CEPT ECC
Electronic Communications Committee

ECC Report 205

Licensed Shared Access (LSA)

Approved February 2014

0 EXECUTIVE SUMMARY

Taking into account the RSPG definition of Licensed Shared Access (LSA), how LSA fits with the regulatory framework on the use of spectrum, current practices in terms of spectrum management and management of frequency authorisations, ECC presents the following conclusions.

Scope of LSA

LSA is a complementary spectrum management tool that fits under an “individual licensing regime”.

LSA facilitates the introduction in a frequency band of new users while maintaining incumbent services in the band.

LSA aims to ensure a certain level of guarantee in terms of spectrum access and protection against harmful interference for both the incumbent(s) and LSA licensees, thus allowing them to provide a predictable quality of service.

LSA excludes concepts such as “opportunistic spectrum access”, “secondary use” or “secondary service” where the applicant has no protection from primary user(s).

LSA licensees and incumbents operate different applications and are subject to different regulatory constraints. They would each have exclusive individual access to a portion of spectrum at a given location and time.

The first practical use case of LSA will be to provide access to additional spectrum for mobile broadband services (MFCN).

Sharing framework

The implementation of LSA relies on the concept of a “sharing framework” that is under the responsibility of the Administration / NRA. Its development requires the involvement of all relevant stakeholders.

The “sharing framework” can be understood as a set of sharing rules or sharing conditions that will materialise the change, if any, in the spectrum rights of the incumbent(s) and define the spectrum, with corresponding technical and operational conditions, that can be made available for alternative usage under LSA.

Frequency allocation

LSA impacts the national allocation of a frequency band, which is a sovereign decision on the destination of this public resource.

National administrations decide which existing applications need to be considered as incumbent uses within the sharing framework and maintained in the long term according to national policy objectives, and taking into account international obligations and community law in the case of EU Member States.

Authorisation process

The Administration / NRA would set the authorisation process with a view to delivering, in a fair, transparent and non-discriminatory manner, individual rights of use of spectrum to LSA licensees, in accordance with the sharing framework defined beforehand.

LSA does not prejudge the modalities of the authorisation process to be set by Administration / NRAs taking into account national circumstances and market demand.

LSA is not a tool to regulate the ECS market and is based on different principles than “Spectrum trading”. It could nevertheless be necessary to check that competition is not adversely affected. The possibility for a governmental entity to engage in trading its spectrum holdings is a national institutional issue.

European harmonisation

From a European, perspective, LSA assists addressing the market demand for harmonised introduction of new applications in specific bands where incumbent uses have to be maintained in different countries. National administrations therefore require some flexibility in the national implementation to enable the protection of incumbent services.

A CEPT harmonisation measure would designate a frequency band and define harmonised conditions for the use of a band (e.g. BEM, radio interface). Investigations at European level on the various sharing constraints aim to ensure that corresponding harmonised standard include the necessary tools for implementation of sharing mechanisms required for operation in the band.

MFCN

The first practical use cases of LSA will be to provide access to additional spectrum for mobile broadband services (MFCN). The report provides detailed consideration on possible implementation of LSA for such scenarios. CEPT is developing harmonised conditions for the use of the band 2300-2400 MHz for MFCN.

LSA could be one solution for mobile network operators to access complementary spectrum for MFCN and should not preclude efforts to secure exclusive access to spectrum for mobile broadband. Current licensing regime based on exclusive access for mobile broadband has well-known benefits, such as enabling mobile network operators to guarantee quality of service, good interference management and a high degree of market certainty necessary to create adequate incentives for investment and innovation. Under certain conditions, LSA is expected to provide similar benefits as traditional exclusive access.

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
ASA	Authorised Shared Access
BEM	Block Edge Mask
BR IFIC	Radiocommunication Bureau International Frequency Information Circular
CB	Citizens' Band
CEPT	European Conference of Postal and Telecommunications Administrations *Conférence Européenne des Postes et Télécommunications*
EC	European Commission
ECA	The European Table of frequency allocations and applications in the frequency range 8.3 kHz to 3000 GHz (ECA table)
ECC	Electronic Communications Committee
ECN&S	Electronic Communications Networks and Services (ECN&S
ECO	European Communications Office
ECS	Electronic Communication Service
EFIS	ECO Frequency Information System
EMC	Electromagnetic Compatibility
EN	European standard
ETSI	European Telecommunication Standardisation Organisation
EU	European Union
FS	Fixed Service
HEN	Harmonised European standard
IMT	International Mobile Telecommunication
ITU-R	International Telecommunication Union - Radiocommunication
LSA	Licensed Shared Access
MFCN	Mobile Fixed Communication Network
MIFR	Master International Frequency Register
MNO	Mobile Network Operator
NRA	National Regulatory Authority
NTFA	National Table of Frequency Allocations
PAMR	Public Access Mobile Radio
PMR	Private Mobile Radio
PMSE	Programme Making Special Events
QoS	Quality of Service
RLANs	Radio Local Area Networks
RR	Radio Regulations
RRS	Reconfigurable Radio Systems
RSA	Recognised Spectrum Access
RSC	Radio Spectrum Committee
RSPG	Radio Spectrum Policy Group
RSPP	Radio Spectrum Policy Programme

R&TTE	Radio and Telecommunications Terminal Equipment
SRDs	Short Range Devices
UWB	Ultra Wide Band
WGFM	Working Group Frequency Management
WRC	World Radiocommunication Conferences

1 INTRODUCTION

During the 72nd meeting of the WG FM in Miesbach, Germany 16 - 20 May 2011, a presentation was made on “An evolutionary spectrum authorisation scheme for sustainable economic growth and consumer benefit” [15]. The Authorised Shared Access (ASA) concept was presented. It has been developed with the aim of making a dynamic use of spectrum possible, whenever and wherever it is unused by incumbent users. ASA will operate on shared and non-interference basis, subject to individual authorisation (i.e. licensed), in bands allocated to the mobile service and identified for IMT by the ITU-R. CEPT technical harmonisation work was referred to be of key importance to the implementation of the ASA concept. Initially, the spectrum sought for mobile service based applications authorised under the ASA concept was the 2.3 GHz band (mobile service sharing with military applications/wireless cameras) and the 3.8 GHz band (mobile with satellites).

In addition, it can be noted that in November 2011, the Radio Spectrum Policy Group finally adopted for publication a Report on collective use of spectrum and other sharing approaches which includes consideration on the regulatory aspects of a Licensed Shared Access (LSA) similar to the ASA concept. According to this RSPG Report [5], LSA can provide new sharing opportunities on a European scale under a licensing regime, while safeguarding national current spectrum usages which cannot be re-farmed. The RSPG has used the LSA as a basis for fostering the potential to share spectrum, which is not only limited to the IMT bands, in a harmonised manner within a licence regime.

Following initial investigations from a correspondence group on Cognitive Radio Systems (CG-CRS), WG FM decided to extend the ASA concept to Licensed Shared Access (LSA), with the potential for other applications in addition to mobile broadband applications (MFCN). WG FM decided at its meeting in September 2012 to establish Project Team FM53 (“RRS & LSA”), aiming to provide generic guidelines to CEPT administrations in relation with the implementation of LSA, and Project Team FM52 (“2.3 GHz”) aiming to develop an ECC Decision on the harmonised band plan for MFCN in 2300-2400 MHz and establishing the regulatory provisions for LSA implementation in the band.

RSPG established in parallel a working group to develop a response to the European Commission’s Request for an Opinion on spectrum issues concerning Licensed Shared Access [8]. The RSPG Opinion on LSA [14] approved in November 2013 provides the following definition:

“*A regulatory approach aiming to facilitate the introduction of radiocommunication systems operated by a limited number of licensees under an individual licensing regime in a frequency band already assigned or expected to be assigned to one or more incumbent users. Under the Licensed Shared Access (LSA) approach, the additional users are authorised to use the spectrum (or part of the spectrum) in accordance with sharing rules included in their rights of use of spectrum, thereby allowing all the authorised users, including incumbents, to provide a certain Quality of Service (QoS)*”.

The two main objectives of this Report are:

- to provide a general analysis of LSA, taking into account initial RSPG working definition, how it fits with regulatory framework on the use of spectrum, current practices in terms of spectrum management and management of frequency authorisations;
- to explain how LSA can be implemented in the mobile broadband application case/MFCN, particularly in the band 2.3-2.4 GHz; and to clarify implications on the requirements to be included in a CEPT “harmonisation measure”.

2 REGULATORY FRAMEWORK FOR THE USE OF THE RADIO SPECTRUM

This section proposes an overview of the regulatory framework for the use of spectrum. It distinguishes the 3 key levels: international, regional and national levels. The main objective is to introduce the key regulatory and legal instruments that govern the use of spectrum.

2.1 INTERNATIONAL CONTEXT: INTERNATIONAL TELECOMMUNICATION UNION (ITU)

The ITU legal instruments, at least those that are relevant to spectrum management, are the Constitution (CS), the Convention (CV) and, most important, the Radio Regulations (RR). These instruments are binding the States and are related to spectrum management as far as it has international implications. These instruments are not directly applicable to individuals, operators or others, concerned by spectrum utilisation. Compliance with those instruments therefore presupposes that each State will take the measures required (legislation, regulations, clauses in licences and authorisations) to implement domestically those obligations to other spectrum users (operators, administrations, individuals, etc.).

The principle underpinning most of the provisions of ITU Radio Regulations is set out in No. 4.3, which stipulates that any new assignment (i.e. any new authorisation to operate a radio station) must be made in such a way as to avoid causing harmful interference to services rendered by stations using frequencies assigned in accordance with the Table of Frequency Allocations and the other provisions of the Radio Regulations, the characteristics of which are recorded in the Master International Frequency Register (MIFR). In particular, a new assignment can only be recorded in the MIFR after completion of a procedure (for instance, Articles 9 and 11) aimed at ensuring that it will not cause harmful interference to assignments made in accordance with the RR and previously recorded systems.

Article 5 of the RR, Section IV (Table of Frequency Allocations) allocates frequency bands for the purpose of their use by one or more terrestrial or space radiocommunication services or the radio astronomy service under specified conditions. A radiocommunication service is defined as the transmission, emission and/or reception of radio waves for specific telecommunication purposes. Terrestrial services and space services can themselves be subdivided in several different types of services (e.g. fixed, mobile, broadcasting). The list of the different services with corresponding definitions is given in Article 1 of the RR. Frequency bands are allocated to radiocommunication services on a primary or secondary basis. Stations of a secondary service shall not cause harmful interference to stations of primary services and cannot claim protection against harmful interference from stations of a primary service.

The RR as such provides an international framework for effective spectrum management that is primarily structured by the need for global harmonisation in various domains (e.g. satellite communication, maritime, civil aviation, and scientific research), coexistence capability between different types of radio communication networks and physical properties of frequency bands. It has major implications for the industry in terms of economies of scale and therefore for the design of radio products. As an international treaty, the RR is periodically revised by World Radiocommunication Conferences (WRC), which is typically held every four years and allow addressing new development in the field of radiocommunications and technological change as appropriate.

2.2 EUROPEAN CONTEXT

2.2.1 Harmonisation measures

Regional organisations also play a major role in the management of the radio spectrum resource. The prime objective of the ECC is to develop harmonised European regulations for the use of radio frequencies. The implementation of ECC Decisions and ECC Recommendations by national administrations is made on a voluntary basis. With 48 administration members, CEPT covers almost the entire geographical area of Europe.

Industry also consistently asks for harmonised spectrum to ensure development of innovative systems. Permanent negotiation on conditions of use of spectrum is critical over Europe as it enables adapting spectrum use conditions to industry requirements and national situations.

In accordance with the "Radio Spectrum Decision" [3], the Commission is assisted by the Radio Spectrum Committee (RSC) and issues mandates to the CEPT, setting out tasks to be performed and corresponding timetable. The RSC shall then approve CEPT Reports and associated technical implementing measures prepared by the Commission, which implementation by the administrations of EU Member States is mandatory.

EC harmonisation measures provide legal certainty to industry stakeholders on the availability of identified spectrum for a given usage and under specified conditions. Deviations are possible but necessitates that the EU Member State request derogation to be granted by Commission, expectedly for a limited duration.

Finally, the legislation that applies to "radio equipment" should be distinguished from the regulation on the "use of spectrum". The conditions for the placing on the market of radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity are governed in the EU by the "R&TTE" Directive [4]. It should be noted that the RSPG opinion on "streamlining" published in 2008 [7] proposes solutions to improve decision mechanisms, cooperation or legislation so as to ensure consistency in the different part of the regulatory environment for the spectrum use, namely CEPT, EC and ETSI.

2.2.2 EU framework for the delivery of Electronic Communications Networks and Services (ECN&S)

Within the EU there is a harmonised regulatory framework for rights of use in the context of Electronic Communications Networks and Services (ECN&S). The relevant texts are the "Framework" Directive [1] and the "Authorisation" Directive [2].

Member States shall ensure that the tasks assigned to national regulatory authorities (NRA) by the EU legal framework are undertaken by a competent body (article 3 §1 of the "Framework" Directive) [1].

Article 9 §1 of the "Framework Directive" [1] stipulates the main objective in relation with the management of radio frequencies for electronic communications services:

> *Member States shall ensure the effective management of radio frequencies for electronic communication services in their territory in accordance with Article 8. They shall ensure that the allocation and assignment of such radio frequencies by national regulatory authorities are based on objective, transparent, non-discriminatory and proportionate criteria.*

The two directives mentioned above allow two kinds of authorisation status in relation to right of use of frequencies for ECN&S: general authorisations or individual rights of use (article 5 §1 of "Authorisation" Directive and article 9 §1 of the "Framework" Directive). The following gives a summary of the two concepts as described in the "Authorisation" Directive [2].

General authorisations

The "Authorisation" Directive sets the legal provisions for general authorisations. General authorisations allow any undertaking to provide electronic communications networks or services, whether by means of radio frequency spectrum or by wired means. Undertakings may be required to submit a notification but cannot be required to obtain an explicit decision before exercising the rights stemming from the general authorisation. For notification, Member States shall not request more information than a declaration by a legal or natural person of the intention to commence the provision of ECN&S and minimal information needed to keep a list of providers of ECN&S (identification of provider, address, short description of the network or services, starting date for activity).

When the use of radio spectrum is involved to support the delivery of electronic communication services, a legal act issued by a NRA authorising the use of spectrum with no "individual right of use" is commonly referred to as a "general authorisation". It is in practice limited to frequency use that does not need to be coordinated to avoid harmful interference.

Individual rights of use

Taking into account the scarcity of radio frequencies in some frequency bands, as well as the need to ensure efficient use of these frequencies, individual rights of use may be granted as opposed to general authorisations. Individual rights of use may be granted for four reasons, in order to:

- Avoid harmful interference;
- Ensure technical quality of service;
- Safeguard efficient use of spectrum;
- Fulfil other objectives of general interest as defined by Member States in conformity with Community law.

Where the granting of rights of use for radio frequencies needs to be limited, Member States shall grant such rights on the basis of selection criteria which must be objective, transparent, non-discriminatory and proportionate (Article 7.3 of the "Authorisation Directive" [2]).

The "Authorisation" Directive defines a set of conditions that may be attached to individual rights of use (Annex B of the directive).

A legal act issued by a NRA that delivers an "individual right of use" is commonly referred to as an "individual authorisation".

Individual rights of use, which in many administrations take the form of licences granted to users, may be transferred as prescribed by Article 9b of the "Framework" Directive. The European Commission may adopt appropriate implementing measures to identify ECN&S bands for which individual rights to use radio frequencies may be transferred or leased (except for frequencies used for broadcasting). In other bands the choice is left to Member States to make provisions for undertakings to transfer or lease individual rights of use. When granting rights of use the Member States shall specify whether those rights can be transferred by the holder of the licence and under which conditions (in accordance with Article 9b).

2.3 NATIONAL LEGISLATION

Authorising the use of the spectrum is a national prerogative, subject to international obligations and community law in the case of EU Member States as mentioned above.

Article 18 of the Radio Regulations stipulates that "*no transmitting station may be established or operated by a private person or by any enterprise without a licence issued in an appropriate form and in conformity with the provisions of these Regulations by or on behalf of the government of the country to which the station in question is subject*". The term "licence" should be understood above in its broad acceptance. This basically means that the use of spectrum must be explicitly permitted.

In order to understand how the access to spectrum is authorised in practice, identification of the domain of use is required.

The prime discrimination factor is whether the spectrum is used by governmental users, on the one hand, or for commercial purpose or by citizens (e.g. amateur, CB, SRDs), on the other hand.

National Tables of Frequency Allocations (NTFAs) and frequency assignments

National Tables of Frequency Allocations (NTFAs) primarily specify the radio services authorised by an individual administration in frequency bands and the entities which have access to them.

National frequency assignments, as derived from the ITU concept, allows the fine management of frequency bands in accordance with the rules set in NTFAs, particularly in bands shared by different type of users and also in respect of coexistence issues in adjacent bands. They may contain sensible data and their management requires confidentiality procedures.

When registered at the BR IFIC, this information becomes publicly available; the purpose being primarily the granting of international rights for protection. Frequency assignments should be well distinguished from national authorisations delivered by NRAs.

Governmental use

Government use covers various domains (e.g. defence, civil aviation, maritime & waterways, public safety, meteorology, science).

As underlined in CEPT Report 46 [10], in case of governmental usage of spectrum, the rights of use are usually limited to the rights described in the National Table of Frequency Allocations (NTFA). No individual authorisations with limited duration are granted.

Governmental users need access to frequency bands so as to perform the duties which they are obliged to fulfil by national law. Their access to spectrum resources should be subject to regular review with Administration / NRA. It is usually given for well identified radio services, sometimes even on a shared basis. The ability of one entity having access to a frequency band to effectively deploy radio networks and use the spectrum will obviously also depend upon the nature of spectrum rights given to other entities sharing the band. These rights shall not be understood in the sense of the Authorisation [2].

Commercial use / civil use / non governmental

The term "**authorisation**" shall be understood as the public legal act issued by NRAs for the purpose of delivering spectrum usage rights to private entities or citizens (i.e. "non-governmental" use of the spectrum), without prejudice to the form that such acts may take in different countries, in contrast with the term licence which can have a broader meaning.

The following two terminologies should also be distinguished, consistently with ECC Report 132 [12]:

- **Individual authorisation** (Individual rights of use);
- **General authorisation** (No individual rights of use).

Individual rights of use are given for limited duration and do not constitute property act of the frequencies by the operator as frequencies are part of the national domain.

The figure below summarises this overview of the baseline structure of national legislation on the use of spectrum in European countries:

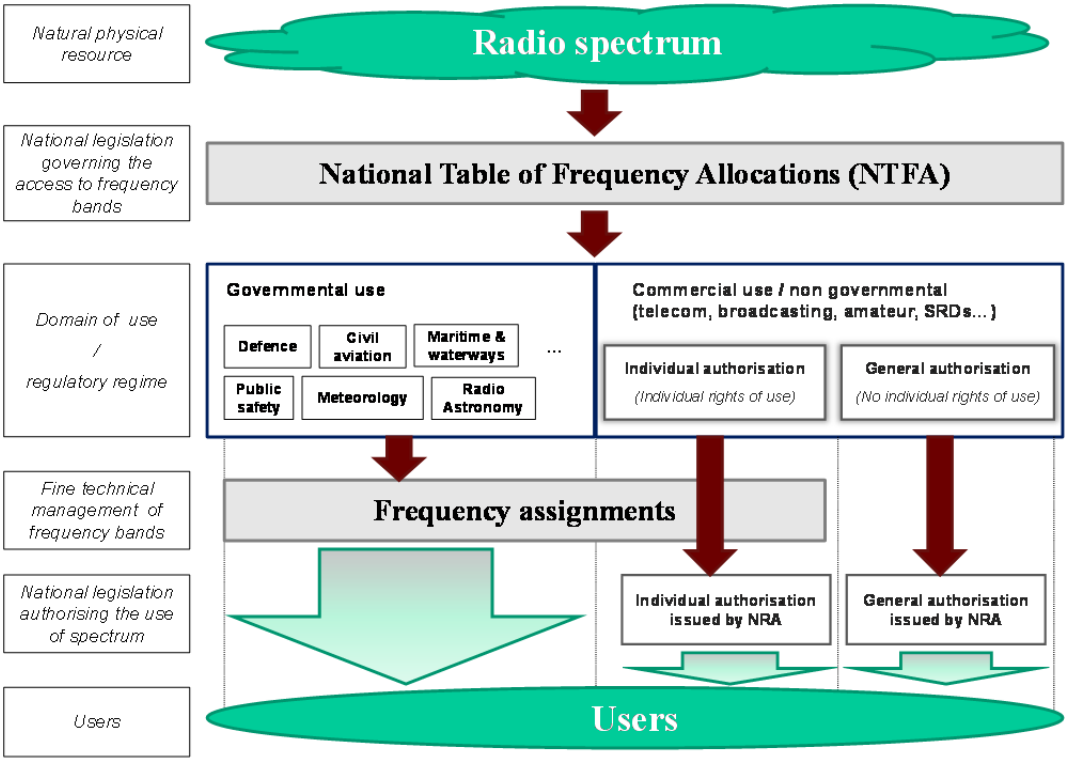

Figure 1: National legislation from the radio spectrum to users

Note: in some CEPT countries, some governmental spectrum usage (e.g. for public safety) is treated under an individual authorisation regime like PMR/PAMR for the private sector.

3 SPECTRUM MANAGEMENT AND MANAGEMENT OF FREQUENCY AUTHORISATIONS

Spectrum management should be seen in the context of this report as the combination of regulatory procedures and tools for managing the spectrum resource at radio service or application level[1] in view of delivering regulatory solutions to accommodate different types of use, address new spectrum demand while accounting for existing uses.

In contrast, managing frequency authorisations takes place at national level and focus on adequate procedures for assigning spectrum to individual users and market regulation.

3.1 SPECTRUM MANAGEMENT AT EUROPEAN LEVEL: SPECTRUM REVIEW, COMPATIBILITY STUDIES AND HARMONISATION MEASURES

For some decades CEPT has carried out reviews of spectrum use with the objective of identifying and designating appropriate frequency bands to services and applications in response to demands from its members and from the industry. CEPT will continue to work on spectrum issues, either in cooperation with the EC in the frame of the RSPP and the "Radio Spectrum Decision" [3] or on its own work programme. CEPT process for designating spectrum to new applications is described in the RSPG opinion on review of spectrum use published in 2012 [6].

Among key features of a European harmonisation measure, the nature of the recommended "regulatory regime" should be well specified, in view of the objectives in terms of quality of service, coexistence and efficient use of the spectrum.

ECC Report 132 [12] provides an illustration of various intermediate regimes that can be envisaged to meet specific demand, allowing different degrees of control of the user by the NRA. For sake of simplification, one can basically distinguish between the cases of "general authorisation" (e.g. SRDs, UWB, 5 GHz RLANs…) and "individual authorisations" (e.g. MFCN, PMR, FS).

For "general authorisations", the compatibility studies conducted by CEPT determine a set of regulatory parameters to ensure protection of radio services. Harmonised implementation by national administrations is critical to support effective enforcement policy. Key principles were provided in CEPT Report 14 [9] to support a strategy to improve the effectiveness and flexibility of spectrum availability for Short Range Devices (SRDs).

In the case of "individual authorisations", "frequency assignments" may need to be coordinated, at national or international level, to ensure coexistence between existing and future systems. A "frequency assignment" may be specific to a frequency band, location and time.

CEPT also develops specific recommendations to support cross-border coordination.

Harmonisation measures provide key references to administrations for their national spectrum management. They allow addressing main market demand.

3.2 SPECTRUM MANAGEMENT AT NATIONAL LEVEL

The notion of National Table of Frequency Allocations (NTFA) introduced in section 2.3, together with the procedures adopted by national administrations to review and update it, plays a central role in spectrum management.

NTFAs are based on the Radio Regulations and various harmonisation measures adopted at European level; they account for compatibility issues between different types of radio services.

[1] Radio Service shall be understood in the sense of the ITU-R. The term 'application' allows qualifying the type of usage within CEPT in accordance with the EFIS terminology.

NTFAs are critical assets for national administrations to plan the allocation of frequency bands, whether on an exclusive or shared basis, between various governmental users which have access to spectrum to perform their own duties, and commercial services, so that consumers can benefit from innovative applications.

NTFAs provide visibility and support to policy making on the allocation of this public resource.

Spectrum management activities may be simplistically seen as a set of many parallel projects, each addressing how to fit in some specific case for spectrum demand from new or evolving radio systems within current and foreseen plans for spectrum use. Those projects normally develop through series of subsequent steps, making up what may be called a spectrum management cycle.

The investigations presented in ECC Report 016 [13] highlights that “refarming” often is a “last-thought” option of spectrum management, because it is likely to cause the most problems to set up and usually is the most lengthy to implement. Therefore the option of spectrum sharing, that is co-location of old and new uses or radiocommunication systems within the same frequency band, is perceived as a natural preference and will always be extensively considered first. If not workable in a first instance, it might be re-considered with amended operational requirements and system parameters for a newcomer.

If co-frequency sharing is not feasible, a solution may be found by applying some kind of frequency separation, e.g. by using the interleaved channels for incumbent and new PMR-like services.

However, sharing might not always be feasible or desirable and use of refarming might become an option. In such cases, the spectrum manager will have to evaluate whether refarming is absolutely necessary, e.g. whether the identified spectrum demand may not be accommodated elsewhere and, if not, whether introduction of newly proposed use or radio system will provide sufficient benefits to justify the refarming.

3.3 MANAGEMENT OF FREQUENCY AUTHORISATIONS

3.3.1 Policy objectives and regulatory principles

NRAs are responsible for setting adequate procedures for assigning spectrum to individual users and managing these authorisations. The policy objectives and regulatory principles in this regards are laid in Article 8 of the “Framework Directive” [1].

Market regulation activities include inter alia ensuring that users derive maximum benefit in terms of choice, price, and quality; ensuring that there is no distortion or restriction of competition in the electronic communications sector; encouraging efficient investment in infrastructure, promoting innovation.

Different mechanisms can be established by NRAs for delivering individual rights of use to undertakings in a given frequency band: e.g. auction, beauty contest, first come/first served. The corresponding procedures must be transparent and non-discriminatory.

An individual authorisation includes rights and obligation for the licensee. For example, authorisations delivered to mobile broadband operators may include coverage obligations (e.g. mobile broadband service for indoor reception delivered to a minimum percentage of the population in a country).

The conventional approach for an undertaking to acquire an individual right of use of radio frequencies is thus to apply to the NRA, based on transparent and non-discriminatory procedures. Alternatively, he may seek under the principles of “spectrum trading” a commercial agreement with a licensee that detains a “tradable right”.

3.3.2 Spectrum trading

The EU “Framework” Directive sets some requirements for the transfer of rights to use radio frequencies. That is, the intention to trade as well as the effective transfer are to be notified to the competent national authority responsible for granting individual rights and are to be made public. This therefore sets up the possibility for national authorities to approve (or not) the transfer (since the authorities have been notified of the intention to trade), though such an approval step is not made mandatory by the Directive.

ECC Report 169 [11] presents the various trading procedures described in the answers to a questionnaire. The procedures can be broken up in several steps, essentially what happens before the transaction and what happens immediately after the transaction. In general approval of transaction by NRA is mandatory, a fact which imply that there can be circumstances where a transaction can be refused.

Beyond the administrative requirements that the licensee and transferee must meet, there are more qualitative criteria like impact on competition that may require a detailed assessment by the NRA.

The possibility of trading rights of use of spectrum is highlighted in the RSPP as a tool to promote innovation and investment through enhanced flexibility. Article 6 (8) of the RSPP also specifies the harmonised bands where Member States shall allow the transfer or leasing of rights of use of spectrum (790-862 MHz, 880-915 MHz, 925-960 MHz, 1710-1785 MHz, 1805-1880 MHz, 1900-1980 MHz, 2010-2025 MHz, 2110-2170 MHz, 2.5-2.69 GHz, and 3.4-3.8 GHz).

As a general baseline principle, under the concept of “spectrum trading”, holders of spectrum rights of use would transfer some or all of those rights and associated conditions to third parties. NRAs have to ensure that no distortion of competition arises from these trades.

The understanding of the baseline structure of national legislations on the use of spectrum (see figure 1) actually determines the conditions under which the concept of “spectrum trading/leasing” can be implemented.

The concept of “spectrum trading” is implemented in Europe essentially with **commercial users** having access to spectrum under an “individual authorisation”.

Such commercial users’ have tradable rights which have been granted through competitive or comparative selection procedures. They can obviously trade or lease only a right that they detain, which means that the concept works only for the delivery by the transferee of electronic communications services that are consistent with the frame of the initial “individual authorisation” issued by the NRA.

A right of use issued by a NRA applies for a certain category of electronic communication service, for limited duration and under specified conditions (e.g. technical, operational, coverage obligations) and the amount of “licensing fee” is expectedly connected to the level of flexibility of the authorisation and the set of obligations. National rules on spectrum trading and role of NRA have to account for risk of market distortion or possible conflict with the obligations resulting from the transfer.

Within most European countries, **governmental users** have no legitimacy to trade spectrum. The frequency bands they have access to perform their own duties cannot be traded for alternative usage.

The case of the United Kingdom is however an exception. Within the UK, the Ministry of Defence (MOD) is indeed the manager and part user of specific frequency bands e.g. 2300-2400 MHz and 3400-3600 MHz.

A Recognised Spectrum Access (RSA), granted by the Office of Communications (Ofcom), is required before the MOD can release spectrum to the market. RSA defines the rights and obligations that may be traded and that has to be complied with by any person acquiring a licence created by transferring the RSA. Grants of RSA are therefore suitable for bodies that cannot be licensed by Ofcom but still want to engage in trading their spectrum holdings.

The concept of RSA relies on the principle of spectrum trading. Ofcom has here to ensure that no distortion of competition arises from these trades.

The implementation of RSA is closely related to national institutional organisation in the management of spectrum. Under the RSA concept, the revenues resulting from the trades would likely be to the benefits of the MOD.

Within France, a different approach is followed. The allocation of frequency bands to the Ministry of Defence is a decision of the Prime Minister and is subject to review. The concept of special treasury allocation[2] fund allows transfer of the revenue generated by spectrum licensing to the benefit of the military.

3.3.3 Individual authorisation and spectrum sharing

Spectrum sharing can be defined for the purpose of this report as common usage of the same spectrum resource by more than one user. Sharing can be made with respect to all three domains: frequency, time and place.

The case of PMR already mentioned is one simple example of radio system where the same spectrum resource is shared by several licensed users.

In contrast, the individual authorisations granted to mobile operators are often qualified as “exclusive rights of use”. Frequency blocs are indeed usually assigned to an individual licensee throughout a whole national territory and are as such “not shared”.

Discussions arose in the context of this report on the baseline options that are available in case of “unused licensed spectrum” under existing regulatory framework:

1. the licensee can trade the spectrum or
2. the usage rights are reviewed by the NRA: the review may lead to no change (e.g. if no adverse effect on competition can be evidenced) or the usage rights (or part of them) can be given back to the NRA.

[2] Compte d’affectation special (CAS)

4 LSA AS A COMPLEMENTARY TOOL FOR SPECTRUM MANAGEMENT

4.1 KEY FEATURES

RSPG established in November 2012 a working group to develop a response to the European Commission's Request for an Opinion on spectrum issues concerning Licensed Shared Access [8]. The RSPG Opinion on LSA [14] approved in November 2013 provides the following definition:

"*A regulatory approach aiming to facilitate the introduction of radiocommunication systems operated by a limited number of licensees under an individual licensing regime in a frequency band already assigned or expected to be assigned to one or more incumbent users. Under the Licensed Shared Access (LSA) approach, the additional users are authorised to use the spectrum (or part of the spectrum) in accordance with sharing rules included in their rights of use of spectrum, thereby allowing all the authorised users, including incumbents, to provide a certain Quality of Service (QoS)*".

Based on the above definition, the analysis of regulatory framework for the use of the radio spectrum (chapter 2) and of various spectrum management regulatory tools and procedures, as well as the management of frequency authorisations (chapter 3), the following key regulatory features of the LSA approach can be highlighted:

- A "sharing framework", for a given frequency band, will define the spectrum, with corresponding technical and operational conditions, that can be made available for alternative usage under LSA framework.
- Establishing a "sharing framework" under the responsibility of the Administration / NRA requires the involvement of all relevant stakeholders.
- The NRA sets on the basis of "sharing framework" adequate procedure for issuing individual authorisations to LSA users.

Spectrum management

LSA is a complementary spectrum management tool that fits under an "individual licensing regime", a fact which allows fine management of network deployment and effective control of the sharing arrangement, as opposed to licence-exempt regulatory approach.

LSA aims to ensure a certain level of guarantee in terms of spectrum access and protection against harmful interference for both the incumbent(s) and LSA licensees, thus allowing them to provide a predictable quality of service. Incumbent(s) and LSA licensees each have exclusive access to spectrum at a given location at a given time.

LSA excludes concepts such as "opportunistic spectrum access", "secondary use" or "secondary service" where the applicant has no protection from primary user.

Management of authorisations

The NRA would set the authorisation process with a view to delivering, in a fair, transparent and non-discriminatory manner, individual rights of use of spectrum to LSA users, in accordance with the sharing framework defined beforehand. LSA does not prejudge the modalities of the authorisation process to be set by NRA taking into account national circumstances and market demand.

4.2 SHARING FRAMEWORK

The "sharing framework", which is established under the responsibility of the Administration / NRA, can be understood as a set of "sharing rules" or "sharing conditions". It is the central piece for the implementation of LSA at national level.

The “sharing framework” will materialise the change, if any, in the spectrum rights of the incumbent(s) and define the spectrum, with corresponding technical and operational conditions, that can be made available for alternative usage under LSA.

National administrations decide which existing applications need to be considered as incumbent uses within the sharing framework and maintained in the long term. Such decision should be made according to national policy objectives and taking into account international obligations and community law in the case of EU Member States.

LSA licensees require a certain level of guarantee in terms of spectrum access in order to incentivise and secure investments in network and equipment. The adequate level of guarantee is to be determined on a national basis taking into account user requirements and sharing constraints.

A review and negotiation process is required on a national basis to establish an effective “sharing framework”, which may vary significantly from country to country. It requires the involvement of all relevant stakeholders and should consider both the spectrum requirements of the incumbent(s) and the demand for alternative usage.

This concept is illustrated by the figure below. In the figure, the spectrum availability is based on geographical separation. In the area marked green, the “sharing framework” defines the spectrum availability to LSA users. It should be noted that in LSA the sharing can be done in the three dimensions, namely, time, frequency and area. The sharing framework can also account for future needs of an incumbent, as depicted with grey stations in the figure:

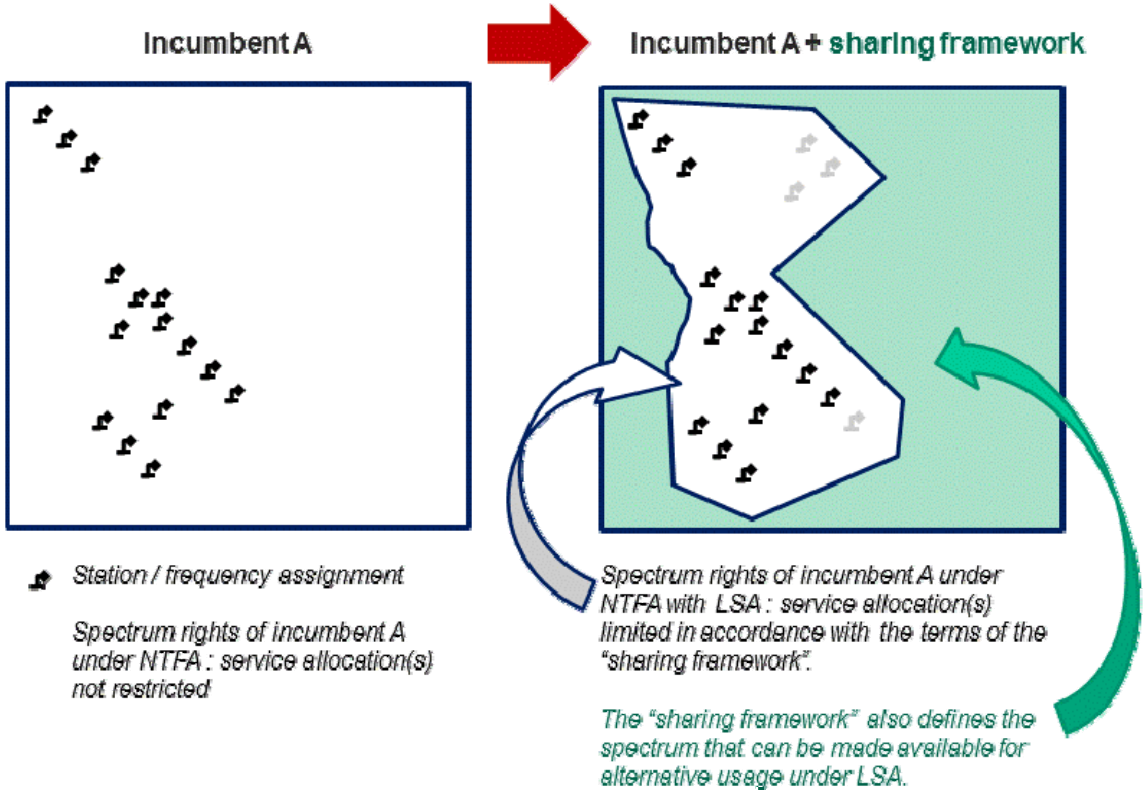

Figure 2: sharing framework

The “sharing framework” strictly addresses the conditions of access to the LSA spectrum enabling the protection of the incumbents’ services.

The concept of “sharing framework” also implies that LSA should not be mixed with a conventional sharing arrangement that is applied for e.g. FS (microwave links) or PMR-like services. In such case, there is no “incumbent” having priority or exclusive spectrum access across a territory and new systems can be introduced on a first-come / first-served basis by applying appropriate geographic of frequency separation measures.

4.3 PRACTICAL IMPLEMENTATION

It is currently envisaged that the initial major opportunities of implementation of the LSA concept arise with an incumbent being a **governmental body**.

In practical cases however, different types of incumbent are likely to operate in a frequency band where the implementation of LSA is foreseen (e.g. 2.3-2.4 GHz).

LSA should therefore also consider other types of incumbent such as PMSE users and support possible dynamic sharing arrangements.

As underlined previously, National Tables of Frequency Allocations (NTFAs) specify the frequency bands and radiocommunication services to which governmental users have access to perform their own duties.

LSA applies only when the incumbent user(s) and the LSA “licensees” are of different nature (e.g governmental versus commercial) and operate different types of applications, and are subject to different regulatory constraints.

The sharing framework has therefore limited impact – likely no impact – on the market regulation policy objectives since incumbent and LSA licensees belong to two different vertical markets.

From the incumbent’s perspective, LSA could be an alternative to ***spectrum refarming***. Spectrum refarming requires migration of incumbent systems to alternative frequency band. LSA is a tool that enables to maintain systems operated by a governmental body while accommodating new commercial use. LSA can be implemented by Administration when spectrum refarming cannot be achieved.

In practice, LSA and spectrum refarming can obviously complement each other as the review of spectrum needs of an incumbent can lead to distinguish between systems that need to be maintained in a frequency band from others which can be migrated or adjusted to enable alternative usage.

4.4 EUROPEAN HARMONISATION

From a European, perspective, the LSA approach allows addressing the market demand for harmonised introduction of new applications in specific bands where incumbent uses have to be maintained in different countries. National administrations therefore require some flexibility in the national implementation to enable the protection of incumbent services.

A CEPT harmonisation measure would designate a frequency band and define harmonised conditions for the use of a band (e.g. BEM, radio interface). Investigations at European level on the various sharing constraints aim to ensure that corresponding harmonised standard include the necessary tools for implementation of sharing mechanisms required for operation in the band.

In the context of identifying additional spectrum for mobile broadband services (MFCN), LSA offers to administrations a complementary regulatory approach to the conventional approach (permanent segmentation and refarming), noting that the conventional approach will obviously continue to be essential to meet future demand.

5 LSA AS A COMPLEMENTARY SOLUTION FOR ACCESSING SPECTRUM FOR MFCN

LSA could be a complementary solution for mobile network operators (MNO) for accessing spectrum for MFCN in specific bands, within specified geographical, time or technical limits. LSA complements the traditional exclusive access based on individual authorisation when re-allocation / refarming of spectrum is impracticable due to incumbent use. Thus, the purpose of LSA is not to replace the traditional exclusive access. LSA would enable the sharing of spectrum with non MNOs incumbents.

5.1 JUSTIFICATION

LSA provides a number of benefits justifying its implementation for the deployment of MFCN:

- LSA would enable the efficient use of spectrum and fosters innovation in mobile broadband therefore significantly contributing to Europe 2020 policy goals;
- Inventory activities within the spectrum review process highlight many instances where spectrum rights have not been awarded according to Directive 2002/20/EC. LSA could support using this spectrum more efficiently supporting the objectives of the Radio Spectrum Policy Programme;
- LSA is a complementary tool to make available additional spectrum resource for use by MFCN when spectrum refarming is not feasible or desirable. LSA creates an opportunity for mobile broadband use in specific bands in a timely manner under the terms of the Authorisation Directive for Electronic Communication Services;
- LSA represents an opportunity for Europe to lead the global debate on the shared use of spectrum.

5.2 APPLICABILITY CRITERIA

Identifying additional harmonised spectrum for ECS is a main objective since economies of scale have been a key requirement for a specific frequency band to support successfully commercial MFCN operation.

In order for LSA bands to be in a position to support successful commercial MFCN services, a number of additional key conditions, named hereafter applicability criteria, have to be fulfilled. In the following a set of applicability criteria are presented that are necessary for the implementation of LSA for MFCN.

5.2.1 Criterion 1: Identification of the incumbent(s) and their usage of the spectrum

National administrations decide which existing applications need to be considered as incumbent uses within the sharing framework and maintained in the long term according to national policy objectives and taking into account international obligations and community law in the case of EU Member States.

In order for the LSA licensee to consider making investments, first the LSA licensee needs to understand precisely where/when the band may be available, so that he knows exactly if the spectrum availability corresponds to his need for the delivery of the intended service.

This implies to know exactly who the incumbent(s) is (are), and what their statistical usage of the band is. Agreeing on a sharing framework under LSA approach also requires the incumbent(s) to inform the LSA Licensee not only of the current availability of spectrum in the band but also of the spectrum availability for the whole duration of the sharing framework. Long-term availability is one of the key enablers of LSA.

5.2.2 Criterion 2: Voluntariness

For MFCN, the goal of LSA is to make available additional spectrum resource in specific bands used by incumbent applications through enabling more advanced sharing than what is possible through existing regulatory frameworks. Sharing through LSA requires close cooperation between the incumbent and the LSA licensee, due to the priority in the spectrum access right.

Furthermore, in order for LSA to bring spectrum to the market more quickly than through band clearance, it is necessary for the incumbent to be proactive in the process.

Therefore, LSA should be implemented on a voluntary basis.

5.2.3 Criterion 3: Based on market demand and incumbent's interests

For LSA to support successful commercial services, it requires both a proactive incumbent (seeing benefits in sharing the band) and a clear business benefit for the LSA licensee. It is essential for LSA to leverage interests of parties involved, i.e. incumbents and LSA licensees. Extensive discussion between the incumbent and the future LSA licensee are essential in order to identify the sharing options that will provide the most benefits to both parties.

The incumbent will be incentivised by the fact that spectrum access can be maintained in the longer term and by adequate compensation for sustained sharing in specific bands. LSA licensee motivation will be based on attractive sharing conditions and timely access to spectrum with supportive economies of scale and at a lower cost, such as the absence of coverage obligations.

LSA should be based on incentive and market demand.

5.2.4 Criterion 4: Exclusivity among LSA licensees

Mobile operators usually rely on dedicated spectrum (spectrum available to a single MNO). LSA will only bring benefits for the delivery of mobile broadband services if it allows provision of QoS at the same level as what dedicated spectrum supports, when and where spectrum is available. When it comes to coverage, QoS can only be provided through licensed spectrum where MNOs have full control/knowledge of the interference they face, and therefore have full understanding of the performance that will be delivered by their network.

MNOs also need to have full visibility over their future access to spectrum in order to be in a position to develop investment plans. Overall, the exclusivity among LSA licensees for a spectrum resource at a given place, at a given time, for a predictable future, is a critical aspect of the concept in order to trigger infrastructure investment and deliver services with coverage QoS.

The incumbent users also benefit from this exclusivity. The exclusivity guarantees to the incumbent that it can identify in a straightforward manner the particular LSA licensee that has right of access to the band at a given time, in a given location.

5.2.5 Criterion 5: Harmonisation

Maintaining opportunities for economies of scale remains a top priority for the mobile broadband industry. Identification of LSA opportunities without consideration of wider industry and standardisation may not lead to successful commercial deployment.

Inter alia, LSA could target spectrum that offers potential for effective global harmonisation (e.g. spectrum that has been identified for IMT and that may not have been made available due to the needs of specific incumbents on a national or regional level) and is supported by standardisation activities.

LSA addresses bands with significant potential for global harmonisation and supported by appropriate standardisation.

5.3 LSA STAKEHOLDERS AND RESPONSIBILITIES

Several stakeholders must cooperate closely together at national level in order to introduce MFCN in a band under LSA:

- The Administration / NRA;
- The incumbent(s) (i.e. non MNOs);
- The prospective LSA licensee(s) (i.e. MNOs).

The exact nature and implementation of LSA is likely to differ from country to country, in order to adapt to national circumstances. In any case, the introduction of MFCN under LSA will always require:

- a dialogue involving Administration / NRA, Incumbent(s) and prospective LSA Licensees, in order to define the sharing framework;
- the Administration / NRA issuing an individual right of use to the LSA Licensee, following a procedure that is compliant with the Authorisation Directive.

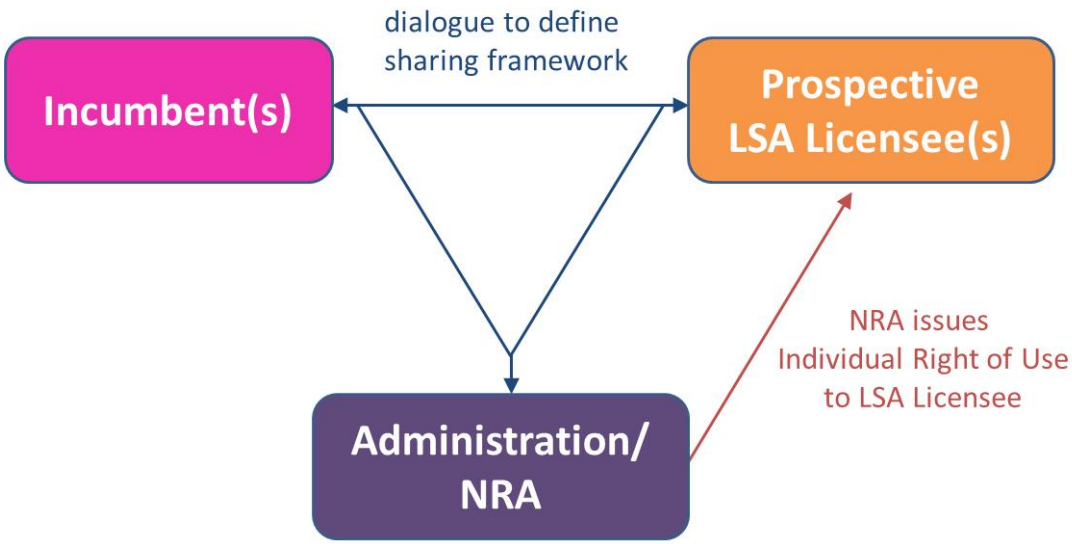

Figure 3: Regulatory process required before the introduction of MFCN in a band under LSA

5.4 LICENSED SHARED ACCESS IN THE CURRENT REGULATORY FRAMEWORK

Chapter 4 of this document introduces LSA as a new tool for spectrum management and explains generally how it fits within the existing regulatory framework on the use of spectrum.

In the following, an analysis is provided on the compatibility of LSA for the delivery of ECS with the EU regulatory framework.

Under the EU Regulatory Framework, the process for awarding spectrum rights of use – general authorisation and/or individual rights of use – is a task assigned to Member States, and particularly to administrations and NRAs, as per the general provision set forth by the Authorisation Directive, whose Art. 5(1) states that

Member States shall facilitate the use of radio frequencies under general Authorisations. Where necessary, Member States may grant individual rights of use in order to: 1) avoid harmful interference, 2) ensure technical quality of service; 3) safeguard efficient use of spectrum, or 4) fulfill other objectives of general interest as defined by Member States in conformity with Community law[3].

The Authorisation Directive also contains a provision that allows each Member State to review its particular market structure and take into account desirable national specificities when granting individual spectrum rights of use.

[3] In practical terms, the general authorisation regime implies that undertakings should be able to transmit just after submitting a notification specifying minimal information to NRAs (provider name, address, description of the network or services, etc.) for the purpose of keeping track of relevant ECN&S activities in the national territory. Under the individual licence regime, by contrast, an explicit decision of the competent Administration or NRA is required before deploying the relevant infrastructure and starting transmission activities.

LSA rights of use:

- entail specific provisions to avoid harmful interference to the incumbent and ensure technical quality of service;
- take into account national specificities (the use of the band by the incumbent);
- are granted as individual rights of use and associated with a number of obligations – usually defined in a 'cahier des charges' for the licensee.

As such, LSA rights of use are fully within the scope of the Authorisation Directive, and most generally the current EU Regulatory Framework for electronic communications.

In compliance with the Framework and Authorisation Directives, the procedure for the assignment of individual LSA rights of use should be 'objective, transparent, non-discriminatory and proportionate[4]. This would also be applicable to LSA rights of use.

As LSA implementation remains a voluntary national decision, each Member State may determine the subset of harmonised LSA frequencies that can be made available to the market under an LSA license, according to its own appropriate timeline. Each Member State may devise its own path for awarding LSA licenses, in accordance with national authorisation regimes, including deciding the number of LSA licensees that may be present in each LSA frequency band and the duration of each LSA license. However, policy coordination across Member States on general principles for LSA implementation should be considered so as to streamline the process and facilitate provision of pan-European services.

Finally, it can be noted that a national consultation phase could give interested parties the opportunity to comment on draft measures relating to the implementation of LSA.

5.5 STEPS FOR SETTING A LSA SHARING FRAMEWORK AND ISSUING INDIVIDUAL AUTHORISATIONS TO LSA LICENSEES

In setting up the sharing framework and issuing individual authorisations to LSA licensees, the following steps could be followed as an example:

1. The initiative to introduce MFCN in a band under LSA could be either triggered by the incumbent or requested by market driven demand.
2. Administration / NRA should identify the relevant parties to be involved in the development of the sharing framework. A dialogue between Administration / NRA, incumbent(s) that are deemed to be protected under LSA and prospective LSA licensees is initiated, with the aim of determining the terms of the sharing framework:
    a. The incumbent reports the conditions under which LSA will be facilitated. These should include its statistical current and future spectrum requirements in order to operate its services in the band. In particular, it may report frequency band, pre-defined time, geographical area frequency use, statistical use of the band or other technical conditions such as pre-emption conditions, in case of urgency, where the incumbent may retrieve use of the spectrum.
    b. The prospective LSA licensees provide some indication of the minimum duration of the sharing framework required to enable adequate return on investment. It may also be useful for the LSA prospective licensees to report on the frequencies, locations and times where spectrum is most acutely required. These conditions are needed to ensure the proper spectrum usage by both the incumbent and the LSA licensee in adjacent time/space/frequency domain(s).
    c. The Administration determines the relevant conditions in particular to ensure operations of the incumbent services to be protected. Based on these conditions, the Administration would set a sharing framework, which can be referenced under the National frequency allocation

[4] See notably Art. 9 of the Framework Directive and Recital 12 of the Authorisation Directive

table, on the basis of which an LSA licensing process can be issued. The administration may also need to modify the incumbent authorisation accordingly.

3. The NRA establishes a LSA licensing process. A prospective LSA licensee interested applies to the NRA for an LSA authorisation.
4. Depending on the dynamic nature of spectrum access for which the incumbent has an authorisation, the LSA licensee may need to be provided (e.g. through a data base) with information on the area(s)/time of availability of the spectrum. If this information remains constant over time it can be provided when the LSA licensee applies for its LSA authorisation.
5. When the incumbent needs to have access to (a part of) the band used by the LSA licensee, the LSA Licensee has to be informed by agreed means and has to modify its use. This must be in accordance with the conditions defined in its LSA authorisation. The dynamic nature of this request, and the urgency of the request, may influence the practical implementation by the LSA licensee.

5.6 TECHNICAL MEASURES TO SUPPORT THE IMPLEMENTATION OF LSA

5.6.1 LSA functional blocks and interaction

The following functional blocks may be required when implementing LSA on a national basis.

A LSA repository is required to deliver the information on spectrum availability and associated conditions when this information is subject to changes over time. The LSA repository may be managed by the Administration, the NRA or the incumbent, or be delegated to a trusted third party.

The LSA controller manages the access to the spectrum made available to the LSA licensee based on sharing rules and information on the incumbent's use provided by the LSA repository. It retrieves information about spectrum from the LSA repository through a secure and reliable communication path.

The LSA controller can interface with one or multiple LSA repositories as well as with one or multiple LSA licensee's networks. The LSA controller may be managed by the Administration, the NRA, the incumbent, the LSA licensee(s) or be delegated to a trusted third party.

There could be one or more repositories and/or controllers per country, depending e.g. on the LSA band and the incumbents' nature. The following figure depicts an example of implementation of LSA with repository and controller.

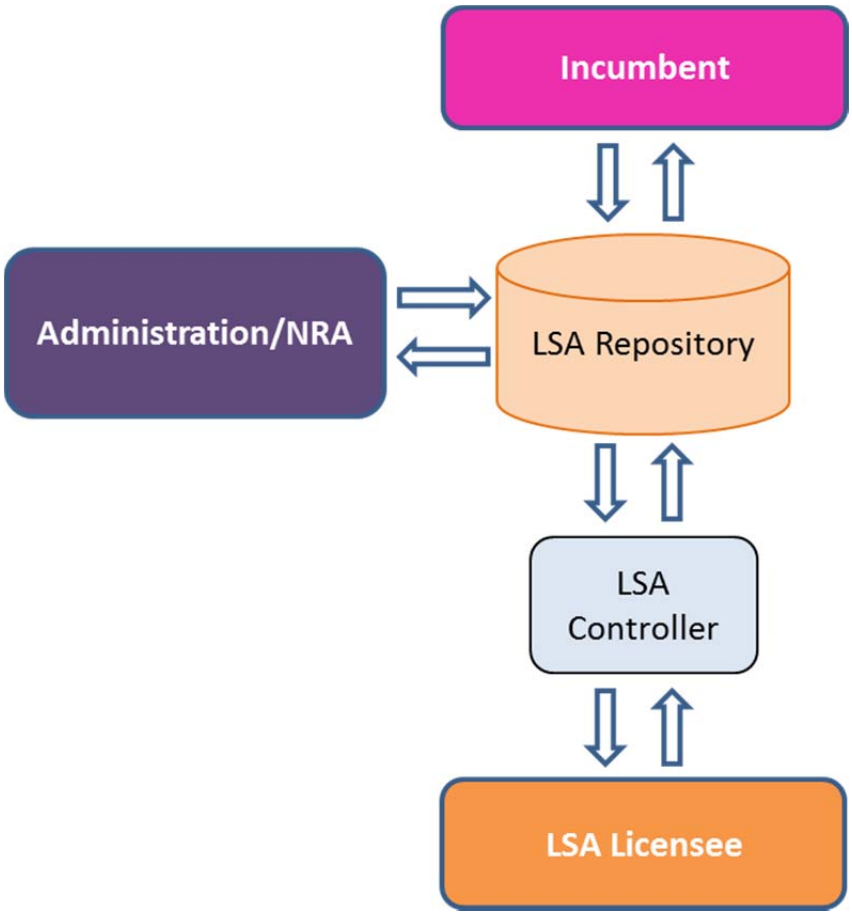

Figure 4: An example of LSA functional blocks and interactions

The LSA repository contains in particular the relevant information on LSA spectrum that must be protected together with the level of protection provided by the incumbent(s).

It should be noted that ETSI RRS has presented possible architecture that enables the LSA concept in document TR 103 113 ("System Reference Document on Mobile broadband services in the 2300 – 2400 MHz frequency band under Licensed Shared Access regime") [16].

5.6.2 Interfaces that would require standardisation

The following have been identified from CEPT perspective as interfaces that would need to be standardised:

- **Interface between LSA repository and LSA controller**
  - Requirements for the technical information exchanged between the repository and the controller as well as requirements on security and reliability of such interface should be considered in the relevant European Standard (EN), in order to ensure interoperability and harmonised market.
- **Interface between Administration / NRA and LSA repository**
  - Requirements for the technical information exchanged between Administration / NRA and LSA repositories as well as requirements on security and reliability of such interface should be considered in the relevant European Standard (EN), in order to ensure interoperability.
- **Interface between Incumbent and LSA repository**
  - The Incumbent should provide the information on spectrum (frequencies, locations and times) that must be protected together with the level of protection.

    - Requirements for the technical information exchanged between the Incumbent and the LSA repository as well as requirements on security and reliability of such interface should be considered in the relevant European Standard (EN).
    - This Interface may be standardised in order to ensure harmonised markets, e.g. for Commercial PMSE applications.
- **Interface between LSA controller and LSA Licensee**
    - This Interface may be standardised in order to ensure harmonised markets, e.g. for Commercial PMSE applications.
- **Interface between different LSA repositories**
    - This interface is required in case those NRAs enter into dynamic cross-border agreements.
    - Requirements for the technical information exchanged between national LSA repositories as well as requirements on security and reliability of such interface should be considered in the relevant European Standard (EN), in order to ensure interoperability.

Steps are taken such that confidentiality and information sensitivity/security requirements are met.

5.7 MANAGEMENT OF CROSS-BORDER COORDINATION UNDER LSA

Cross-border coordination is usually conducted through bilateral agreements between administrations / NRAs. Individual right of use delivered at national level request MNOs to respect the terms and conditions of such agreements. In traditional MFCN bands, the CEPT may conduct studies and product guidelines in order to support administrations / NRAs in their bilateral/multilateral negotiations.

Cross border coordination for MFCN services introduced in a band under LSA follows the exact same framework. Bilateral/multilateral agreements must be contracted between relevant administrations / NRAs and the LSA licensee will be requested to comply with such agreement under its individual right of use.

6 HARMONISATION MEASURES AND DOCUMENTS FOR THE IMPLEMENTATION OF LSA FOR MFCN

6.1 ROLE OF INTERNATIONAL BODIES

6.1.1 CEPT activities required for implementation of LSA in a band

Administrations / NRAs initiate the technical harmonisation work specific to LSA within CEPT. This phase would likely cover:

- The identification of frequency bands where LSA would be applicable;
- The discussion on the desirable technical harmonisation measures and conditions for the use of selected frequencies, e.g. band plan:
  This step traditionally corresponds to the creation of a CEPT WG FM Project Team. Such Project Team may also conduct a number of studies in order to support the implementation of a sharing framework at national level and the adoption of relevant cross border coordination agreements;
- The adoption by the ECC of an ECC Decision which fixes the conditions and the date by which such frequencies can be made available to market stakeholders.
  This step can open the way for administrations to mirror the ECC Decision in their national regulation.

6.1.2 ETSI activities required for implementation of LSA in a band

Standardisation work within ETSI is required for appropriate implementation of LSA.

The main focus of the standardisation work should be that of ensuring that the LSA system reference design and the LSA architecture/interfaces are compatible with existing and future MFCN network specifications and compliant with EU technical regulations, e.g., the R&TTE and EMC Directives. For instance, ETSI has published a System Reference Document for Mobile Broadband Services in the 2300–2400 MHz Band under Licensed Shared Access Regime.

Another aspect of the standardisation activity is to ensure that harmonised standards, which enable the introduction of equipment on the market, are in line with the terms of the ECC Decision.

6.2 DESCRIPTION OF DOCUMENTS REQUIRED OR SUPPORTING THE IMPLEMENTATION OF LSA

6.2.1 ECC Decision

The role of the ECC Decision is twofold:

- Indicate the decision by administrations / NRAs to harmonise a band at CEPT level for MFCN under LSA;
- Provide the technical conditions of access to the band that require harmonisation at CEPT level. These include a minima the band plan and the appropriate technical conditions, e.g. BEM.

6.2.2 ECC Report

One or several ECC Reports may be adopted in order to support the administrations / NRAs for the implementation of the ECC Decision at national level. Typically, an ECC Report would provide studies and recommendations regarding:

- the least restrictive technical conditions of access to the band, including the study that led to the technical conditions of access to the band adopted in the ECC Decision;
- coexistence studies between MFCN and incumbent services;
- coexistence studies between MFCN and services in adjacent bands;

- studies on cross-border coordination.

6.2.3 Harmonised Standard

6.2.3.1 Situation in the EU

The ETSI must develop Harmonised European Standards (HEN) that would ensure, among other aspects, conformity of equipment with the terms and conditions of the ECC Decision harmonising the band for MFCN. Equipment in conformity with such a HEN can then be placed on the market.

The ETSI may develop European standards (EN) in order to fulfil additional interoperability and standardisation goals.

6.2.3.2 Situation in CEPT Country not party to the EU

Administrations / NRAs typically identify or provide to manufacturers and vendors a reference standard. Manufacturer and vendor must ensure that their product are in conformity with such standard as one step of the procedures required for putting such equipment on the market.

6.2.4 Sharing framework

At national level, an Administration / NRA puts in place a sharing framework. The sharing framework includes:

- The identification of the incumbent(s) to be protected;
- The terms and conditions under which the incumbent has access to the spectrum;
- The terms and conditions under which the potential LSA licensees may access the spectrum.

The sharing framework may also include, depending on the specific circumstances:

- Identification of frequencies, locations and times that must be protected for the incumbent, together with the level of protection;
- Mechanism for transmission of information on spectrum availability between Incumbent and LSA licensee;
- Duration of the sharing framework;
- Financial terms and conditions of the sharing framework;
- Terms and conditions for the operation of both the LSA repository and the LSA controller;
- Reference to appropriate regulatory document, i.e. ECC Decisions, Harmonised Standards.

6.2.5 License

The LSA license is an individual right of use. The LSA license is delivered by the Administration / NRA to the LSA licensee. The LSA license must include:

- The identification of the LSA licensee;
- The terms and conditions under which the LSA licensee may access the spectrum;
- The sharing framework.

7 CONCLUSIONS

Taking into account the RSPG definition of Licensed Shared Access (LSA), how LSA fits with the regulatory framework on the use of spectrum, current practices in terms of spectrum management and management of frequency authorisations, ECC presents the following conclusions.

Scope of LSA

LSA is a complementary spectrum management tool that fits under an “individual licensing regime”.

LSA facilitates the introduction in a frequency band of new users while maintaining incumbent services in the band.

LSA aims to ensure a certain level of guarantee in terms of spectrum access and protection against harmful interference for both the incumbent(s) and LSA licensees, thus allowing them to provide a predictable quality of service.

LSA excludes concepts such as “opportunistic spectrum access”, “secondary use” or “secondary service” where the applicant has no protection from primary user(s).

LSA licensees and incumbents operate different applications and are subject to different regulatory constraints. They would each have exclusive individual access to spectrum at a given location and time.

The first practical use case of LSA will be to provide access to additional spectrum for mobile broadband services (MFCN).

Sharing framework

The implementation of LSA relies on the concept of a “sharing framework” that is under the responsibility of the Administration / NRA. Its development requires the involvement of all relevant stakeholders.

The “sharing framework” can be understood as a set of sharing rules or sharing conditions that will materialise the change, if any, in the spectrum rights of the incumbent(s) and define the spectrum, with corresponding technical and operational conditions, that can be made available for alternative usage under LSA.

Frequency allocation

LSA impacts the national allocation of a frequency band, which is a sovereign decision on the destination of this public resource.

National administrations decide which existing applications need to be considered as incumbent uses within the sharing framework and maintained in the long term according to national policy objectives, and taking into account international obligations and community law in the case of EU Member States.

Authorisation process

The Administration / NRA would set the authorisation process with a view to delivering, in a fair, transparent and non-discriminatory manner, individual rights of use of spectrum to LSA licensees, in accordance with the sharing framework defined beforehand.

LSA does not prejudge the modalities of the authorisation process to be set by Administration / NRAs taking into account national circumstances and market demand.

LSA is not a tool to regulate the ECS market and is based on different principles than “Spectrum trading”. It could nevertheless be necessary to check that competition is not adversely affected. The possibility for a governmental entity to engage in trading its spectrum holdings is a national institutional issue.

European harmonisation

From a European, perspective, LSA assists addressing the market demand for harmonised introduction of new applications in specific bands where incumbent uses have to be maintained in different countries. National administrations therefore require some flexibility in the national implementation to enable the protection of incumbent services.

A CEPT harmonisation measure would designate a frequency band and define harmonised conditions for the use of a band (e.g. BEM, radio interface). Investigations at European level on the various sharing constraints aim to ensure that corresponding harmonised standard include the necessary tools for implementation of sharing mechanisms required for operation in the band.

MFCN

The first practical use cases of LSA will be to provide access to additional spectrum for mobile broadband services (MFCN). The report provides detailed consideration on possible implementation of LSA for such scenarios. CEPT is developing harmonised conditions for the use of the band 2300-2400 MHz for MFCN.

LSA could be one solution for mobile network operators to access complementary spectrum for MFCN and should not preclude efforts to secure exclusive access to spectrum for mobile broadband. Current licensing regime based on exclusive access for mobile broadband has well-known benefits, such as enabling mobile network operators to guarantee quality of service, good interference management and a high degree of market certainty necessary to create adequate incentives for investment and innovation. Under certain conditions, LSA is expected to provide similar benefits as traditional exclusive access.

ANNEX 1: LIST OF REFERENCE

[1] Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (the “Framework” Directive)

[2] Directive 2002/20/EC of the European Parliament and of the Council on the authorisation of electronic communications networks and services (the “Authorisation” Directive)

[3] Decision 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community (the “Radio Spectrum Decision”)

[4] Directive 1999/5/EC on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (the “R&TTE” Directive)

[5] Final RSPG Report on Collective Use of Spectrum and Other Sharing Approaches, November 2011

[6] RSPG Opinion on review of spectrum use (6 February 2012), ref. RSPG12-408 (Final)

[7] RSPG Opinion on streamlining the regulatory environment for the use of spectrum (19 November 2008), ref. RSPG08-246 (Final)

[8] RSPG Request for Opinion on Increasing Opportunities for Shared Use of Spectrum (May 2012)

[9] CEPT Report 14: Report from CEPT to the European Commission in response to the Mandate to: Develop a strategy to improve the effectiveness and flexibility of spectrum availability for Short Range Devices (SRDs)

[10] CEPT Report 46: Report from CEPT to the European Commission in response to the Mandate on inclusion of information on rights of use for all uses of spectrum between 400 MHz and 6 GHz (March 2013)

[11] ECC Report 169: Description of practices relative to trading of spectrum rights of use (Paris, May 2011)

[12] ECC Report 132: Light licensing, license-exempt and commons (Moscow, June 2009)

[13] ECC Report 016: Refarming and secondary trading in a changing radiocommunications world (Messolonghi, September 2002)

[14] RSPG Opinion on Licensed Shared Access, November 2013, ref. RSPG13-538

[15] An evolutionary spectrum authorisation scheme for sustainable economic growth and consumer benefit, May 2011, ref. document FM(11)116

[16] ETSI TR 103 113 v1.1.1: System Reference Document: Mobile broadband services in the 2300 – 2400 MHz frequency band under Licensed Shared Access regime