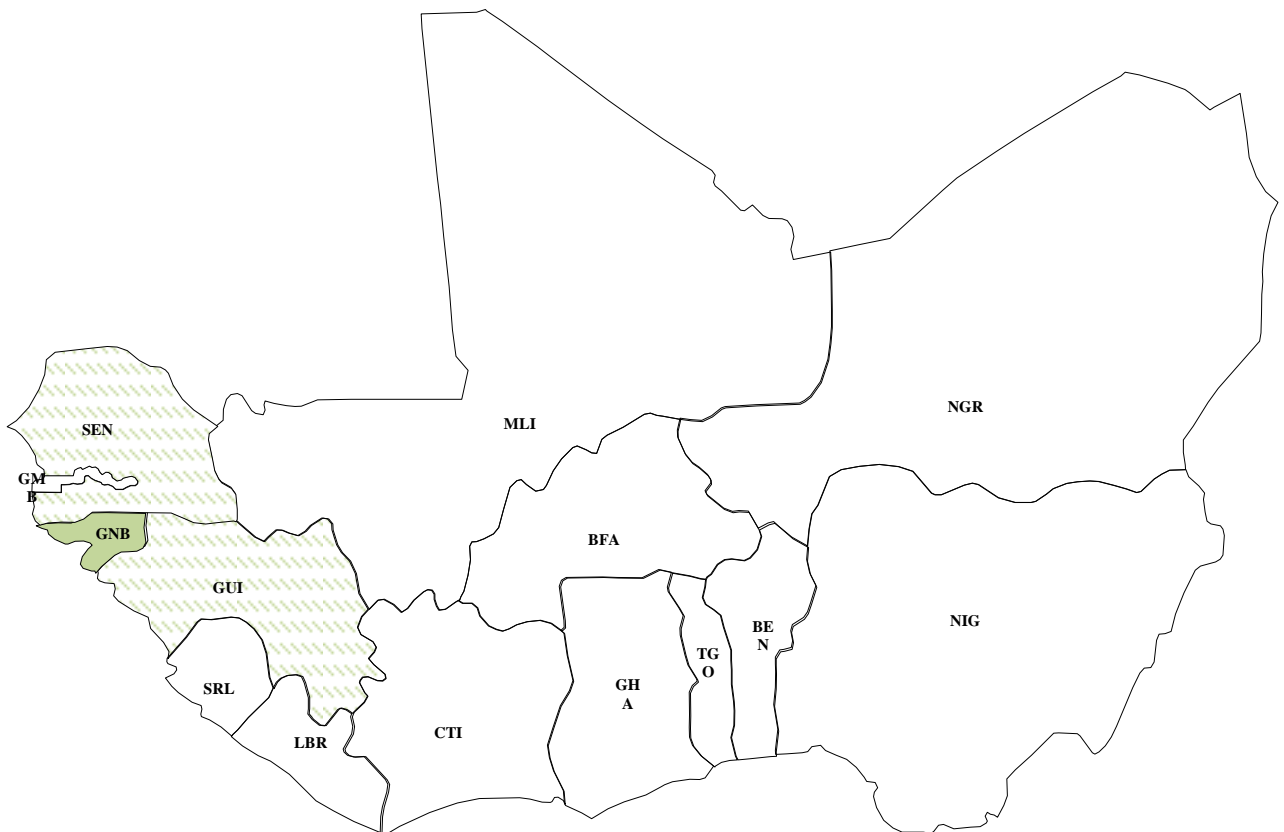
The Republic of Guinea-Bissau borders the North Atlantic Ocean and lies between **Senegal** and Guinea on the West African mainland with 18 islands off the coast.

The country covers 36,120 km². Guinea Bissau is part of the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS).

Guinea-Bissau macroeconomic statistics²⁰ are as follows:

Population	1,610,746 inhabitants;
GDP per capita	US \$519.46;
GDP per capita growth	0.74%;
Inflation, consumer prices	1.51%;
Inflation, GDP deflator	1.12%.

Figure 22: Guinea Bissau and its neighboring countries



²⁰ www.data.worldbank.org ;

1.2 Brief Information and Communication Technology profile

a) ICT Ministry

The Ministry of Transport and Telecommunications (MTT) is the higher institution responsible for the telecommunications sector.

b) Regulatory authorities

The legal framework definition is adapted to the existing global, regional and sub-regional context with the adoption in 1999 of the Basic Telecommunication Law creating the regulatory body, the Institute of Communications of Guinea-Bissau (ICGB), with the following attributes:

- to collaborate actively in defining telecommunication policy in Guinea-Bissau;
- to advise the Government in the exercise of its guardianship functions; and
- to exploit radio-frequency spectrum, numbering and other resources.

c) Operators

The telecommunications sector in Guinea Bissau is structure as follows:

- Fixed operator
 - Guine Telecom-Companhia De Telecomunicacoes Daguine-Bissau, Sar, state owner;
- Mobile operator
 - Guinétel, subsidiary of Guine Telecom;
 - Orangie Bissau SA, subsidiary of SONTALE (Senegal);
 - Spacetel Guinea-Bissau SA ;
 - MTN Guinea Bissau.

Broadcasting sector is comprised of two (2) TV stations: one is state-run and the other is operated by Portuguese public broadcaster RTP, and is run by local management, but with studios and infrastructure funded by Portugal.

2 National Spectrum Management Framework

2.1 Legislative basis

ICGB is responsible of radio frequency management in terms of telecommunications law adopted in 1999.

2.2 National Table of Frequency Allocations

The “*Instituto das Comunicações da Guiné-Bissau, ICGB*” has not develop a National Table of Frequency Allocations yet.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ICGB is the body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as government).

Guinea-Bissau does not have challenges on spectrum management in particular cross border frequency coordination.

3.2 Bilateral / Multilateral agreement

Guinea-Bissau does have a multilateral cross border frequency coordination agreement. Acting as cross border frequency coordination framework, this agreement is signed in August 2009 between **Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mali, Mauritania and Senegal.**

This multilateral agreement cover frequency band from 87.5 MHz to 30 GHz.

Frequencies in the bands listed below which concern Fixed, Land Mobile and Broadcasting Services shall be coordinated under the terms of these agreements.

Table 39: Frequency band under the terms of the agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
136 – 174 410 – 470	PMR
452 – 470 830 – 840 / 875 – 885	CDMA
880 – 890/925 – 935 890 – 915/935 – 960 1710 – 1785 /1805 – 1880	GSM
1755 – 1805/2110 – 2160 1920 – 1980 /2110 – 2170	UMTS / FDD
1900 – 1920 2010 – 2025	UMTS / TDD
2500 – 2690	WLAN, IMT, MMDS
3400 – 3600	BLR, IMT
6425 – 7110	Microwave
7125 – 7725	
7900 – 8400	
10700 – 11700	
12750 – 13250	
14500 – 15350	

Frequency Band (MHz)	Applications
17700 – 19700	
21200 – 23600	
24500 – 26500	
27500 – 29500	

The multilateral agreement is mainly structured on:

1. Definitions;
2. Administrative provisions;
3. Technical provisions.

Attached to this agreement there are seven (7) annexes. Six (6) annexes described specific technical provisions which detail minimal conditions for a station to operate within each frequency band.

Annex 7 is related to the *exchange of information and focal point*.

1) Definitions

This part defines terminologies applicable under the agreement. Terms are *frequency categories*, *coordination area* and *harmful interference*.

– Frequency categories

Three (3) types of frequencies are defined as described in the table below.

Table 40: Predefined Frequency Category

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions

– Coordination area

Coordination area is defined as a zone adjacent to two countries’ border, with a certain distance deep in each country’s interior.

– Harmful interference

Harmful interference is any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

2) Administrative provisions

Administrative provisions give details on the following terms: follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.

3) Technical provisions

Agreements authorize Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are:

- *In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;*
- *In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.*

However, technical provisions described in annex are applicable. These technical provisions consist of a limitation of the field strength and the antenna height.

3.3 Exchange information and Focal Point

The multilateral agreement requires each administration to exchange information on the frequencies that they have assigned every three (3) months.

Each country designed focal point as follows:

Table 41: Focal Point per country

Country	Focal point
Cape Verde	David GOMES david.gomes@anac.cv +2382613069
The Gambia	Rodine S. RENNER rsr@pura.gm +220 996 23 33
Guinea	Habib TALL modihabib@yahoo.fr + 224 60 59 84 86
Guinea Bissau	Pedrinho SA icgb@mail.bissau.net +245 660 72 52
Mali	Ibrahim Belco MAIGA belco@crt.ml +223 223 14 90
Senegal	Pape Ciré CISSE pc.cisse@artp.sn +221 77 6470461

3.4 Coordination procedure

There is no coordination procedure to handle interferences.

3.5 Interference experience

Guinea-Bissau does not have record on interference experience. Consequently, it's difficult to qualify interference cases as successful or unsuccessful.

The lack of coordination and history on interferences cases explains, why Guinea-Bissau continues to express that frequency bands under the terms of agreement need coordination.

Table 42: Frequency band requiring coordination

Frequency Band	Service / Application
900/1800	GSM
450 / 800	CDMA
2.5 – 2.690 GHz	MMDS, Wimax
3.4 – 3.6 GHz	WLL

3.6 Data Exchange Format

Guinea-Bissau does not have a frequency register.

Although, Guinea-Bissau affirms that data format does not exist, the multilateral agreement announced a format for information exchange.

The considered fields are as follows:

- Owner;
- Category of the station;
- Number of stations;
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

Mail is said to be suitable transmission methods for information exchange between Guinea-Bissau and other Administrations.

3.7 Tools and database used.

Guinea-Bissau is familiar with ITU tools such as *Winbasms*, *SMS4DC* are used by ICGB's engineer. In the same time, ICGB is about to purchase tools for a spectrum management and monitoring platform.

Propagation model used are *ITU-R 370*, *ITU-R 452*, *ITU-R 530*, *ITU-R P 618*, *ITU-R P 1546*, *Okumura-Hata*, *Free space*.

4 Observation

The situation of Guinea-Bissau is as follows:

- one entity deals with cross border frequency coordination;
- National Table of Frequency Allocation does not exist;
- framework for cross border frequency coordination does not exist;
- inefficiency of multilateral agreement.

5 Conclusion and Recommendations

Guinea-Bissau is trying to set up a functional framework for spectrum management in particular for cross border frequency coordination.

However, this framework needs to be completed by useful tools (*procedures, calculation method, software, etc ..*) which could make measurements and identify levels that may trigger coordination.

As Guinea-Bissau has a comprehensive view (by signing a multilateral agreement), it recommends that these additional tools must be standardized²¹ with those of neighbouring countries.

6 Contact

For this study, Pedrinho SA had been contacted. The focal point is:

Pedrinho SA
Directeur des Radiocommunications
Instituto das Comunicações da Guiné-Bissau
Rua 5 de Julho, CP 1372, BISSAU
sapedrinho@yahoo.com.br
+2456607252
+2455927785

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Guinea Bissau;

7.2 Cross border frequency coordination agreement

Annex 2: Multilateral agreement between CPV, GMB; GUI, GNB, MLI and SEN;

Annex 2bis: Multilateral agreement annexes;

²¹ because of the reality of the resources

Liberia

1 Introduction

1.1 Country profile

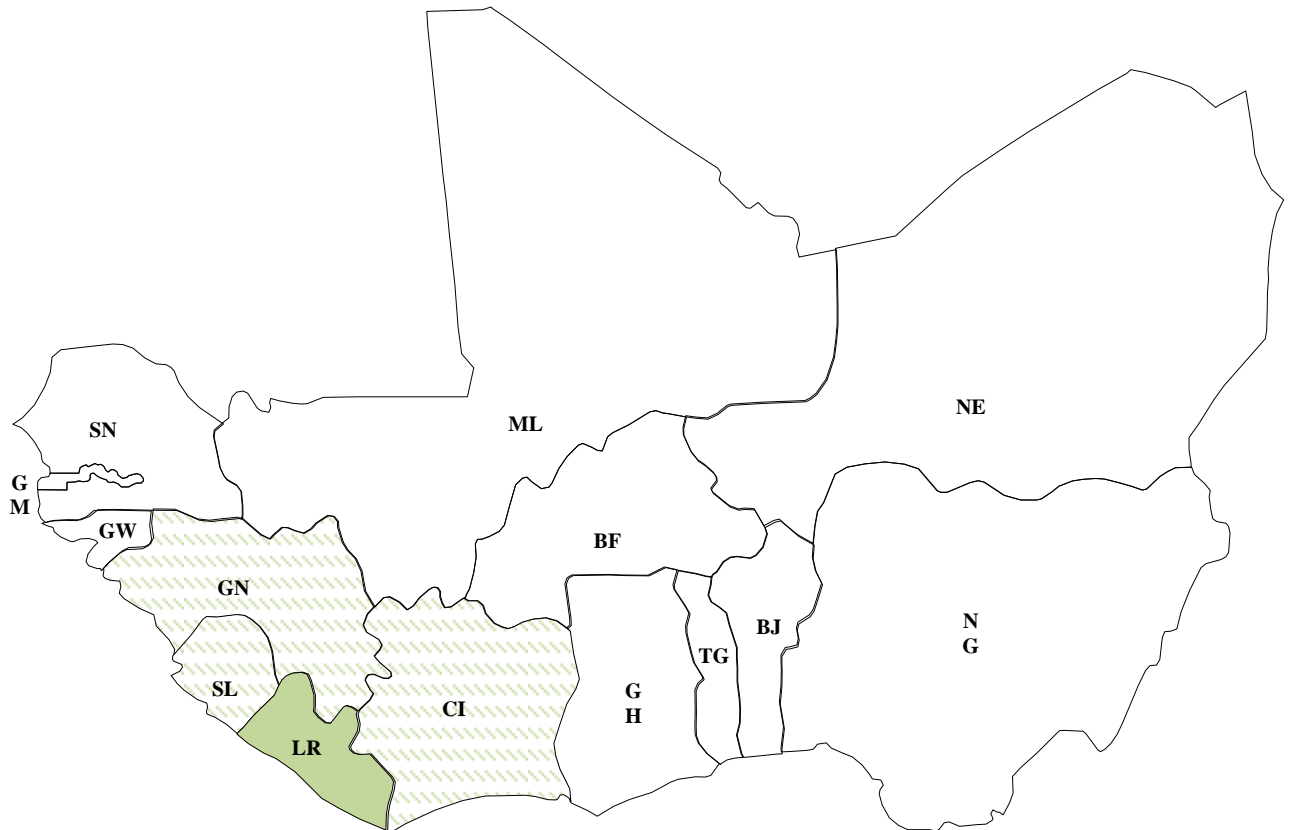
The Republic of Liberia is situated on the West Coast of Africa and borders the Republics of **Côte d'Ivoire**, **Guinea**, and **Sierra Leone** and has a land mass of 111,370 km².

Liberia is part of the Economic Community of West African States (ECOWAS).

Liberia macroeconomic statistics²² are as follows:

- Population 3,954,979 inhabitants;
- GDP per capita US \$ 221.57;
- GDP per capita growth 0.32%;
- Inflation, GDP deflator 7.42%.

Figure 23: Liberia and its neighboring countries



²² www.data.worldbank.org ;

1.2 Brief Information and Communication Technology profile

a) Post and Telecommunications Ministry

The Ministry of Post and Telecommunications (MPT) is responsible for determining broad sector policy and development strategy, in conformity with the goals and laws of the Government of Liberia.

The Ministry will play a key role in promoting the harmonization of telecom policies and regulatory frameworks within regional, sub-regional economic integration arrangements.

b) Regulatory authorities

The Liberia Telecommunications Authority was established by the Telecommunications Act of 2007 (Telecom Act 2007).

In accordance with the Telecom Act 2007, the mission of the LTA is *“to consistently create an enabling environment that promotes market driven fair competition, which provides accessible and affordable communication services for all²³”*.

c) Operators

There are five (5) operators currently operating in Liberia:

- Liberia Telecommunication Corporation, Libtelco, the national Operator, provide fixed wireless phone, wireless Internet and fax services;
- Four (4) mobile operators: Cellcom, Comium, LiberCell, and LoneStar.

2 National Spectrum Management Framework

2.1 Legislative basis

LTA is responsible for radio frequency management in terms of Telecommunications Act of 2007 (Telecom Act 2007) of the National Legislature.

2.2 National Table of Frequency Allocations

Liberia does have a National Table of Frequency Allocations called *“Frequency Allocation Table of Liberia (FATL)”*.

The LTA’s frequency allocation is carried out in line with the International Telecommunication Union’s (ITU) Radio Regulation guidelines but with local dissimilarity.

FATL consists of five columns that have the following titles:

- Frequency band of Region 1;
- Frequency band of Liberia;
- Main Services;
- Applications and;
- Notes /Comments.

²³ LTA, annual report 2009

Table 43: Snapshot of Liberia Table of Allocations

ITU Region 1 Table of Allocations	Republic of Liberia Table of Allocations	Main Service in Liberia	Applications	Notes /Comments
459.0 – 460.00 MHz FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E	459.0 – 460.00 MHz FIXED MOBILE	MOBILE	UHF Mobile	450-460 MHz Duplex Operations Paired with 460 – 470 MHz
460.00 – 470.00 MHz FIXED MOBILE Meteorological-Satellite (space-to-Earth S5.287 S5.288 S5.289 S5.290	460.00 – 470.00 MHz FIXED MOBILE	MOBILE	UHF Mobile	450-460 MHz Duplex Operations Paired with 460 – 470 MHz
470.0 – 790.0 MHz BROADCASTING S5.149 S5.291A S5.294 S5.296 S5.300 S5.302 S5.304 S5.306 S5.311 S5.312	470.0 – 790.0 MHz BROADCASTING	Broadcasting	TV channels 21 – 60	

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

LTA is the responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as government).

Liberia does not have challenges on spectrum management in particular cross border frequency coordination.

3.2 Coordination procedure

There is no coordination procedure to handle interferences as well as cross border frequency coordination framework.

3.3 Interference experience

LTA 2009's annual report mentioned "*a high level of illegal frequency usage is taking place in the country*". This state of affairs let us suppose that there are interferences, which are not indexed.

3.4 Bilateral / Multilateral agreement

Liberia does not have any bilateral or multilateral cross border frequency coordination agreements.

3.5 Data Exchange Format

Liberia does not have a frequency register.

3.6 Tools and database used.

Liberia “never carry out frequency coordination”, therefore tools that might be used are unknown. But recently, “LTA felt the compelling need [...] to undertake a series of measures that will eventually lead to the installation of a Spectrum Monitoring System. This system is capable of identifying unauthorized and illegal frequency users by use of its directional finding capability²⁴”.

4 Observation

The situation of Liberia is as follows:

- one entity deals with cross border frequency coordination;
- National Table of Frequency Allocation exists;
- framework for spectrum management does not exist;
- framework for cross border frequency coordination does not exist.

5 Conclusion and Recommendations

The lack of spectrum management framework in Liberia is not the ideal situation but it could be an advantage if a harmonized framework, at the regional level, is put in place. Liberia could be at the same level of other countries without passing by the cycle “*test error*”.

6 Contact

For this study, Commissioner Henry BENSON and Director Emmanuel PAYEGAR had been contacted.

The focal point is:

Emmanuel J. PAYEGAR
 Engineering Director
 Liberia Telecommunications Authority (LTA)
 Mobile: +231(0)880427282
 Office : +231(0) 27302019
epayegar@lta.gov.lr

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Liberia.

7.2 National Table of Frequency Allocations

Annex 3: Liberia National Table of Frequency Allocations.

²⁴ LTA, Annual Report, 2009

Mali

1 Introduction

1.1 Country profile

The Republic of Mali is a landlocked, tropical, country surrounded by Mauritania, **Senegal**, **Guinea**, **Cote d’Ivoire**, **Burkina Faso**, **Niger** and Algeria. It covers 1.24 million km².

Mali is part of the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS).

Mali macroeconomic statistics²⁵ are as follows:

- Population 13,010,209 inhabitants;
- GDP per capita US \$ 691.50;
- GDP per capita growth -1.86%;
- Inflation, consumer prices 2.20%
- Inflation, GDP deflator 4.27%

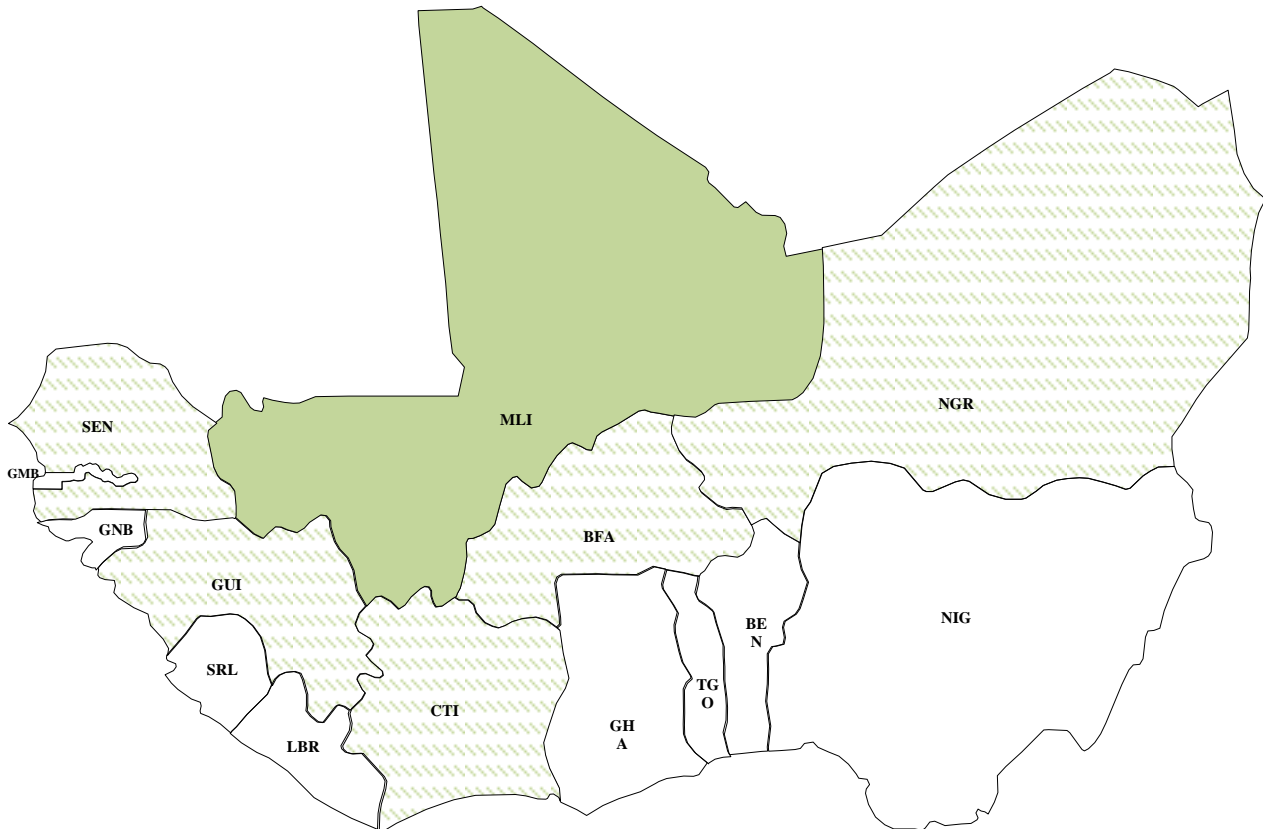


Figure 24: Mali and its neighboring countries

²⁵ www.data.worldbank.org

1.2 Brief Information and Communication Technology profile

a) Communication and New Technologies Ministry

The Ministry of Communication and New Technologies²⁶ has the role to elaborate and implement the national policy in the fields of media, telecommunications, posts and new technologies. For this reason, it performs in particular the following functions:

- preparation and implementation of public and private media policy development;
- development and implementation of ICT policy.

b) Regulatory authorities

Two (2) independent organs ensure the regulation of Telecommunications and Broadcasting in Mali. They are:

- Comité de Régulation des Télécommunications, CRT ;
- Conseil Supérieur de la Communication, CSC.

i. Comité de Régulation des Telecommunications, CRT

The “CRT” was established by law n°99-043 in September 30th, 1999 modified by law n° 01-005 in February 27th, 2001. It has the role of assisting the Ministry in the application of the law and the respect of general terms for operating in telecommunications sector²⁷.

ii. Conseil Supérieur de la Communication, CSC

The “*Conseil Supérieur de la Communication*” that had been established by law n°92-038/AN-RM in December 24th, 1992 is an independent institution which has the role of ensuring and guaranteeing the freedom and independence of the means of communication in the respect of the law²⁸.

c) Operators

The telecommunication and broadcasting sector in Mali is marked by the presence of the following role players:

- SOTELMA, affiliated with MAROC TELECOM, provides fixed services;
- MALITEL, SOTELMA’s subsidiary company provides mobile service;
- IKATEL, affiliated with FRANCE TELECOM, provides fixed and mobile services;
- Two (2) TV stations: ORTM and AFRICABLE.

2 National Spectrum Management Framework

2.1 Legislative basis

CRT is responsible for radio frequency management in terms of law n°99-043 in September 30th, 1999 modified by law n° 01-005 in February 27th, 2001.

²⁶ www.mcmt.gov.ml/contenu_page.aspx?pa=20

²⁷ www.crt-mali.org/pdf/loi-orde/ORDONNANCE_N99-043.PDF

²⁸ www.justicemali.org/www.justicemali.org/pdf/33-conseilcomm.pdf

2.2 National Table of Frequency Allocations

CRT had edited, in 2008, the National table of Frequency allocation (NFTA) called “*Tableau National d’Attribution des Fréquences - TNAF*”. This NFTA is covering frequencies band from 9 kHz to 30 GHz. It has three (3) columns:

- its first column titled “Frequency Band”;
- its second column titled “ITU Region I allocation”
- its third column titled “Mali allocation”.

FREQUENCY BAND	ITU REGION I ALLOCATION	MALI ALLOCATION
460-470 MHz	FIXED MOBILE 5.286AA Meteorological-Satellite (Earth-to-Space) 5.287 5.288 5.289 5.290	FIXED MOBILE
470-608 MHz	BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.302 5.304 5.306 5.311A 5.312	BROADCASTING Mobile
608 – 614 MHz		BROADCASTING Mobile Radioastronomy
614 – 790 MHz		BROADCASTING Mobile
790-824 MHz	FIXED BROADCASTING MOBILE except aeronautical mobile 5.316B 5.317A 5.312 5.314 5.315 5.316 5.316A 5.319	MOBILE BROADCASTING
824 – 862 MHz	FIXED BROADCASTING MOBILE except aeronautical mobile 5.316B 5.317A 5.312 5.314 5.315 5.316 5.316A 5.319	MOBILE BROADCASTING
862-890 MHz	FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322	MOBILE
890-942 MHz	FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322	MOBILE

There is some dissimilarity with the Table of Frequency Allocations of ITU Region 1, edition 2008.

There is no Regional Table of frequency Allocation. But, Mali signed ITU-R regional plans such as *GE84*, *GE89* and *GE06*.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

CRT is the unique body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as military).

There are no challenges on spectrum management.

Regarding cross border frequency coordination agreement, CRT had signed two (2) bilateral and one (1) multilateral agreements respectively with **Burkina – Faso** (January 2010), **Niger** (November 2010) and a list of countries composed of **The Gambia, Cape-Verde, Guinea, Guinea-Bissau, Senegal** and Mauritania (August 2009).

3.2 Bilateral / Multilateral agreement

According to the response to the questionnaire, Mali does not have a framework (administrative procedures, technical provisions, frequency register to store coordination results, etc.) apart those included in agreements.

These agreements cover terrestrial services from 87.5 MHz to 30 GHz and concern frequency band listed on table 2.

Table 45: Frequency band under the terms of agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
452 – 470	CDMA
830 – 840 / 875 – 885	
880 – 890/925 – 935	GSM
890 – 915/935 – 960	
1710 – 1785 /1805 – 1880	
1755 – 1805/2110 – 2160	UMTS / FDD
1920 – 1980 /2110 – 2170	
1900 – 1920	UMTS / TDD
2010 – 2025	
2500 – 2690	WLAN, IMT, MMDS
3400 – 3600	BLR, IMT
6425 – 7110	Microwave
7125 – 7725	

Frequency Band (MHz)	Applications
7900 – 8400	
10700 – 11700	
12750 – 13250	
14500 – 15350	
17700 – 19700	
21200 – 23600	
24500 – 6500	
27500 – 29500	

Table 46: Different Structure of agreements

Agreement	Part
Bilateral	Frequency categories; Coordination procedures; Administrative provisions; Technical provisions; Exchange information and Focal Point.
Multilateral	Definitions; Administrative provisions; Technical provisions

Attached to these agreements as annexes, there are specific technical provisions which detail minimal conditions for a station to operate within each frequency band.

A thorough analysis of agreements shows that “*Definitions*” part of multilateral agreement has the same contents as “*Frequency categories*” part of bilateral agreement. In the same way, the “*Exchange of information*” part is included in “*Administrative provisions*” part of multilateral agreement.

Differences between these agreements are “*Coordination procedures*” part which exists in the bilateral agreement and not in the multilateral agreement

1) Common parts

– *Frequency categories*

This part defines the following terms shown in the table hereafter:

Table 47: Term’s definition

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions
penetration distance	distance beyond which the service ensured by a transmitter of the neighboring country must be inoperative

coordination area	a zone adjacent to two countries' border, with a certain distance deep in each country's interior.
harmful interference	any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

– Administrative provisions

Administrative procedures give details on the following terms: *follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.*

– Technical provisions

Agreement authorizes Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are:

- In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;
- In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.

However, technical provisions described in annex are applicable. These technical provisions consist of a limitation of the field strength and the antenna height.

– Exchange information and Focal Point

Agreements require each administration to exchange information and to design its focal Point. Focal points for both bilateral and multilateral agreement are listed in table 47.

Table 48: Focal point for both Bilateral and multilateral agreement

Country	Focal Point
Burkina Faso	Pousbilo OUEDRAOGO pousbil@arce.bf +226 50 37 53 60 +226 70 26 84 08
Mali	Ibrahim Belco MAIGA belco@crt.ml +223 20 23 14 90 +223 66 76 59 88
Niger	Salou Abdou DORO salou.abdou@ties.itu.int +227 20 73 90 08 +227 93 82 64 00
Cape Verde	David GOMES david.gomes@anac.cv +2382613069
The Gambia	Rodine S. RENNER rsr@pura.gm +220 996 23 33

Country	Focal Point
Guinea	Habib TALL modihabib@yahoo.fr + 224 60 59 84 86
Guinea Bissau	Pedrinho SA icgb@mail.bissau.net +245 660 72 52
Senegal	Pape Ciré CISSE pc.cisse@artp.sn +221 77 6470461

3.3 Coordination procedures

Agreements are mainly based on the fact that an administration which has been granted a preferential right may put stations operating on preferential frequencies into use without prior coordination.

The Administration using the preferential frequencies must inform (using the exchange format) the other Administration.

There is no procedure (**for other predefined frequency category**) which describe, for example, at least steps for:

- circulate a request for co-ordination to all Administrations affected for their comment;
- Ask (the Administration affected) for information within a certain delay upon receipt of the request for co-ordination;
- Evaluate (the Administration affected) information in accordance with the provisions of the Agreement and notify the requesting Administration of the outcome;
- Notify (to the Administration affected) any coordinated frequency assignment as soon as the corresponding station is put into operation but not later than a certain delay upon approval
- Notify (the Administrations affected) any change on the technical characteristics of stations registered in the frequency register.

3.4 Interference experience

Mali does not have relative data on interferences notifications. However, the table 6 emphasized a need for coordination for certain frequency band. These identified bands requiring coordination are already under the terms of the agreements whose aim is precisely to avoid interferences.

This situation shows the follow-up and the effectiveness of these agreements.

Table 49: Frequency Band requiring coordination

Band (MHz)	Service	Neighboring country	Priority
87.5 – 108	Broadcasting		H
174 – 230	Broadcasting		H

Band (MHz)	Service	Neighboring country	Priority
470 – 862	Broadcasting		H
880 – 890/925 – 935	Mobile (GSM)		H
890 – 915/935 – 960			H
1710 – 1785 /1805 – 1880			H
7900 – 8400	Fixed		H

3.5 Data Exchange Format

CRT does not have a frequency register. For the exchange of information, which is mandatory as per the agreements, both bilateral and multilateral agreements have the same format with fields such as:

- Owner;
- Category of the station;
- Number of stations;
- Type of station (Base or mobile);
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

Within agreements, mail is said to be suitable transmission methods for information exchange with the neighbouring countries.

3.6 Tools and database used.

CRT does not use any tools from ITU. But, by now CRT is on the process to have a new system for monitoring and management. Propagation model used are listed in the table 49.

Table 50: Propagation mode

Service	Propagation Model	Band
Fixed (Free space)	ITU-R 525	3-30 GHz
Fixed (PtP)	ITU-R 530	3-30 GHz
Broadcasting, Mobile	ITU-R 1546	3-30 GHz

4 Observation

Mali does have one entity which deals with cross border frequency coordination.

Mali's National Table of Frequency Allocation has some dissimilarity with ITU Region I, edition 2008 Table of Allocation.

Mali does have cross border frequency coordination agreement with neighbouring countries.

Agreement does not avoid spectrum users to face interferences within frequency band agreed by countries.

Agreements are not homogeneous, which can be a source of difficulty for spectrum managers.

5 Conclusion and Recommendations

Regarding the situation, it recommends to:

- harmonize Mali's agreement;
- complete agreement by describing procedures for predefined frequency category;
- elaborate and develop a calculation method to evaluate signal strength.

6 Contact

For this study, Ibrahim Belco MAIGA had been contacted.

The focal point is:

Ibrahim Belco MAIGA

belco@crt.ml

+223 20 23 14 90

+223 66 76 59 88

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Mali.

7.2 Cross border frequency coordination agreement

Annex 2: Agreement between Mali and Burkina Faso;

Annex 2bis: Agreement between Mali and Niger;

Annex 2ter: Multilateral agreement between Cape Verde, The Gambia, Guinea, Guinea Bissau, Mali and Senegal;

Annex 2quater: Multilateral agreement annexes.

7.3 National Table of Frequency Allocations

Annex 3: Mali National Table of Frequency Allocations.

Niger

1 Introduction

1.1 Country profile

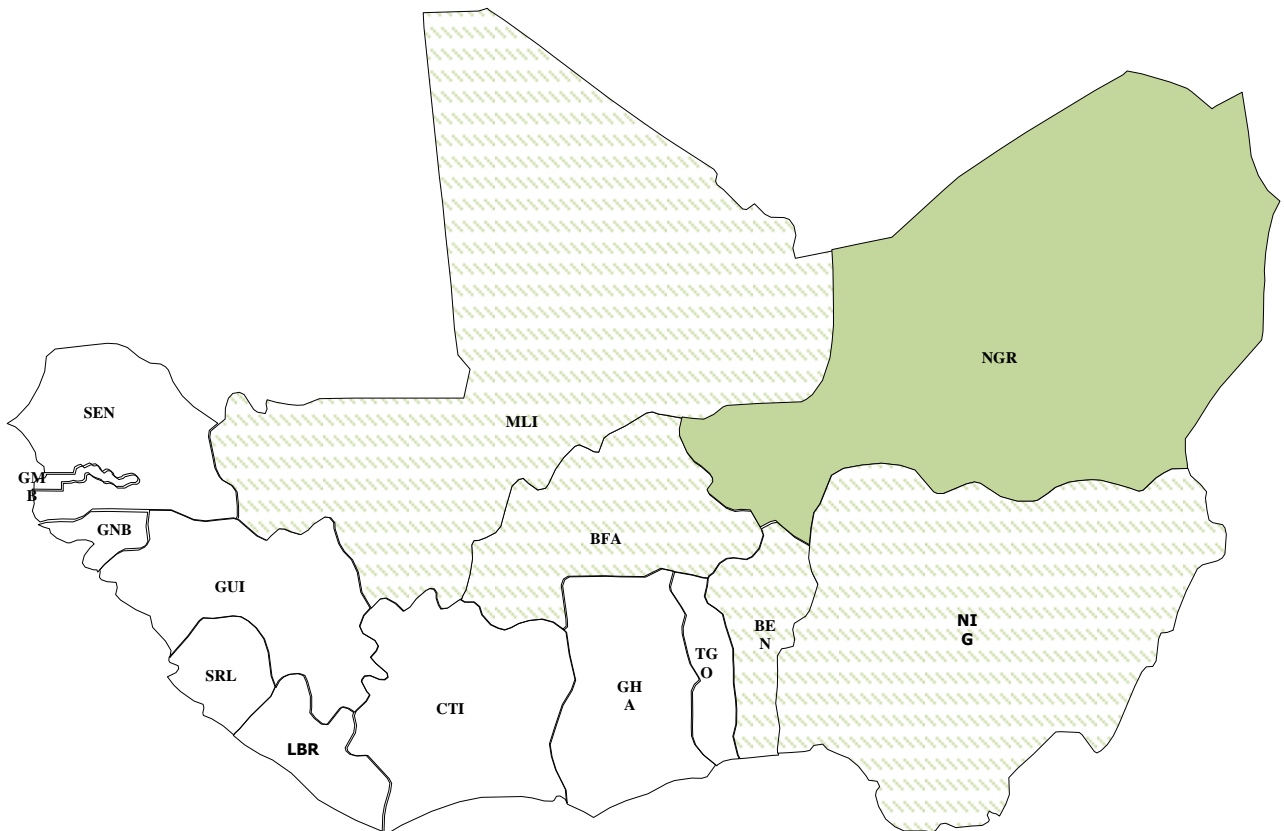
Located in sub-Saharan Africa, Niger is a vast landlocked country which covers a surface of 1.267.000 km². It borders **Nigeria** and **Benin** to the south, **Burkina-Faso** and **Mali** to the west, Algeria and Libya to the north and Chad to the east.

Niger is part of the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS).

Niger macroeconomic statistics²⁹ are as follows:

Population	15,290,102 inhabitants;
GDP per capita	US \$ 352.09;
GDP per capita growth	-2.87%;
Inflation, consumer prices	4.30%;
Inflation, GDP deflator	4.92%.

Figure 25: Niger and its neighboring countries



²⁹ www.data.worldbank.org

1.2 Brief Information and Communication Technology profile

a) Information and Communication Technologies Ministry

The Information and Communication Technologies Ministry has the role of development and implementation of the national policies. For this reason, it exerts, inter alia, following attributions of defining policies, strategies, programs, plans related to Information and Communication Technologies.

b) Regulatory authorities

Two (2) independent organs ensure the regulation of Telecommunications and Broadcasting in Niger. They are:

- Autorité de Régulation Multisectorielle, ARM;
- Conseil Supérieur de la Communication, CSC.
- i. Autorité de Régulation Multisectorielle, ARM

The “*Autorité de Régulation Multisectorielle*” was established by the law n°99-044 in October 26th, 1999. Its role is to control telecommunications sector by the application of the law and framework related to the sector, the consultation of the players, the guarantee of transparent and fair competition in order to protect the interests of the government, consumers and operators

- ii. Conseil Supérieur de la Communication, CSC

The “*Conseil Supérieur de la Communication*”, a constitutional institution, is an independent institution which has the role of ensuring and guaranteeing the freedom and independence of the means of communication in the respect of the law.

c) Operators

The telecommunication and broadcasting sector in Niger is marked by the presence of the following role players:

- Two (2) fixed line network operators, SONITEL SA, the incumbent operator and ORANGE NIGER SA;
- Four (4) GSM operators, AIRTEL NIGER SA, ATLANTIQUE TELECOM NIGER SA, ORANGE NIGER SA and SAHELCOM SA, the subsidiary company of SONITEL SA;
- Six (6) Internet Services Providers, SONITEL SA, ORANGE NIGER SA, ALINK, IXCOM, LIPTINFOR NIGER SA and CONNECTEO NIGER;
- Eight (8) TV stations: TENERE, TELE SAHEL, TAL TV, DOUNIA, CANAL 3, TV BONFEREY, SARAOUNIA TV, AFRICABLE;
- One (1) TV distributor using MMDS technology, TELESTAR;
- One (1) satellite TV distributor, CANAL + HORIZONS SATELLITE.

2 National Spectrum Management Framework

2.1 Legislative basis

ARM is responsible of radio frequency management in terms of “Ordonnance n° 99-045 du 26 octobre 1999, portant réglementation des télécommunications au Niger modifiée et complétée par l’ordonnance n°2010-89 du 16 décembre 2010 and decree n°2000-370/PRN/MC du 12 octobre 2000 portant organisation des spectres radioélectriques ».

2.2 National Table of Frequency Allocations

ARM had edited, in 2010, the National table of Frequency allocation (NFTA) called “*Plan National d’Attribution des Fréquences - PNAF*”. This NFTA is covering frequencies band from 9 kHz to 275 GHz. It has five (5) columns:

- its first column titled “Frequency Band”;
- its second column titled “ITU Region I allocation”
- its third column titled “Niger allocation”;
- its fourth column “Technical Interfaces” described technical provisions applicable;
- its fifth column contains some “Remarks”.

Table 51: Snapshot of Niger's National Table of Frequency Allocation

FREQUENCY BAND	ITU REGION I ALLOCATION	NIGER ALLOCATION	TECHNICAL INTERFACES	REMARKS
460-470 MHz	FIXED MOBILE 5.286AA Meteorological-Satellite (Earth-to-Space) 5.287 5.288 5.289 5.290	MOBILE ARM	IR0205	NGR-026 Décision N°41/CNR/ARM/Te/GSF du 30 juillet 2009
470-790 MHz	BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.302 5.304 5.306 5.311A 5.312	BROADCASTING CSC		
790-862 MHz	FIXED BROADCASTING MOBILE except aeronautical mobile 5.316B 5.317A 5.312 5.314 5.315 5.316 5.316A 5.319	FIXED MOBILE ARM	IR0034	NGR-027 NGR-028 Décision N°41/CNR/ARM/Te/GSF du 30 juillet 2009
862-890 MHz	FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322	FIXED MOBILE ARM	IR0034	NGR-029, NGR-030 Décision N°41/CNR/ARM/Te/GSF du 30 juillet 2009
890-942 MHz	FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322	MOBILE	IR0206	NGR-030 Décision N°41/CNR/ARM/Te/GSF du 30 juillet 2009

PNAF follows rigorously the Table of Frequency Allocations of ITU Region 1 with a light difference on maritime service (as Niger is an inland country)

PNAF include national footnotes describing terms and conditions under which frequency band should be used.

Technical interfaces (radio-frequency channel arrangement, standard, etc.) used by ARM are strictly compliant to ITU-R recommendation.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ARM is the unique body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as military).

ARM faces to some challenges on spectrum management. According to the law, frequency assignment could only be done by ARM but, there is a de facto situation wherein some administrations directly manage and assign frequency.

Since 2009, to avoid these challenges, ARM delegates only frequency assignment to four (4) bodies and still keeps attributions related to cross-border frequency coordination and spectrum monitoring. These bodies are CSC, the content regulator for broadcasting services, ANAC for aeronautical service and two bodies from military and governmental uses.

3.2 Bilateral / Multilateral agreement

The process of completing spectrum management and monitoring framework is in the course of finalization. So, there is no formal framework related to cross border frequency coordination.

However, Niger had signed in November 2010, three (3) cross border frequency coordination agreements with Benin, Burkina-Faso and Mali.

These agreements cover terrestrial services from 87.5 MHz to 30 GHz and concern frequency band listed on table 2.

Table 52: Frequency band under the terms of agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
452 – 470	CDMA
830 – 840 / 875 – 885	
880 – 890/925 – 935	
890 – 915/935 – 960	GSM
1710 – 1785 / 1805 – 1880	
1755 – 1805/2110 – 2160	UMTS / FDD
1920 – 1980 / 2110 – 2170	
1900 – 1920	UMTS / TDD
2010 – 2025	
2500 – 2690	WLAN, IMT, MMDS
3400 – 3600	BLR, IMT
6425 – 7110	Microwave

Frequency Band (MHz)	Applications
7125 – 7725	
7900 – 8400	
10700 – 1700	
12750 – 13250	
14500 – 15350	
17700 – 19700	
21200 – 23600	
24500 – 26500	
27500-29500	

These agreements are mainly structured on:

1. Frequency categories;
2. Report of harmful interference;
3. Coordination procedures;
4. Administrative provisions;
5. Technical provisions;
6. Exchange information and Focal Point.

Attached to these agreements as annexes, there are specific technical provisions which detail minimal conditions for a station to operate within each frequency band.

– Frequency categories

This part defines the following terms shown in the table hereafter:

Table 53: Term’s definition

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions
penetration distance	distance beyond which the service ensured by a transmitter of the neighboring country must be inoperative
coordination area	a zone adjacent to two countries’ border, with a certain distance deep in each country’s interior.
harmful interference	any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

– Report of harmful interference

Within agreement with Benin, it is said that the Administration affected must report harmful interference to its counterpart for solving within a delay of thirty (30) days.

With Mali and Burkina-Faso, there is no report of harmful interference.

– Coordination procedures

Agreements are mainly based on the fact that an administration which has been granted a preferential right may put stations operating on preferential frequencies into use without prior coordination.

The Administration using the preferential frequencies must inform (using the exchange format) the other Administration.

There is no procedure (**for other predefined frequency category**) which described, for example, at least steps for:

- circulate a request for co-ordination to all Administrations affected for their comment;
- Ask (the Administration affected) for information within a certain delay upon receipt of the request for co-ordination;
- Evaluate (the Administration affected) information in accordance with the provisions of the Agreement and notify the requesting Administration of the outcome;
- Notify (to the Administration affected) any coordinated frequency assignment as soon as the corresponding station is put into operation but not later than a certain delay upon approval
- Notify (the Administrations affected) any change on the technical characteristics of stations registered in the frequency register.

– Administrative provisions

Administrative procedures give details on the following terms: *follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.*

– Technical provisions

Agreement authorizes Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are:

- In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;
- In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.

However, technical provisions described in annex are applicable. These technical provisions consist of a limitation of the field strength and the antenna height.

– Exchange information and Focal Point

Agreements require each administration to exchange information and to design its focal Point.

Focal points are:

Country	Focal Point
Burkina Faso	Pousbilo OUEDRAOGO pousbil@arce.bf +226 50 37 53 60 +226 70 26 84 08
Benin	Géraud-Constant AHOKPOSSI aconstant@atrpt.bj +229 21 31 01 65 +229 95 63 35 71
Mali	Ibrahim Belco MAIGA belco@crt.ml +223 20 23 14 90 +223 66 76 59 88
Niger	Salou Abdou DORO salou.abdou@ties.itu.int +227 20 73 90 08 +227 93 82 64 00

3.3 Interference experience

Interferences complaints registered on ARM's database are usually on Nigeria Border. But, with Nigeria, Niger has neither an agreement nor a procedure.

Niger expresses the needs of cross border frequency coordination as it's described in the table below.

Table 54: Frequency band requiring coordination

Band (MHz)	Service	Neighbouring country
136 - 174	Land Mobile	Benin, Burkina-Faso, Mali
410 - 470	Land Mobile	Benin, Burkina-Faso, Mali
880-890/925-935	GSM	Nigeria
890-915/935-960		
1710-1785 /1805-1880		
1755-1805/2110-2160	UMTS / FDD	
1920-1980 /2110-2170		
1900-1920	UMTS / TDD	
2010-2025		

The table 4 shows that cross border frequency coordination agreements remain incomplete because certain frequency band are not integrated.

3.4 Data Exchange Format

ARM does have a frequency register which fields are:

- Channel number;
- Frequency (MHz);
- Owner;
- Service;
- Assignment date;
- Latitude;
- Longitude;
- Class (fee consideration);
- Observations.

There is not a special register for storing coordination results yet. In the case of storing coordination results, the associated register must have the required format for “*Exchange of information*” which is mandatory as per the coordination agreement. The fields of this format are:

- Owner;
- Category of the station;
- Number of stations;
- Type of station (Base or mobile);
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

For Niger, mail is said to be suitable transmission method for information exchange with the neighbouring countries.

3.5 Tools and database used.

ARM has SMS4DC from ITU (but never used) and TCI system for spectrum management and monitoring (ASMS and SMS).

Maps used are in *jpeg* format and its does not have geographical projection system.

ITU-R P.1546 directives are used for propagation prediction.

Coordination area is the zone whereof calculation is made.

4 Observation

Niger does have one entity which deals with cross border frequency coordination and an updated National Table of Frequency Allocation. However, cross border frequency coordination’s framework is not efficient as some parts are missing such as procedures for predefined frequency category, calculation method to evaluate emission, etc.

5 Conclusion and Recommendations

Niger's spectrum management and monitoring framework in particular cross border frequency coordination's are being set up gradually.

As Niger have incomplete agreements which have some dissimilarity in the contents, it is recommended to complete and harmonize these agreements.

6 Contact

For this study, Salou Abdou DORO had been contacted.

The focal point is:

Salou Abdou DORO
 Responsable gestion du spectre des fréquences
 Autorité de Régulation Multisectorielle
 64 rue des bâtisseurs, BP 13179 – Niamey
 +22720739008
Salou_abdou50@yahoo.com

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Niger.

7.2 Cross border frequency coordination agreement

Annex 2: Agreement between Niger and Benin;

Annex 2bis: Agreement between Niger and Burkina Faso;

Annex 2ter: Agreement between Niger and Mali.

7.3 National Table of Frequency Allocations

Annex 3: Niger National Table of Frequency Allocations;

Annex 3bis: Niger Table of Frequency Allocations.

Nigeria

1 Introduction

1.1 Country profile

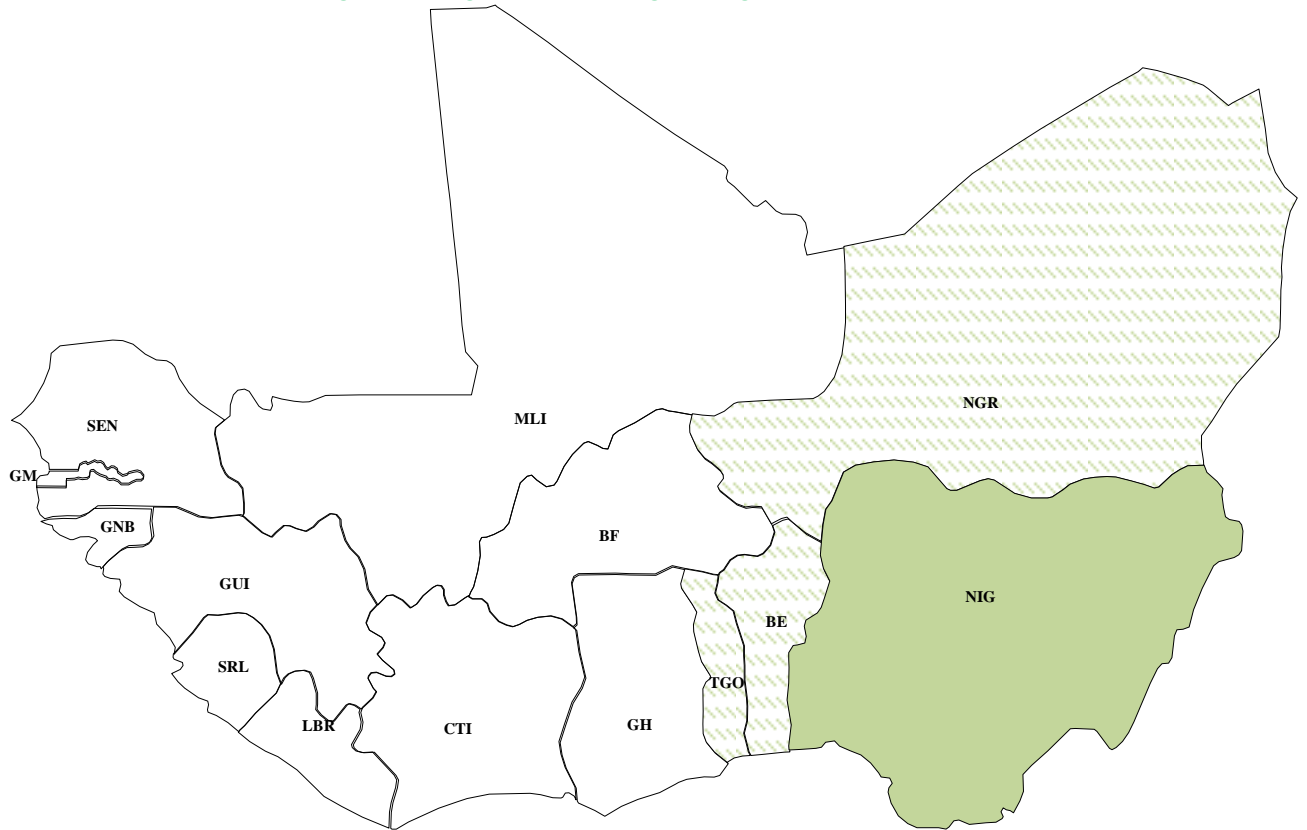
The Federal Republic of Nigeria which a land mass of 923,770 km² is located in the Western Africa bordering the gulf of Guinea to the south, **Benin** to the west, **Niger** to the North, Cameroon to the east and Chad to the north-east.

Nigeria is part of the Economic Community of West African States (ECOWAS).

Nigeria macroeconomic statistics³⁰ are as follows:

- Population 154,728,892 inhabitants;
- GDP per capita US \$ 1118.11;
- GDP per capita growth 3.20%;
- Inflation, consumer prices 11.54%;
- Inflation, GDP deflator -0.65%

Figure 26: Nigeria and its neighboring countries



³⁰ www.data.worldbank.org ;

1.2 Brief Information and Communication Technology profile

a) Federal Ministry of Information & Communications, FMIC³¹

The Federal Ministry of Information & Communications is mandated to proactively inform, enlighten, and educate the citizenry on the activities, actions, policies and programs of government and to initiate and supervise telecommunications policies in Nigeria.

The Federal Ministry of Information & Communications is mandated to proactively inform, enlighten, and educate the citizenry on the activities, actions, policies and programs of government and to initiate and supervise telecommunications policies in Nigeria.

Its functions are, among other things:

- to serve as the Federal Public Information outfit responsible for professional policy-making, planning, gathering, processing, packaging and dissemination of essential and vital information which will enhance and facilitate democratic governance of Nigeria as a Federal Republic;
- To develop, design, institutionalize, appropriate and generally acceptable public information and communication policies which will promote information management and control in a democratic society.
- To initiate action programs, policies, rules and regulations which will ensure the existence and maintenance of civilized and orderly information and communication systems in Nigeria consistent with acceptable cultural and conventional norms and ethics of the Nigerian people and world community;
- To represent Nigeria at International level for conferences on information.

b) Regulatory authorities

i. Nigerian Communications Commission, NCC

The promulgation of Decree 75 of 1992 established the Nigerian Communications Commission (NCC). NCC is the independent National Regulatory Authority for the telecommunications industry in Nigeria.

The Commission is responsible for creating an enabling environment for competition among operators in the industry as well as ensuring the provision of qualitative and efficient telecommunications services throughout the country³².

ii. Nigerian Broadcasting Commission, NBC

The National Broadcasting Commission is established by Section 2 subsection (1) of Act No 38 of 1992 as amended by Act No 55. of 1999.

This Act empowers the Commission, to carry out a number of duties, some of which include, licensing monitoring, regulating and conducting research in broadcasting in Nigeria.

It is also the duty of the Commission, to ensure the development, in a dynamic manner, through the accreditation of the mass communication curricula in all the tertiary and other institution related to broadcasting³³.

³¹ www.fmhc.gov.ng

³² www.ncc.gov.ng

³³ www.nbc.gov.ng

c) Operators

The telecommunication sector in Nigeria is marked by the presence of the following role players AIRTEL, ETISALAT (EMTS) MOBILE, GLOBACOM LTD, STARCOMMS, MTN NIGERIA LTD, MTEL (NITEL), MULTILINKS (TELKOM), VISAFONE , ZOOMMOBILE.

The broadcasting sector - comprising 187 radio stations, 143 television stations, is easily the largest on the African continent.

2 National Spectrum Management Framework

2.1 Legislative basis

NCC is responsible for radio frequency management in terms of Decree 75 of 1992.

2.2 National Table of Frequency Allocations

Nigeria is developing its National Table of Frequency Allocation (NFTA). This NFTA will be compliant to ITU- Region 1 table of frequency allocation.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

The FMIC and the regulators are responsible for frequency coordination as follows:

- For broadcasting service, FMIC in consultation with NBC;
- For civil bands, FMIC in consultation with NCC.

For Government and military use, FMIC is the unique body responsible.

3.2 Coordination procedure

The procedure described is as follows: “the victim of interference reports to the regulator who investigates and escalates to the Administrator who in turn reports to the Administration of the interfering country for coordination”.

As described, the procedure emphasizes the ambiguous role of the FMIC. It also appears as an internal procedure and does not clearly detailed the way that the two (2) Administrations deal with interference at their borders.

As a consequence, it’s correct to think that there is no coordination procedure to handle interferences.

3.3 Interference experience

Nigeria affirms not to have records on interference. This is the reason why frequency bands listed in the table 48 require cross border frequency coordination.

Table 55: Frequency band requiring coordination

Frequency band	Application	Neighboring country involved
510-1605KHz	MW Radio	Benin, Cameroun, Chad, Niger
5900-261000KHz	SW Radio	
47-69MHz	VHF TV (Channels 2-4)	
88-108MHz	FM Radio	
174-230MHz	VHF TV (Channels 5-12)	
470-790MHz	UHF TV	
2.52-2.67GHz	MMDS	
450 MHz	CDMA	
800 MHz	CDMA	
850 MHz	Broadband Mobile	
1800 MHz	GSM/ iBurst	
1900 MHz	CDMA	
2.1 GHz	3G	
2.2 GHz	Not defined	
2.3 GHz	WiMAX	
3.5 GHz	WiMAX	
5.4 GHz	WiMAX	

3.4 Bilateral / Multilateral agreement

Nigeria does not have any bilateral or multilateral cross border frequency coordination agreement.

3.5 Data Exchange Format

Nigeria does not have a frequency register.

3.6 Tools and database used.

Nigeria seems not to use ITU tools. However, technical equipment frequency counters, spectrum analyzers, spectrum monitoring equipment, fixed and transportable mobile monitoring stations are being used to investigate and identify harmful interference.

4 Observation

The situation of Nigeria is as follows:

- The Federal Ministry, in consultation with the regulatory, deals with cross border frequency coordination;
- National Table of Frequency Allocation does not exist but is being developed;
- Framework for cross border frequency coordination does not exist.

5 Conclusion and Recommendations

The cross border frequency coordination in Nigeria is characterized by its lack of legal framework and adequate methods and tools, this despite the competitive environment.

This situation which is not the best one should evolve to the installation of a framework and in this case, it is desirable to implement the recommendations of the ECOWAS supplementary act A/SA.5/01/07 which recommends in its article 15 to have a common method for documenting and monitoring spectrum use.

6 Contact

For this study, Engr Festus DAUDU and Austine NWAULUNE had been contacted.

The focal point is:

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Federal Ministry of Information and Communication
+2348077600357
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7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Nigeria;

Annex 1bis: Additional information from Nigeria.

Senegal

1 Introduction

1.1 Country profile

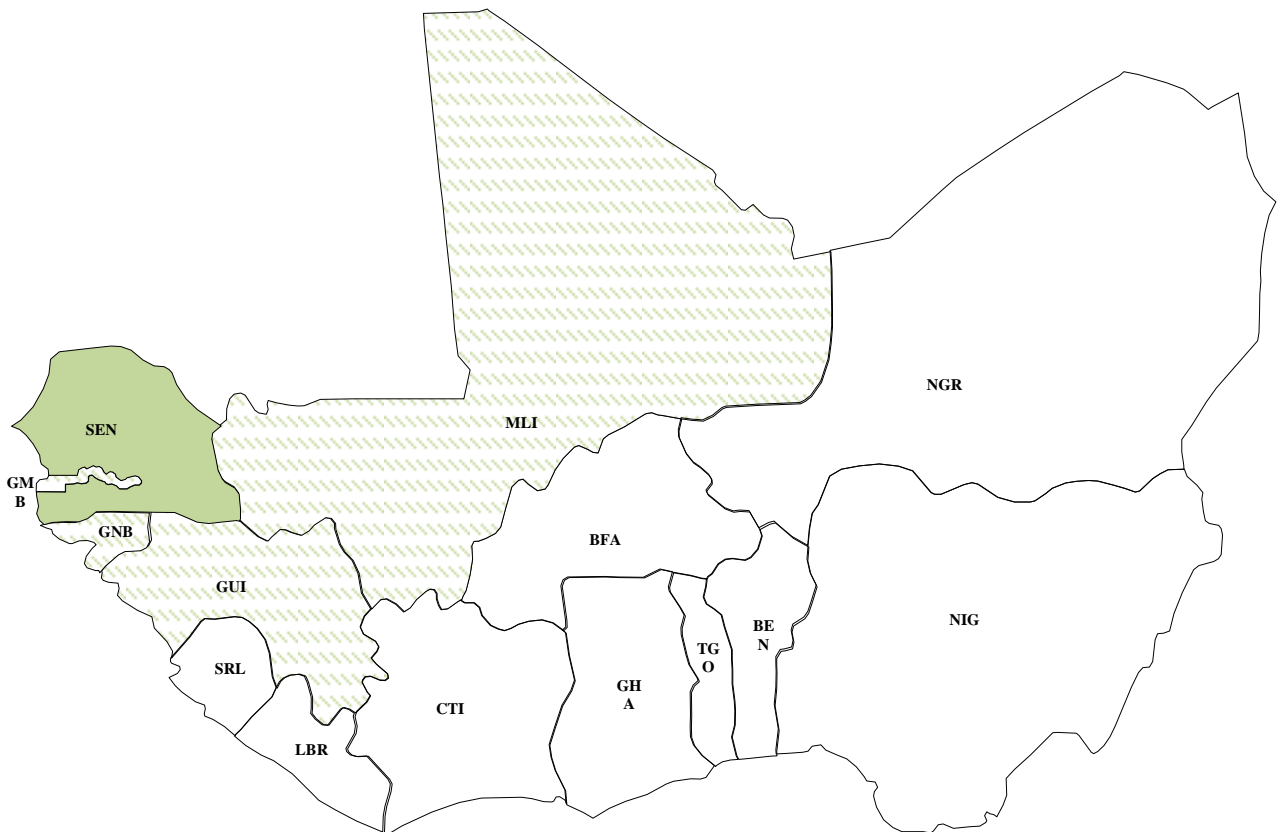
The Republic of Senegal is located on the West Coast of Africa. Its neighbouring Mauritania, **Mali**, **Guinea**, **Guinea-Bissau** and **The Gambia**.

Senegal is part of the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS).

Senegal macroeconomic statistics³⁴ are as follows:

- Population 12,534,228 inhabitants;
- GDP per capita US \$ 1022.96;
- GDP per capita growth -0.41%;
- Inflation, consumer prices -1.05%;
- Inflation, GDP deflator -0.47%.

Figure 27: Senegal and its neighboring countries



³⁴ www.data.worldbank.org

1.2 Brief Information and Communication Technology profile

The sector of telecommunications in Senegal is consisted of the actors who are³⁵:

- the Ministry of the Posts, Telecommunications and New Technologies of Information and Communication;
- the regulators ;
- the Operators.

a) The Ministry

The Ministry has the role:

- to follow-up and coordinate telecommunications policy;
- to define telecommunications framework;
- to represent the country in international meeting.

b) The regulators

i. Autorité de Régulation des Télécommunications et des Postes, ARTP

ARTP was established by the law n°2001-15 in December 27th, 2001 modified by the law n°2006-02 in January 4th, 2006. It is in charge of the regulation and the respect of the provisions defined within the code of telecommunications.

ii. Conseil National de Régulation de l’Audiovisuel, CNRA³⁶

CNRA was established by the law n°2006-04 in January 4th, 2006. It has as essential missions to regulate and control the respect of the provisions defined within audiovisual framework.

c) Operators

The telecommunications sector in Senegal was structured as follows:

- Two (2) global operators
 - SONATEL for fixed services with its subsidiary SONATEL Mobiles;
 - EXPRESSO, a new global licence holder whose activities started up in 2009;
- A mobile telephone operator, TIGO (SENTEL), a subsidiary of Millicom International Cellular,
- Four (4) ADSL internet access providers;
- Value added service providers (answering services, kiosk services, SMS+call centre, etc.);
- Pre-paid card providers.

³⁵ www.telecom.gouv.sn/doc.php

³⁶ www.cnra.sn/index.php?option=com_content&view=article&id=109&Itemid=34

The broadcasting sector has the following players:

- RTS1;
- SN2;
- WALF TV;
- 2STV;
- RDV;
- TFM;
- CANAL INFOS NEWS;
- AFRICABLE.

2 National Spectrum Management Framework

2.1 Legislative basis

ARTP is responsible for radio frequency management in terms of Law n°2006-02 in January 4th, 2006 modifying the law n°2001-15.

2.2 National Table of Frequency Allocations

The ARTP had edited, in 2006, the *Tableau National d'Attribution des Fréquences (TANAF)* acting as the National table of Frequency allocation (NFTA).

TANAF is covering frequencies band from 9 kHz to 300 GHz. It has six (6) columns:

- its first column titled "Frequency Band";
- its second column titled "ITU Region I allocation";
- its third column titled "frequency band";
- its fourth column titled "Senegal allocation";
- its fifth column "Main utilization";
- its sixth column contains "Channel arrangement";
- its seventh column contains some "Remarks".

A snapshot of TANAF is shown in the table below.

Table 56: Senegal TANAF's snapshot

Frequency Band	ITU Region I allocation, RR-2008	Senegal Allocation				
		Frequency band	Service	Main utilization	Channel arrangement	remarks
459 – 460 MHz	FIXED MOBILE 5.209, 5.271, 5.286, 5.286A, 5.286B, 5.286C, 5.286E	450 – 460 MHz	FIXED MOBILE	Trunk Radio	25 kHz per channel duplex 5 MHz	TETRA
460 – 470 MHz	FIXED MOBILE Meteorological-Satellite (space-to-Earth)	460 – 470 MHz	FIXED MOBILE Meteorological-Satellite (space-to-Earth)		1.25 MHz per channel Duplex 10MHz	CDMA system

Frequency Band	ITU Region I allocation, RR-2008	Senegal Allocation				
		Frequency band	Service	Main utilization	Channel arrangement	remarks
	5.287, 5.288, 5.289, 5.290					
470 – 790 MHz	BROADCASTING 5.149, 5.291A, 5.294, 5.296, 5.300, 5.302, 5.304, 5.306, 5.311, 5.312	460 – 470 MHz	BROADCASTING	TV Broadcasting Band IV/V	8 MHz per channel	GE06 digital
790 – 862 MHz	FIXED BROADCASTING MOBILE except aeronautical mobile 5.312, 5.314, 5.316, 5.319, 5.321	790 – 862 MHz	FIXED BROADCASTING	TV Broadcasting Band IV/V	8 MHz per channel	GE06 digital
862 – 890 MHz	FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 5.319, 5.323	862 – 890 MHz	FIXED MOBILE except aeronautical mobile BROADCASTING	Short Range Devices	25 kHz per channel duplex 5 MHz	

TANAF does not have national footnotes.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ARTP is the unique body responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as military).

There are no challenges on spectrum management.

Regarding cross border frequency coordination agreement, Senegal does not have a framework apart from those by agreement.

ARTP began activities in this field since 2004 through bilateral meetings to treat specific cases of interferences.

In addition to these meetings, ARTP had signed one (1) multilateral agreement with **The Gambia, Cape-Verde, Guinea, Guinea-Bissau, Mali** and Mauritania (August 2009).

3.2 Bilateral / Multilateral agreement

Senegal, as it's said in the previous paragraph, had:

- held meetings to discuss on interferences in FM and TV frequency band;
- signed a multilateral agreement.

The minutes of meeting detailed some interferences cases which occur on FM and TV frequency band. The table 2 gives a summary of these meetings.

Table 57: Coordination's meeting with neighboring countries

Country	year	Service	Type	Parameter
The Gambia, Guinea, Guinea-Bissau	2004	FM broadcasting	Minutes of Meeting	None
The Gambia	2006	TV Broadcasting	Minutes of Meeting	p.a.r, antenna height,
The Gambia	2007	FM broadcasting	Minutes of Meeting	None
Guinea	2007	FM broadcasting	Minutes of Meeting	None
Mali	2007	FM broadcasting	Minutes of Meeting	None
Guinea-Bissau	2010	FM broadcasting	Minutes of Meeting	none

The multilateral agreement cover frequency band from 87.5 MHz to 30 GHz. Frequencies in the bands listed below which concern Fixed, Land Mobile and Broadcasting Services shall be coordinated under the terms of these agreements.

Table 58: Frequency band under the terms of the agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 - 862	
790 – 862	IMT
136 – 174 410 - 470	PMR
452 –470 830 – 840 / 875 – 885	CDMA
880-890/925-935 890-915/935-960 1710-1785 /1805-1880	GSM
1755-1805/2110-2160 1920-1980 /2110-2170	UMTS / FDD
1900-1920 2010-2025	UMTS / TDD
2500-2690	WLAN, IMT, MMDS
3400 - 3600	BLR, IMT
6425-7110	Microwave
7125-7725	
7900-8400	
10700-11700	

Frequency Band (MHz)	Applications
12750-13250	
14500-15350	
17700-19700	
21200-23600	
24500-26500	
27500-29500	

The multilateral agreement is mainly structured on:

1. Definitions;
2. Administrative provisions;
3. Technical provisions.

Attached to this agreement there are seven (7) annexes. Six (6) annexes described specific technical provisions which detail minimal conditions for a station to operate within each frequency band.

Annex 7 is related to the *exchange of information and focal point*.

1) Definitions

This part defines terminologies applicable under the agreement. Terms are *frequency categories*, *coordination area* and *harmful interference*.

– Frequency categories

Three (3) types of frequencies are defined as described in the table below.

Table 59: Predefined Frequency Category

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions

– Coordination area

Coordination area is defined as a zone adjacent to two countries' border, with a certain distance deep in each country's interior.

– Harmful interference

Harmful interference is any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

2) Administrative provisions

Administrative provisions give details on the following terms: *follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation.*

3) Technical provisions

Agreements authorize Administrations to assign frequencies if technical provisions are complied with.

Mainly, these technical provisions are:

- *In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;*
- *In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.*

However, technical provisions described in annex are applicable. These technical provisions consist of a limitation of the field strength and the antenna height.

3.3 Exchange information and Focal Point

The multilateral agreement requires each administration to exchange information on the frequencies that they have assigned every three (3) months. Each country designed focal point as follows:

Table 60: Focal Point per country

Country	Focal point
Cape Verde	David GOMES david.gomes@anac.cv +2382613069
The Gambia	Rodine S. RENNER rsr@pura.gm +220 996 23 33
Guinea	Habib TALL modihabib@yahoo.fr + 224 60 59 84 86
Guinea Bissau	Pedrinho SA icgb@mail.bissau.net +245 660 72 52
Mali	Ibrahim Belco MAIGA belco@crt.ml +223 223 14 90
Senegal	Pape Ciré CISSE pc.cisse@artp.sn +221 77 6470461

3.4 Interference experience

The table 2 shows that Senegal had faced interferences in FM and TV frequency bands. This situation does not change as Senegal is still requiring cross border frequency coordination within these band as it's shown in the table 60 hereafter.

Table 61: Frequency band, service and neighboring country required frequency coordination

Band (MHz)	Service	Neighbouring country	Priority
88 - 108	Broadcasting	Cape-Verde, The Gambia, Guinea-Bissau, Mali and Mauritania	High
174 - 230	Broadcasting		
470 - 862	Broadcasting		

This persistence of interferences since 2004 is a proof that the conclusions of the meetings as well as the multilateral agreement do not give technical guarantees to avoid harmful interference.

3.5 Data Exchange Format

ARTP does not have a specific register for storing results of cross border coordination. If coordination is required, frequencies to be coordinated are sorted in an excel file. After acceptance, they are included in the National Frequency File. This National Frequency does not have a particular format.

However, coordination multilateral agreement, in its annex 7, requires an exchange of information. Information to be transmitted to other Administration is as follows:

- Owner;
- Category of the station;
- Number of stations;
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Antenna height.

Fax and Mail are suitable transmission methods for information exchange between Senegal and other Administrations.

3.6 Tools and database used.

ARPT do use ITU tools and software. In addition, tools such as ARGUS and SPECTRA from SIGAF system are used for spectrum management and monitoring.

Models or methods used for propagation prediction are listed in table hereafter.

Table 62: Propagation Model

Service	Propagation Model	Band
Fixed (Free space)	ITU-R 525	3-30 GHz
Fixed (PtP)	ITU-R 530	3-30 GHz
Broadcasting, Mobile	ITU-R 1546	3-30 GHz

ARPT has a cartographic database of the whole territory of Senegal updated by satellite. It's using WGS 84 as a geographical projection system with a resolution of 200 m (20 m for major cities).

4 Observation

Senegal does have a unique regulator which deals with cross border frequency coordination.

Senegal has a National Frequency Table of Allocation (NFTA) with associated Frequency Plans. These tools are compliant to ITU-R recommendations.

Senegal understood the necessity of cross border frequency coordination through several meetings with neighbouring countries.

Senegal does have some appropriate tools for cross border frequency coordination.

5 Conclusion and Recommendations

Senegal very clearly understood the advantages of cross border frequency coordination even if it did not implement the suitable regulation framework as it's confirm by the persistence of interferences in frequency bands under the terms of agreements.

It's recommend to set up an appropriate framework for cross border frequency coordination which will include the best practices of others countries.

6 Contact

For this study, Pape Cire CISSE, Abdou Ibra NDIAYE, Khalilou Dit Pape NIANE had been contacted.

The focal point is:

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 Agence de Régulation des Postes et Télécommunications – ARTP
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7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Senegal;

7.2 Cross border frequency coordination agreement

Annex 2: Multilateral agreement between Cape Verde, The Gambia, Guinea, Guinea-Bissau, Mali and Senegal;

Annex 2bis: Multilateral agreement annexes;

Annex 2ter: Minutes of meeting between Senegal and Mali (May 2007);

Annex 2quater: Minutes of meeting between Senegal and The Gambia (May 2007);

Annex 2quinquies: Minutes of meeting between Senegal and The Gambia (March 2006);

Annex 2sexies: Minutes of meeting between Senegal, The Gambia, Guinea and Guinea-Bissau (April 2004).

7.3 National Table of Frequency Allocations

Annex 3: Senegal National Table of frequency allocations.

Sierra-Leone

1 Introduction

1.1 Country profile

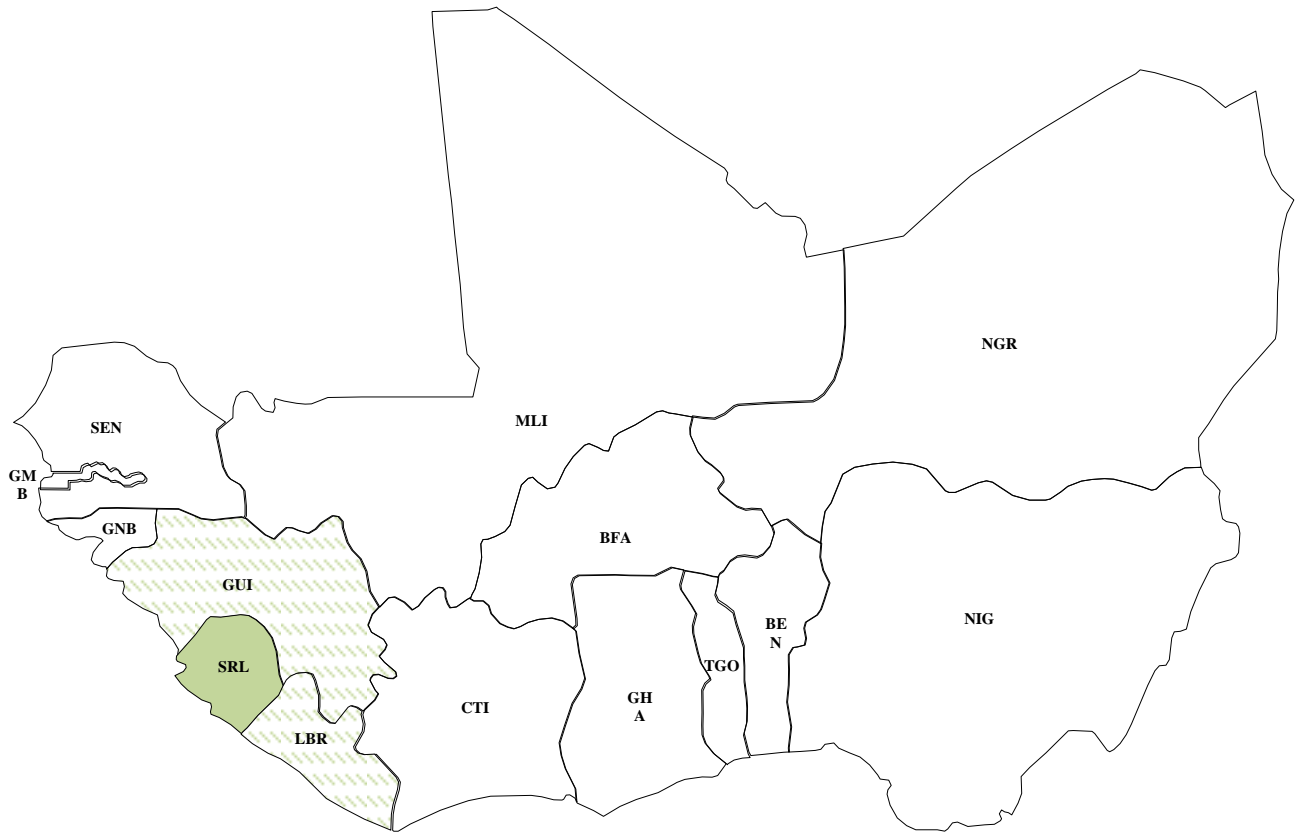
The Republic of Sierra Leone is located in western Africa, and borders **Guinea** and **Liberia** with a coast along the Atlantic Ocean .It has 71,740 km².

Sierra Leone is part of the Economic Community of West African States (ECOWAS).

Sierra-Leone macroeconomic statistics³⁷ are as follows:

- Population 5,696,471 inhabitants;
- GDP per capita US \$ 340.89;
- GDP per capita growth 1.52%;
- Inflation, consumer prices 9.25%;
- Inflation, GDP deflator 6.272%.

Figure 28: Sierra Leone and its neighboring countries



³⁷ www.data.worldbank.org ;

1.2 Brief Information and Communication Technology profile

a) Ministry of Information and Communications

The Ministry of Information and Communications is the primary stakeholder of ICT related policies and is tasked with overseeing the development, review and implementation of the Government’s information and communication agenda.

b) Regulatory authorities

i. The National Telecommunications Commission – NATCOM

NATCOM is an independent regulatory body, established by an Act of Parliament, the Telecommunications Act 2006, as amended. NATCOM is charged with the mandate to:

- provide for the licensing and regulation of telecommunications operators, and for the promotion of universal access to basic telecommunications services;
- ensure fair competition among operators,
- protect the interest of the investors and users of telecommunication networks and services;
- improve the regional and global integration of Sierra Leone in telecommunications, and
- provide for other related matters.

ii. The Independent Media Commission - IMC

IMC is an independent regulatory body, established by an Act of parliament, the Independent Media Commission Act 2006.

c) Operators

There is only one fixed line operator which is the Government owned Sierra Leone Telecommunications Company Limited (*SiERRATEL*).

Four (4) companies had licenses to operate digital mobile telecommunications and related services in the country. They are:

- *Zain SL Ltd;*
- *Comium;*
- *Africell;*
- *Tigo Millicom.*

Some Internet Service Providers are operating. They are:

- PCS Holdings (SL) Ltd (IPtel);
- Afcom (SL) Ltd;
- Multinet (SL) ltd;
- Afrinet;
- Access Point (in Bo);
- Fidelity;
- Limeline Sierra Leone and Thompsonian.

2 National Spectrum Management Framework

2.1 Legislative Basis

NATCOM is responsible of radio frequency management in terms of the telecommunications Act of 2006/2009.

2.2 National Table of Frequency Allocations

Sierra Leone does have a National Table of Frequency Allocations called “*Sierra Leone Table of Allocation, STA*”.

This table consists of two columns that have the following titles:

- ITU Region 1 Table of Allocations;
- Sierra Leone Table of Allocations.

Table 63: ITU-R, Region I edition 2008 vs STA

ITU-R, Region I, RR edition 2008	Sierra Leone National Table of Frequency Allocations	
	ITU Region1 Table of Allocations	Sierra Leone Table of Allocations
456-459 MHz FIXED MOBILE 5.286AA 5.271 5.287 5.288	456 - 459 MHz FIXED MOBILE S5.271 S5.287 S5.288	FIXED MOBILE
459-460 MHz FIXED MOBILE 5.286AA 5.209 5.271 5.286A 5.286B 5.286C 5.286E	459 - 460 MHz FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E	FIXED MOBILE
460-470 MHz FIXED MOBILE 5.286AA Meteorological-satellite (space-to-earth) 5.287 5.288 5.289 5.290	460 - 470 MHz FIXED MOBILE Meteorological-satellite (space-to-earth) S5.287 S5.288 S5.289 S5.290	FIXED MOBILE Meteorological-Satellite (space-to-Earth)
470-790 MHz BROADCASTING 5.149 5.291A 5.294 5.296 5.300 5.302 5.304 5.306 5.311A 5.312	470 - 790 MHz BROADCASTING S5.149 S5.291A S5.294 S5.296 S5.300 S5.302 S5.304 S5.306 S5.311 S5.312	BROADCASTING
790-862 MHz FIXED BROADCASTING MOBILE except aeronautical mobile 5.316B 5.317A 5.312 5.314 5.315 5.316 5.316A 5.319	790 - 862 MHz FIXED BROADCASTING S5.312 S5.314 S5.315 S5.316 S5.319 S5.321	FIXED BROADCASTING

ITU-R, Region I, RR edition 2008	Sierra Leone National Table of Frequency Allocations	
	ITU Region1 Table of Allocations	Sierra Leone Table of Allocations
862 - 890 MHz FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 5.319 5.323	862 - 890 MHz FIXED MOBILE except aeronautical mobile BROADCASTING S5.322 S5.319 S5.323	FIXED MOBILE except aeronautical mobile

The STA is not compliant to ITU-R, Region I, edition 2008 table of allocation as it's shown in the table 1.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

NATCOM is the responsible for frequency coordination. This responsibility is extended to all services (Fixed, Mobile, Broadcasting, Satellite, etc.) and for any use (civil as well as government).

Sierra Leone does not have challenges on spectrum management in particular cross border frequency coordination.

3.2 Coordination procedure

There is no coordination procedure to handle interferences as well as cross border frequency coordination framework.

3.3 Interference experience

Sierra Leone does experience interference coming from across the border but there is no procedure to handle it.

The table 2 below highlights the case of a permanent interference at Guinea border.

Table 64: Case of interference

Band (MHz)	Service	Neighbouring Country involved	Periodicity
87.5 – 108	Broadcasting	Guinea	Permanent

3.4 Bilateral / Multilateral agreement

Sierra-Leone does not have any bilateral or multilateral cross border frequency coordination agreement.

3.5 Frequency Register

Sierra-Leone does not have a frequency register.

3.6 Data Exchange Format

CD/DVD is the suitable transmission methods for information exchange between Sierra-Leone and its neighbouring countries.

3.7 Tools and database used.

Sierra-Leone does have a spectrum monitoring from TCI tools.

4 Observation

The situation of Sierra-Leone is as follows:

- one entity deals with cross border frequency coordination;
- National Table of Frequency Allocation exists but needs to be updated;
- framework for spectrum management does not exist;
- framework for cross border frequency coordination does not exist.

5 Conclusion and Recommendations

Sierra-Leone probably underestimates importance and complexity of cross border frequency coordination. As, this framework is in the course of installation, it is recommended that Sierra-Leone privileges a harmonization of practices and methods as suggested by ECOWAS supplementary acts.

6 Contact

For this study, Victor FINDLAY had been contacted. The focal point is:

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National Telecommunications Commission – NATCOM
victorfindlay@yahoo.com
+23233739066

7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Sierra-Leone;

7.2 National Table of Frequency Allocations

Annex 3: Sierra-Leone National Table of frequency allocations.

Togo

1 Introduction

1.1 Country profile

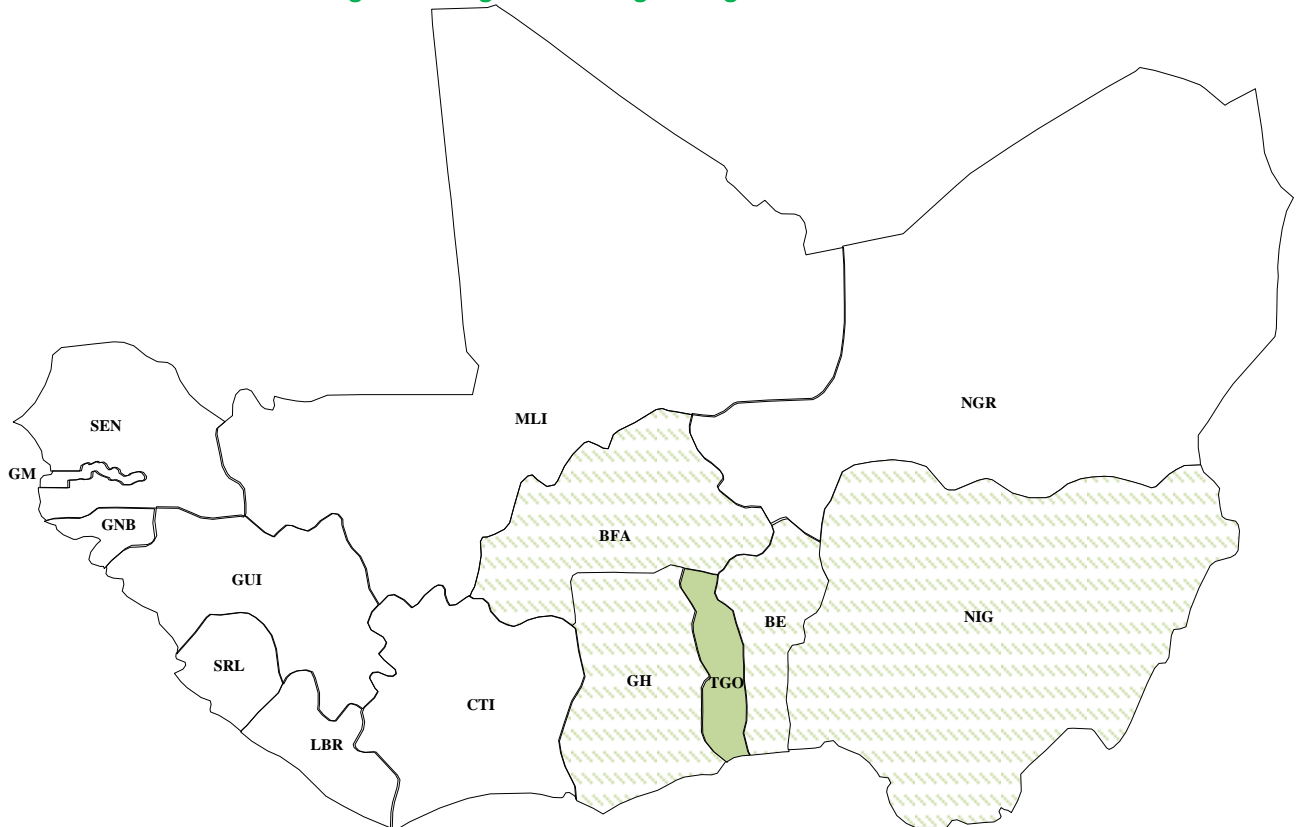
The Republic of Togo is a land in western Africa with a surface area of 56,790 km². The country is bordered by Burkina Faso to the north, Ghana to the west, Benin to the east and the Atlantic Ocean to the south.

Togo is part of the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS).

Togo macro-economic statistics³⁸ are as follows:

- Population 6,618,613 inhabitants;
- GDP per capita US \$431.30;
- GDP per capita growth 0.02%;
- Inflation, consumer prices 1.95%;
- Inflation, GDP deflator 1.31%.

Figure 29: Togo and its neighboring countries



³⁸ www.data.worldbank.org

1.2 Brief telecommunication / broadcasting profile

The sector of telecommunications in Togo consists of the actors who are:

- the Ministry of Posts and Telecommunications;
- the regulators ;
- the Operators.

a) The Ministry

The Minister in charge of telecommunications sector has the role, among other things, of implementing the sector policy and delivering license.

b) The regulators

- i. Autorité de Réglementation des Secteurs de Postes et Télécommunications, ARPT

Created by the law n°98-005 of February 11th, 1998, ARPT must implement and follow-up the application of the law under objective, transparent and non-discriminatory conditions.

- ii. La Haute Autorité de l’Audiovisuel et de la Communication, HAAC

The “*Haute Autorité de l’Audiovisuel et de la Communication*” is responsible for the regulation of the broadcasting sector in Togo. The HAAC is a constitutional body and an institution of the Republic whose composition, organisation and operation are defined by law. According to the constitution, the HAAC is tasked to guarantee the freedom and protection of the press and other mass media, uphold respect for ethical standards in the information and communication sector, and ensure equitable access to the public media by political parties and associations.

c) Operators

The telecommunication and broadcasting sector in Togo is marked by the presence of the following role players:

- One (1) fixed-line network operator (TOGO-TELECOMS SA). It is a public operator;
- Two (2) GSM operators, TOGO CELLULAIRE, TOGO TELECOMS’s subsidiary, ATLANTIQUE TELECOMS TOGO;
- A VoIP operator, CAFE INFORMATIQUE ET TELECOMMUNICATIONS ;
- Three (3) ISP, TOGO-TELECOMS, CAFE INFORMATIQUE ET TELECOMMUNICATIONS and E-PROCESS ;
- Internet access providers;
- Various radio and television stations.

2 National Spectrum Management Framework

2.1 Legislative basis

ARPT is responsible for radio frequency management in term of law n°98-005 of February 11th, 1998 modified by law n°2004-010 in May 3rd, 2004.

2.2 National Table of Frequency Allocations

The ARPT had edited, in 2006, the “*Plan National d’Attribution des Fréquences (PNAF)*” acting as the National table of Frequency allocation (NFTA). PNAF is covering frequencies band from 9 kHz to 100 GHz. It has five (5) columns:

- its first column titled “Frequency Band”;
- its second column titled “ITU Region I allocation”:
- its third column titled “Civil/Military”, give the type of usage;
- its fourth column titled “Togo allocation” give the type of application;
- its fifth column “Observations”.

A snapshot of PNAF is shown in the table below.

Table 65: Togo’s PNAF Snapshot

Frequency Band	ITU Region I allocation, RR-2008	Civil / Military	Togo Allocation	Observations
459 – 460 MHz	FIXED MOBILE 5.209, 5.271, 5.286, 5.286A, 5.286B, 5.286C, 5.286E	Civil / Military	PMR Remote Control WLL	
460 – 470 MHz	FIXED MOBILE Meteorological-Satellite (space-to- Earth) 5.287, 5.288, 5.289, 5.290	Civil / Military	PMR Remote Control WLL Maritime communications	
470 – 790 MHz	BROADCASTING 5.149, 5.291A, 5.294, 5.296, 5.300, 5.302, 5.304, 5.306, 5.311, 5.312	Civil	TV Broadcasting Band IV/V	
790 – 862 MHz	FIXED BROADCASTING MOBILE except aeronautical mobile³⁹ 5.312, 5.314, 5.316, 5.319, 5.321	Civil	TV Broadcasting Band IV/V	
862 – 890 MHz	FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 5.319, 5.323	Civil	TETRA	

This NTFA is not compliant to ITU- Region 1 RR 2008.

3 Cross border frequency coordination

3.1 Responsibility for cross border frequency coordination

ARPT is the body responsible for frequency coordination. This responsibility is extended to all services (Fixe, Mobile, Broadcasting, Satellite, Maritime, etc.) and for any use (Civil as well as military). As per consequence, there is no challenge on spectrum management.

³⁹ Not included in the PNAF

Togo announced that coordination’s framework is “included within spectrum management and monitoring framework”. But elsewhere in the law, it is not made of coordination framework.

Regarding cross border frequency coordination, Togo started earlier with Ghana (in some case with Burkina-Faso) through several meetings. Recently, an agreement had been signed with Benin.

3.2 Bilateral / Multilateral agreement

As it’s said earlier, Togo has a bilateral agreement with Benin and several minutes of meetings, which define arrangements with Ghana and Burkina-Faso.

Minutes of report are listed in the table below.

Table 66: Minutes of Report

Country involved	Period	Service	Decision
Burkina-Faso, Ghana	2002	TV and FM	Identification of frequencies which cause interferences or not
Ghana	2004	GSM	Field strength measurement
Burkina-Faso, Ghana	2005	TV, FM and GSM	Definition of penetration distance and coordination area
Ghana	2009	GSM	measurement on GSM Frequency

The bilateral agreement is signed in December 2010 with Benin.

Frequencies in the bands listed in the table 3 which concern Fixed, Land Mobile and Broadcasting Services shall be coordinated under the terms of the agreements.

Table 67: Frequency Band under the terms of the agreement

Frequency Band (MHz)	Applications
87,5 – 108	FM Broadcasting
174 – 230	TV Broadcasting
470 – 862	
790 – 862	IMT
452 –470 830 – 840 / 875 – 885	CDMA
880-890/925-935 890-915/935-960 1710-1785 /1805-1880	GSM
1755-1805/2110-2160 1920-1980 /2110-2170	UMTS / FDD
1900-1920 2010-2025	UMTS / TDD
2500-2690	WLAN, IMT, MMDS
3400 - 3600	BLR, IMT
6425-7110 7125-7725	Microwave

Frequency Band (MHz)	Applications
7900-8400	
10700-11700	
12750-13250	
14500-15350	
17700-19700	
21200-23600	
24500-26500	
27500-29500	

The agreement is mainly structured on:

1. Frequency categories;
2. Report of harmful interference;
3. Coordination procedures;
4. Administrative provisions;
5. Technical provisions;
6. Exchange information and Focal Point.

Attached to the agreement as annexes, there are specific technical provisions which detail minimal conditions for a station to operate within each frequency band.

– Frequency categories

This part defines the following terms shown in the table hereafter:

Table 68: Terms definition

frequencies requiring coordination	frequencies that the Administrations are bound to coordinate with the other Administrations concerned before putting station
shared frequencies	frequencies that can be used in sharing, without prior coordination, on the basis of bilateral and multilateral agreements and in implementation of some conditions
preferential frequencies	frequencies that can be assigned, without prior coordination, by the Administrations concerned on the basis of bilateral and multilateral agreements and in implementation of some conditions
penetration distance	distance beyond which the service ensured by a transmitter of the neighboring country must be inoperative
coordination area	a zone adjacent to two countries' border, with a certain distance deep in each country's interior.
harmful interference	any transmission that has a marked harmful effect on the quality of the communications of a radio service, hinders or interrupts it repeatedly, by exceeding the admissible maximum level of the interfering field specified in the ITU – R recommendations for terrestrial mobile and fixed service

– Report of harmful interference

The agreement said that the Administration affected must report harmful interference to its counterpart for solving within a delay of thirty (30) days.

– Coordination procedures

The agreement does have a so called coordination procedure. This procedure is just limited to the transmission of information. It is not taking into account step to follow in case of predefined frequency categories coordination.

– Administrative provisions

Administrative procedures give details on the following items: *follow-up of the agreement, revision of the agreement, language of the agreement, information of the ITU Secretary General, frequency register and focal point designation*

– Technical provisions

Agreement authorize Administrations to assign frequencies if technical provisions are complied with. Mainly, these technical provisions are:

- *In case of broadcasting service, p.a.r and antenna height shall be chosen to avoid harmful interference;*
- *In case of Fixed and Land Mobile services, p.a.r and antenna height shall be chosen not to exceed penetration distance.*

However, technical provisions described in annex are applicable.

– Exchange information and Focal Point

Agreements require each administration to exchange information and to design its focal Point. Focal points are:

Table 69: Focal Point

Country	Focal Point
Benin	Géraud-Constant AHOKPOSSI aconstant@atrpt.bj +229 21 31 01 65 +229 95 63 35 71
Togo	Not specified

3.3 Interference experience

Due to its geographical location, Togo faces interferences as it is mentioned in table 2. Fortunately, coordination with Burkina Faso and Ghana always found solutions despite the non-respect of the penetration distance by Ghana side.

But, as ARPT expressed the needs of cross border frequency coordination with Benin, Burkina-Faso and Ghana in frequency bands listed table 3, it is to be thought that the agreement and the arrangements obtained at the meetings are insufficient.

3.4 Data Exchange Format

ARPT has a frequency register which fields are as follows:

- station_id;
- station_category;
- frequency;
- localization;
- reception_zone;
- Date of assignment;
- class_of_emission;
- Power;
- antenna height.

For the exchange information which is mandatory by the agreement only, its fields are:

- Owner;
- Category of the station;
- Number of stations;
- Type of station (Base or mobile);
- Frequency;
- Longitude and latitude;
- Locality;
- Date of assignment;
- Class of emission;
- Power;
- Antenna Gain;
- Angle of elevation;
- Antenna height;
- Basic Station Information Code (BSIC).

In the perspective of cross border frequency coordination framework, mail is the suitable transmission methods for information exchange between Togo and its neighbouring countries.

3.5 Tools and database used

ARPT is familiar with ITU tools such as *GE84PLN*, *TerRaNV*, *TerRaQ* and *RRC06*. In addition, ARPT used tools from Rohde & Schwarz (spectrum analyzer, etc ..).

ARPT uses the recommendation *ITU-R 1546* as a propagation model.

ARPT does not have digital terrain data or map.

4 Observation

ARPT does have one entity which deals with cross border frequency coordination.

ARPT does not have an up to date National Table of Frequency Allocation.

ARPT is still faced with interferences besides meeting and agreement.

5 Conclusion and Recommendations

Togo clearly understands the advantage of cross border agreement even if it does not set up the suitable framework who would allow avoiding the quasi regular interferences at its borders.

It is recommended that Togo achieved its cross border frequency coordination framework by; for example harmonizing its agreements in order to have the same contents with the agreements of its neighbouring countries.

6 Contact

For this study, Abayeh BOYODI and Modena AWANDI had been contacted. The focal point is:

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Mobile: +228 9019484

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7 Annex

7.1 Response to the questionnaire

Annex 1: Final response from Togo;

7.2 Cross border frequency coordination

Annex 2: cross border frequency coordination agreement between Togo and Benin;

Annex 2bis: Minutes of meeting between Togo and Ghana (February 2009);

Annex 2ter: Minutes of meeting between Togo, Burkina Faso and Ghana (January 2005);

Annex 2quater: Minutes of meeting between Togo and Ghana (April 2004);

Annex 2quinquies: Minutes of meeting between Togo and Ghana (May 2002);

7.3 National Table of Frequency Allocations

Annex 3: Togo National Table of frequency allocations.

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www.itu.int/ITU-D/projects/ITU_EC_ACP/

Geneva, 2013