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RADIO SPECTRUM POLICY GROUP

RSPG Opinion on Licensed Shared Access

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I. INTRODUCTION

Article 2 of the amended Commission Decision¹ establishing a Radio Spectrum Policy Group states that, “*the RSPG shall assist and advise the Commission on radio spectrum policy issues, on coordination of policy approaches, on the preparation of multiannual radio spectrum policy programmes and, where appropriate, on harmonised conditions with regard to the availability and efficient use of radio spectrum necessary for the establishment and functioning of the internal market*”. RSPG opinions should help in substantiating by qualitative and, wherever possible, quantitative indicators whether a European Union objective can be better achieved at EU level, taking into account the principle of subsidiarity².

This paper represents the RSPG response to the European Commission’s Request for an Opinion on spectrum regulatory and economic aspects of Licensed Shared Access (document RSPG12-424 Rev2, 8 November 2012).

A previous RSPG Report (Report on CUS and other spectrum sharing approaches RSPG11-392) had concluded that “*Licensed Shared Access (LSA) could provide new sharing opportunities on a European scale under a licensing regime, while safeguarding national current spectrum usages which cannot be refarmed. It is not intended that LSA will be an initial or temporary phase prior to the refarming of any band. Consequently, general sharing conditions should be agreed at European level, taking into account national particularities in bands designated for LSA at EU level, thus offering new opportunities for providing services with a good Quality of Service in spectrum within Europe. This new concept needs to be further developed, in particular regarding the possibility to dynamically modify licensing conditions within the framework of the recently adopted EU regulation*”.

This Opinion also defines LSA and considers how it could be implemented, in particular focusing primarily on unlocking bands used by incumbents, in which sharing opportunities which could improve the efficiency of the spectrum use are identified for additional licensed users.

For the purpose of this Opinion the spectrum sharing is defined 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.

Licence-exempt Collective Use³ and Secondary Trading⁴ are both valuable instruments to share spectrum already well established in the European and Member

¹ 2009/978/EU: Commission Decision of 16 December 2009 amending Decision 2002/622/EC establishing a Radio Spectrum Policy Group.

² Article 5(3) of the Treaty on European Union and Article 5 of the Protocol 30 to the European Community Treaty.

³ See RSPG08-244 Opinion on Collective Use of Spectrum

States legislation. Collective Use of spectrum is not designed to grant exclusive access to frequency bands or provide interference protection from other authorised users operating within the same bands. In a licence-exempt collective approach spectrum usage is either allowed without the need of a licence according to the technical conditions established in the National Table of Frequency Allocations or other national regulation, or is granted by general licensing instead of individual licensing, so no individual licence is involved. On the other hand, secondary trading is an instrument to transfer spectrum rights of use from one undertaking to another in accordance with the conditions attached to their authorisations.

On the basis of the above, it is therefore concluded that no further work on Licence-exempt Collective Use and Secondary Trading is deemed necessary in the context of the work of the RSPG on LSA. However, this should not rule out the possibility that spectrum leasing agreements and/or contracts could provide incentives for the shared use of spectrum under an LSA approach.

⁴ See RSPG04-54 Opinion on Secondary Trading

II. BACKGROUND

1. Radio spectrum is a critical and valuable asset to support growth and jobs in the European Union. With demands on the radio spectrum becoming more intense e.g. accelerating growth in wireless data traffic generated by smart phones, tablets, and other portable Internet access devices, it is necessary to use this unique resource as efficiently as possible. Access to harmonised spectrum and its use for wireless broadband services remain a pre-requisite for the achievement of the Digital Single Market while its non-commercial uses (e.g. aeronautical, space observation, meteorological, military) remain as important as ever for Europe.
2. To handle the growth in wireless traffic, the industry and administrations are challenged to introduce new technologies and regulatory mechanisms to optimise the use of the finite radio spectrum resource. In this context, the continued promotion of the shared use of radio spectrum is a valuable means to leverage the unique capability to re-used spectrum resources. For example, it could offer additional, licence exempt, access to spectrum for wireless broadband communications. Access to previously assigned spectrum could also be facilitated through licensed usage, under a Licensed Shared Access (LSA) approach.

The EC has published a communication⁵ on this matter in which it states that *“spectrum sharing contracts can provide users with legal certainty while creating market-based incentives, including financial compensation, to identify more beneficial sharing opportunities in the internal market, if NRAs grant shared spectrum access rights to additional users of a frequency band”*. In parallel, CEPT has initiated work on a Licensed Shared Access Regulatory Framework and the possible use of the LSA approach to enable wireless broadband applications in the 2300-2400 MHz band.

3. Spectrum management combines in practice the use of various tools to address new market demand and to achieve key objectives such as quality of service, interference prevention and efficient use of the spectrum. National administrations or regulatory authorities have to be accountable for these principles when they authorise the use of the spectrum, in conformity with their international obligations and community law.
4. Access and use of spectrum in the context of the Authorisation Directive is authorised in two ways: either licensed or licence-exempt.
 - “licensed” means that the usage rights are individually granted to an undertaking in time, frequency and geography. For example, a licence might last for 25 years, apply to a frequency block and on a national or regional basis. Examples of licensed use are the harmonised ECS bands (790-862

⁵ COM (2012)478 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Promoting the shared use of radio spectrum resources in the internal market

MHz, 880-915 MHz, 925-960 MHz, 1710-1785 MHz, 1805-1880 MHz, 1920-1980 MHz, 2110-2170 MHz, 2500-2690 MHz, and 3400-3800 MHz) for the provision of electronic communication services. In such cases, the regulator takes a responsibility to protect the licensed user against interference and provides a legal basis for ensuring a certain quality of service (QoS).

- “licence-exempt” means that the right to use the spectrum is afforded to devices that meet certain technical conditions to share the spectrum and which have a low probability of causing interference to other services. The regulator takes no responsibility for protecting individual users of licence-exempt devices against interference and does not provide a legal guarantee for ensuring a certain quality of service (QoS). An example of licence-exempt use is the 2.4GHz spectrum for the provision of Wi-Fi access service.
5. The objective of an LSA approach is to grant additional spectrum rights of use in specific bands on a shared basis allowing predictable QoS for all rights holders. However, these arrangements will need sufficient flexibility in order to allow for the incumbent to develop its network and to be able to take into account changes in technology (both the incumbent and new LSA users), in accordance with its spectrum rights of use.
 6. LSA could be introduced as a regulatory approach to release spectrum to meet consumers' needs and demand. In addition to conventional planning methods, cognitive radio technologies and their capabilities (geolocation databases, sensing, etc.) may have a role as enablers for sharing under the LSA approach.

For example, where a given incumbent user only operates equipment in certain geographic areas, there could be a possibility for LSA rights holders to use the spectrum in other geographic regions to meet market demand. The number of LSA rights granted to users will depend on the quantity and quality of spectrum available and the sharing rules that govern the coexistence (geographical spectrum access sharing with LSA).

Another example would be where an incumbent user only uses their assigned spectrum at certain times. In this case, there might be the possibility for LSA users to use the available capacity at other times (Time spectrum access sharing with LSA).

7. LSA could be appropriate in bands used by government entities, by establishing new sharing arrangements with commercial operations. Regulators might also consider reviewing the conditions of use of certain services so that channel or geographic exclusivity can be re-evaluated if so justified.

LSA could also be implemented in bands where appropriate guarantees are needed for incumbents to share spectrum used by sensitive systems – for example, in the band 2300-2400 MHz which is used in some countries for

telemetry services and cordless cameras.

8. Balancing the impact on the incumbent and the usage constraints on any additional user is a challenge. Administrations, when examining socio-economic benefits would *inter alia* need to take into account (i) the conditions under which existing assignments were made, including costs incurred, and (ii) the legitimate expectations of the incumbent as well as LSA users.
9. It will also be necessary to ensure that LSA arrangements do not adversely affect competition, and thus that the spectrum assignment procedures settled in Member States enable undertakings to apply for spectrum made available under a sharing framework based on transparent and non-discriminatory conditions in conformity with EU law.

III. LSA SCOPE AND DEFINITION

A previous RSPG Report (Report on CUS and other spectrum sharing approaches RSPG11-392⁶) defined the Licensed Shared Access concept (LSA).

The European Commission issued a Request for an Opinion on Licensed Shared Access (document RSPG12-424 Final, 8 November 2012). This Request for Opinion which aims at developing a concept for LSA with a view of facilitating its implementation and fully leveraging its potential, asks to confirm or adapt, if necessary, the definition of LSA as concluded in RSPG11-392.

In developing this Opinion, the RSPG has agreed on the following revised definition for LSA:

“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 authorized users, including incumbents, to provide a certain Quality of Service (QoS)”.

Therefore, LSA is not to be considered a new licensing regime but rather a regulatory approach that focuses on facilitating a more efficient use of spectrum in frequency bands assigned (or expected to be assigned) to one or more incumbent users by introducing additional licensed users.

Under LSA approach ***“an incumbent is a current holder of spectrum rights of use”.***

Incumbents may be distinguished depending on the type of rights of use (e.g. military, ECNs/ECSs providers). In this regard, it is proposed to first review existing spectrum sharing examples in Member States and to define common regulatory principles of the LSA concept and operational guidance for its implementation in concrete cases, such as in the band 2300-2400 MHz.

Under LSA, the case of *bands expected to be assigned to one or more incumbent users* refers to the case of vacant bands or bands with expired rights of use, in which the Administration/NRA could include terms in the licences granted to the incumbent/s in order to facilitate future LSA arrangements with prospective LSA users.

⁶ “An individual licensed regime of a limited number of licensees in a frequency band, already allocated to one or more incumbent users, for which the additional users are allowed to use the spectrum (or part of the spectrum) in accordance with sharing rules included in the rights of use of spectrum granted to the licensees, thereby allowing all the licensees to provide a certain level of QoS”

IV. CURRENT SHARED ACCESS PRACTICES IN EU MEMBER STATES

This section identifies some examples of current practices of licensed sharing based on the responses of the Member States to a relevant questionnaire.

Existing cases of licensed shared spectrum access in EU countries fall mostly in the field of PMR/PAMR, MCA and MCV as well as GSM-R. To illustrate the scope of LSA, it is useful to look at practical cases of licensed spectrum sharing in the Member States and verify in what aspects these current cases can contribute to the development of principles for the LSA approach. In this line, the following sharing cases are addressed:

- **PMR / PAMR**

PMR is one example of radio system, where the introduction of new networks is typically managed through the coordination of frequency assignments by the relevant Administration. The sharing arrangement is a first come/first served concept to get a licence where all of the licensed users operate at the same level (identical rights of use) and appropriate coordination measures are applied.

PMR and PAMR networks operate under a frequency and geographic sharing regime. Operating protocols for co-channel systems requires users to implement listen before transmitting, or other access techniques/protocols. Several users can operate the same frequency in a sequential mode in the same geographic area utilising different codes. In order to establish such networks, the operator(s) must know a priori the sharing arrangement in terms of cell planning, i.e., the available channels per geographical area. Also, PMR systems are equipped with mechanism that allows such types of spectrum/time sharing. As conclusion, existing PMR users/customers are operating under a non-LSA regime as all of them operates at the same level and there is no “incumbent” having priority or exclusive spectrum access.

However, users of PMR networks could be considered as additional LSA licensees if they are introduced into a band with an incumbent.

- **MCA and MCV**

MCA (Mobile Communication services on Aircraft) and MCV (Mobile Communication services on board Vessels) allow the provision of mobile communications to customers, according to EC Decisions 2008/294/EC and 2010/166/EU, respectively. It is a case of separation in the geographic domain (900 MHz, 1800 MHz band). Technical conditions set in the harmonised regulatory measures aim to prevent co-channel interference to the services of the mobile operators.

Depending on the national legislation, some countries have licensed these operations, whereas some others are following the recommendations 2008/295/EC and 2010/167/EU, by exempting them from licensing.

This could be seen as example of LSA only under the assumption that the use of the spectrum is permitted by the Administration/NRA under an individual authorisation. In this case geographic separation and technical conditions enable the possibility of sharing the frequency and time domains and is an example of sharing rules.

- **Governmental incumbent users sharing with additional users**

The RSPG recognises that strategic governmental usage in some countries and in certain bands, such as aeronautical telemetry or CCTV for security purposes, would need to maintain its primary allocation status. Hence, RSPG considered the possibility to provide access to such bands through an appropriate regulatory mechanism. Studies are needed to detail the technical basis for a shared access, if feasible.

- **GSM-R**

The use of GSM-R in France is an interesting example of the principles of LSA approach in a band used by a governmental incumbent user. This example illustrates the important role that defined sharing arrangements between different users play to ensure a certain quality of service (QoS).

European deliverable:

ECC/DEC/(02)05 designates the frequency bands 876.0-880.0 MHz and 921.0-925.0 MHz for railway purposes.

Defence systems are also operated in this frequency range in several European countries, as mentioned in the ECA Table and also in the NJFA7 (2002):

“Essential military requirements from 10 to 60 MHz for tactical radio relay, of which 10 MHz should be harmonised spectrum for training in border areas, subject to bilateral or multilateral coordination.”

Incumbent user

In accordance with the French National Table of Frequency Allocation (NTFA), the ministry of defence (DEF) is the “incumbent” in bands 869.7-880 MHz and 915-925 MHz. Its status means that DEF has de facto exclusive rights in the management of these bands. Other users may also access the band, but subject to agreement by DEF on a case by case basis for individual frequency assignments.

Sharing agreement

A sharing agreement was reached in 2005 between DEF and ARCEP, the national regulator in charge of ECS. This agreement sets provisions to enable the

⁷ NATO Joint Civil/Military Frequency Agreement (NJFA)

deployment of GSM-R systems in bands 876-880 MHz and 921-925 MHz. This agreement is referenced in the NTFA.

The registration of frequency assignments for GSM-R systems in the national database (FNF) is the procedure by which the GSM-R stations will gain adequate protection.

Change of the “rights of use”

The sharing arrangement between ARCEP and DEF enables the implementation of ECC deliverable, and therefore to meet market demand.

The change of the NTFA materialises the change of the incumbent’s rights.

It also offers a stable framework, based on which ARCEP can issue authorisations to GSM-R operator.

Additional users

GSM-R operators operate by definition in limited numbers and under individual licensing regime. The sharing rules are included in the authorization.

– Wireless cameras

In some cases individual licensing is accepted on a non-interference and/or non-protected basis. In other cases secondary licences are restricted in time and/or geographic domain. A specific example is the use of military frequencies in the 2200-2300 MHz and 2300-2400 MHz range for wireless cameras. In many cases the licences for these cameras are only given for a specific event and are subject to coordination with the primary user, the Ministry of Defence.

These individual licences provide users with spectrum usage rights on a non-interference and non-protection basis. Hence, they should not be considered as examples of the LSA approach because no legal basis for ensuring a certain quality of service (QoS) is provided by the regulator. The added value of granting a user with an LSA licence would therefore be to legally ensure the provision of a certain QoS by also protecting the shared use of spectrum by the LSA user, as it is now in some countries like Sweden.

• PMSE, SAB/SAP services, ENGs

In a number of bands (mainly public spectrum and broadcasting) additional (secondary) users share the spectrum with an incumbent user under certain restrictions (mainly geographical and temporary restrictions) e.g. PMSE (Programme Making and Special Events) within TV white spaces, SAB/SAP services, ENGs.

Whether or not such use would be considered under the LSA approach depends on the level of protection provided with the rights of use of a shared band. When the shared rights of use are provided on non-interference, non-protection basis and no licence is granted, it would not be an example of LSA. However, when a licence is granted to the additional users it could be seen as an LSA case.

It is worth noting that it could also be possible for a new licensee to be a ‘middleman’, e.g. a white space database manager who could provide QoS to other users/consumers on a license exempt basis.

V. THE DIFFERENT PARTIES IN AN LSA APPROACH

In order to assess the LSA concept in its different dimensions and at the same time develop actionable guidance for NRAs and the European Commission, an analysis has been performed of current shared access practices in EU Member States (see section above). After consideration of these current practices, and possible scenarios for LSA it can be concluded that the NRA, as the general leading party in all approaches has a key role (e.g. on setting up the sharing rules).

The roles of the operational actors involved in unlocking bands used by incumbents for additional licensed users are reviewed in this section.

Discussion towards the implementation of LSA in a specific frequency band can be initiated by an incumbent, by the Administration/NRA or by an individual or a group of prospective LSA users.

1. Administration/NRA

The Administration/NRA has a central role to play in the introduction of LSA. In chronological order, the tasks of the Administration/NRA can be summarized as follows:

i. Prospective role of the Administration/NRA

The Administration/NRA should define the possibilities for LSA and actively promote discussions. These possibilities can be based on contributions, proposals and technical studies from incumbents and/or prospective LSA users. These stakeholders can make proposals based on own incentives, technical evolutions, the consequences of the European legal framework, etc.

A sharing framework must be established under the responsibility of the Administration/NRA for a given frequency band taking into account national specificities.

ii. Definition of the sharing framework for LSA.

The Administration/NRA will define the spectrum parameters, including the technical and operational conditions related to the LSA approach to allow for an efficient use of the band to be applied (if appropriate) to alternative usage under the LSA approach, protecting the (planned) incumbent user(s) by offering legal certainty and offering the necessary possibilities to additional users (LSA licensees). Incumbent user(s) and prospective LSA user(s) can foster the development of a sharing framework through bilateral discussions.

In order to offer the LSA licensee(s) adequate access to the band and therefore to allow them to provide the desired level of quality of service to the end user/consumer, the Administration/NRA should set the parameters for this sharing framework (e.g.: coordination process, compatibility criteria, authorized spectrum bands, conditions of the license -such as limitations in terms of timing and location-, spectrum mask, etc.)

The sharing framework and all the relevant elements included will depend on a case by case decision. This process may be carried out on a national or on a European level.

iii. Definition of transparent licensing process

The Administration/NRA would set the authorisation process with a view of 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. The LSA concept does not prejudice the modalities of the authorisation process to be set by Administration/NRAs taking into account national circumstances and market demand.

This approach is derived from key principles established by the EU legal framework for Electronic Communications Networks and Services (ECN&S). In particular, Article 9.1⁸ stipulates the main objective in relation with the management of radio frequencies for electronic communications services.

Where it is necessary to grant individual rights of use for radio frequencies, Member States shall grant such rights, upon request, to any undertaking providing or using networks or services, as stipulated in Article 5.2 of the Authorisation Directive. Such rights of use shall be granted through open, transparent and non-discriminatory procedures. This principle is reinstated in Article 7.3⁹ of the Authorisation Directive.

iv. Carry out the authorisation procedure - Issuing of licenses.

After the establishment of the applicable licensing process, the Administration/NRA will need to carry out the authorization process itself. This can take place after the establishment of the necessary primary or secondary

⁸ 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

⁹ 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. Any such selection criteria must give due weight to the achievement of the objectives of Article 8 of Directive 2002/21/EC (Framework Directive)

national legislation, which will generally include a consultation process. The incumbent user will have the possibility to take part in this consultation phase.

2. Incumbent user

As defined in section III an incumbent is described as a current holder of spectrum rights of use. Nevertheless it is currently envisaged that major opportunities of application of the LSA concept would be in the case of an incumbent being a governmental user.

The rights of use of such governmental bodies, in particular in bands where they enjoy some exclusive or priority rights, are usually limited to the rights described in the National Table of Frequency Allocations (NTFA) or other national regulations. In most countries, no individual authorisations with limited duration are granted. Government bodies have access to spectrum to perform their own duties. Managing frequency authorisations and competitive issues are core competences of Administrations/NRAs.

Given the merits of the LSA approach, particularly in the context of establishing for a specific frequency band a consensual long-term sharing framework, an incumbent could take the initiative towards setting an LSA arrangement.

The initiative can also be driven by market demand. An incumbent may have to assess a request for sharing and, if appropriate, can make a proposal to the Administration/NRA and negotiates the sharing arrangements with prospective LSA users. The review and negotiation process should consider both the spectrum requirements of the incumbent(s) and the demand for alternative usage.

When reviewing its spectrum requirements, an incumbent may have 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.

The sharing framework established under the responsibility of Administration/NRA, which can be referenced under the National Table of Frequency Allocations (NTFA), will ultimately materialise the change in the spectrum rights of the incumbent(s). It could also include an obligation on the incumbent to provide the necessary information to support the sharing framework.

- **Incentives for the Incumbent**

One of the incentives for the incumbent in facilitating LSA may be a lowering of overall costs by making available spectrum which is not fully utilised. The incumbent has to provide specific duties and obligations, and also needs to account for the

general evolution of radiocommunication, budget constraints and the need to rationalise maintenance and long term deployment of systems.

LSA offers an alternative for the incumbent to release a frequency band targeted by new users whilst keeping guarantees for maintaining its uses in the long term, thus contributing to the overall objectives of efficient use of the spectrum. The Administrations/NRAs have the responsibility to ensure that operators abide by their licence conditions, allowing enforcing effective shared use.

The existing incumbents' licences should be reviewed after an agreement is achieved. A key factor for incumbents is protection against interference; therefore their licences could be changed if agreed between the parties or mandated through national legislation in specific and limited conditions.

Taking into account the above discussion, it can be beneficial that in some specific cases financial compensation be considered and agreed between the parties

It should be noted that, in particular in the case of governmental entities, where services are to be publicly available or related to public safety, the incentives for the incumbents are deemed to be different, given that most Member-States do not apply spectrum fees to those entities. Incentives to them could be the possibility of sharing costs of investments and maintenance of the infrastructure with new LSA licensees.

3. LSA users

New LSA users are the prospective additional licensees, who will share the spectrum under certain operational conditions.

They will have an important role, given that they will identify possibilities of sharing (bands and business plan), may make proposals to or receive proposals from the Administration/NRA or the incumbent and negotiate, if appropriate, the sharing arrangements with the spectrum users (incumbent and other LSA users). Finally, they will apply for a licence to the Administration/NRA to use the spectrum made available under the established sharing framework, consistent with national and community legislation.

The individual right of use granted to an LSA user is a legal instrument by which the Administration/NRA authorises such an undertaking to use a frequency band under specified conditions. It therefore should include the "sharing rules" defined beforehand by the NRA/Administration, so that these specified conditions encompass the necessary obligations towards the incumbent.

- **Incentives for prospective LSA users**

In order for the LSA licensee to consider making investments, first the LSA licensee will need to understand where/when the band may be available, over the whole duration of the licence, so that they know if the spectrum availability corresponds to their need for the delivery of the intended service.

Achievable sharing conditions should be sufficiently concise, attractive and predictable to:

- Incentivise users to invest in equipment and network.
- Enable operators to be able to promptly make use of spectrum.
- Provide Regulatory certainty.

VI. LEGAL, REGULATORY AND LICENSING ASPECTS

LSA provides a controlled environment enabling additional use of spectrum held by an incumbent which would otherwise not be available.

Sharing opportunities could be identified in a particular frequency band, where the combined net socio-economic benefit of multiple applications sharing the band is greater than the net socio-economic benefit of a single application.

National Legislation

The legislation of the EU Member States facilitates sharing of spectrum, either on a licensed or licence-exempt basis. Also, through the authorization Directive administrations can impose harmonized operational and technical conditions in rights of use, in particular when a particular band is opened based on an EC instrument (Decision or Recommendation).

European Legislation

As far as European legislation is concerned, it is generally believed that the LSA regulatory approach is fitting well into the existing European Regulatory Framework. Under this Framework, the process for awarding spectrum rights of use – general authorization and/or individual rights of use – is done by the Member States, and particularly Administrations and NRAs, as per the general provision set forth by the Authorization Directive, whose Art. 5.1) states that:

“Member States shall facilitate the use of radio frequencies under general authorizations. 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) fulfil other objectives of general interest as defined by Member States in conformity with Community law¹⁰”.

The Authorization 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.

Licensing aspects

The key objective of LSA is to facilitate access to additional licensees in bands in which there are already one or more incumbent users. After achieving a successful sharing arrangement

¹⁰ In practical terms, the general authorization regime implies that undertakings should be able to operate 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 license regime, by contrast, an explicit decision of the competent Administration or NRA is required before deploying the relevant infrastructure and starting transmission activities.

based on sharing rules developed with the involvement of all concerned parties and under the responsibility of the administration, Administration/NRA formally grants the LSA licence. The Administration/NRA is responsible for protecting them both according to the sharing rules included in the rights of use granted to the licensees, giving legal certainty to both incumbent and LSA users

LSA rights of use:

- entail specific provisions to avoid harmful interference to the incumbent and ensure a certain quality of service, providing at the same time an incentive for the incumbent to accept the necessary changes in its rights;
- take into account specific national specificities (the use of the band by the incumbent);
- would be granted as individual rights of use and be associated with a number of conditions– usually defined in the LSA licence.

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

Competition

Fair competition and consumers' interest should be preserved in the implementation of LSA. National Authorities should be vigilant that LSA is developed in a way to ensure that any transition from incumbent rights to LSA does not affect competition adversely or result in spectrum hoarding.

Incumbent holders of spectrum rights should act openly and transparently in dealing with requests for LSA. The above mentioned incentives could mitigate problems raised by incumbents.

In this sense the LSA approach, should ensure that all incumbents and potential LSA users are treated in a fair and transparent way and that the LSA process which provides additional access opportunities is open, public, reasonable, fair and transparent.

It is also recommended that LSA licences do not, in the long term, limit potential innovation by the incumbent service in accordance with its spectrum rights of use.

In conclusion, balanced operational conditions should be defined taking into account the above-mentioned considerations.

VII. IMPLICATIONS OF IMPLEMENTING LSA IN EU

Harmonisation ensures that a suitable regulatory framework is available to facilitate the development of standards, to provide a level of certainty and economies of scale for investors and to support the implementation of the relevant authorisation regime at national level.

The LSA regulatory approach should be established through a harmonised approach, e.g. based on CEPT and/or EC Decisions and/or Recommendation.

Identification of frequency bands, applications or fields of use where a known opportunity for additional usage exists, to possible implementation of LSA and definition of harmonised conditions for sharing is of major importance.

- **CEPT/ECC**

CEPT could develop a technical basis for sharing between LSA users and incumbent(s) in specific frequency bands, covering the following items:

- The identification of frequency bands where LSA would be implementable, taking into account existing incumbent uses and market demand for shared access solutions;
- An assessment of the desirable technical harmonisation measures and conditions for the use of selected frequencies, e.g., band plan and rules for interference protection against incumbent and/or other future LSA licensees operating in the same band.
- The adoption by Administrations of an ECC Decision which fixes the conditions and the date by which such frequencies, operated in compliance with the agreed rules, can be made available to market stakeholders. This step can open the way for Administrations to mirror the ECC Decision in their national markets by updating their National Table of Frequency Allocations (NTFA).

- **ETSI**

The role of ETSI is focused on the standardisation activity to ensure that harmonised standards meet the regulatory requirements, and which may include sharing mechanisms for operation in a specific frequency band.

The baseline proposals in the RSPG opinion on “streamlining” (November 2008) aimed at improving decision mechanisms, cooperation or legislation so as to ensure consistency in the different elements of the regulatory environment for the spectrum use, namely CEPT, EC and ETSI would still apply in the context of LSA.

Work has already started in ETSI where a System Reference Document (SRDoc) for Mobile Broadband Services in the 2300–2400 MHz band under Licensed Shared Access Regime is currently being developed. The main focus of this standardisation work should be to ensure that the LSA system reference design, LSA architecture and interfaces are compatible with existing and future MFCN network specifications and compliant with EU technical regulations, e.g., the R&TTE and EMC Directives.

- **EC/EU**

The Commission may, in accordance with the procedures set out in the “Spectrum Decision”, adopt appropriate technical implementing measures with a view to ensuring harmonised conditions for the availability and efficient use of radio spectrum.

The goal of LSA is to free up additional spectrum resource through facilitating sharing arrangements between different types of use, whether within one individual country or between different neighbour countries.

In practice, an EC Decision could define a regulatory framework harmonising the technical conditions (e.g. BEM, radio interface...) and leaving administrations to specify, when necessary, additional technical and regulatory conditions for the protection of incumbent services under LSA.

VIII. RESPONSES TO THE CONSULTATION

A public consultation on a draft version of this Opinion was held from June 2013 until August 2013. In all, 21 responses were received. The RSPG is grateful to all respondents for their input. All responses can be found on the RSPG website http://www.rspg-spectrum.eu/consultations/index_en.htm. A summary of the responses is provided in **Annex B** to this Opinion.

The responses received can be classified in the following groups:

1. **Public Mobile Operators and Trade Associations** (8 respondents).
2. **Industry** (4 respondents).
3. **Broadcasting and Entertainment** (3 respondents).
4. **Railway Infrastructure** (3 respondents).
5. **Internet Trade Associations** (2 respondents).
6. **Satellite Operators Trade Association** (1 respondent).

Most respondents commended the draft Opinion for providing a new approach and an important opportunity to improve spectrum efficiency, by authorizing access to spectrum otherwise underutilised, or where refarming is too costly or not possible in a reasonable timeframe.

Most respondents believe that the legislative framework that is available across EU appears to be adaptable to the principles set out in the draft Opinion.

Views are divided on the character of incumbent in the context of LSA. Some respondents have indicated their preference to restrict the scope of the incumbent to governmental holders of spectrum rights of use. Other respondents however are in favour of a broader general approach, with opportunities for both Governmental-commercial and commercial-commercial agreements.

Mobile operators and Industry respondents have pointed out that LSA will not solve the spectrum scarcity for future mobile broadband operations, but they consider LSA as a good complementary instrument to enable the timely availability of harmonised spectrum.

Mobile operator respondents have insisted on the point that exclusive licensed access remains the most effective and successful way to cope with high QoS, good interference management (still a top priority), and market certainty, and that LSA

cannot replace the need for exclusive spectrum for mobile services. In connection with this, some Industry respondents recommend that LSA licensees should enjoy exclusive rights where and when the spectrum is not used by the incumbents, thus enabling a predictable QoS.

As regards the possibility that Administrations/NRAs initiate LSA processes, some respondents have cautioned that the Administration/NRA should carefully consider the incumbent acquired rights resulting from spectrum tendering procedures, as well as take into consideration the investments made. In general caution has been expressed on how LSA is introduced, to avoid negative aspects on investments.

Other points raised by the respondents included:

- that LSA policy, like all spectrum policy, should be adaptable to a wide range of spectrum use and malleable to the advances in technology, while requiring minimal regulatory intervention.
- that LSA should apply to bands that are harmonised, or are earmarked for global harmonisation in the future.
- that the first practical implementation of LSA in Europe could begin with the 2.3 GHz band, in 2014.
- that any national particularities should not lead to additional restrictions. Too specific technical conditions may lead to a fragmented situation, with particular sharing conditions developing in different countries.
- that spectrum sharing technologies remain largely unproven, and cognitive radio might be inconsistent with Technology Neutrality.
- that as regards Sharing Agreements, the NRA should remain the sole responsible entity to determine the most appropriate type of individual rights of use and conditions.
- that LSA should be promoted among Member States as a voluntary measure, and only in case of public spectrum holder, where is clearly demonstrable that spectrum is not used efficiently, LSA can be imposed by the Administration on new assigned spectrum after the entering into force of any regulation on LSA.
- that as regards the cost of equipment, some respondents believe that the cost of equipment for LSA would be higher than those of exclusive spectrum, while others believe that LSA means lower cost to the LSA licensees (e.g. absence of coverage obligations).

IX. THE OPINION OF THE RSPG

The challenges to identify spectrum for the introduction of new technologies, as well as the need to manage increased demands on spectrum capacity to support growth in existing wireless traffic in Europe, have led to a common understanding between Administrations that there is significant scope for enhanced shared use of spectrum, through the introduction of Licensed Shared Access (LSA).

The RSPG defines the LSA concept as follows:

“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 authorized users, including incumbents, to provide a certain Quality of Service (QoS)”.

Under LSA approach *an incumbent is a current holder of spectrum rights of use.* Depending on the rights of use under consideration, different types of incumbents may be distinguished (e.g. military, ECNs, ECSs).

The RSPG notes that:

- a) The legislation of the EU Member States facilitates sharing of spectrum, either on a licensed or licence-exempt basis.
- b) LSA is not intended to be a new licensing regime but rather a regulatory approach to facilitate a more efficient use of spectrum in frequency bands assigned (or expected to be assigned) to one or more incumbent users by introducing additional licensed users.
- c) A licence granted by the Administration/NRA provides legal certainty to the parties. In accordance with the Framework and Authorization Directives, the procedure for the assignment of individual LSA rights of use should be objective, transparent, non-discriminatory and proportionate.

The RSPG considers that:

- a) LSA is based on a different principle than spectrum trading, the latter being only based on commercial agreements between the parties.
- b) LSA applies to an incumbent, being any current holder of spectrum rights of use (commercial or governmental). However, it is likely that the LSA concept has more relevance in practice when the incumbent user(s) and the LSA “licensees” are of different nature and subject to different regulatory constraints. It is

envisaged that initially major opportunities for application of the LSA concept would be in the case of an incumbent being a governmental user.

- c) Administrations already have experience on issuing licences for various kinds of sharing, as illustrated in section IV of this opinion.
- d) Spectrum assigned through LSA can generally be made available on the market more rapidly, compared to spectrum being made available through alternative means, e.g. refarming.
- e) LSA can spur the development of new technologies that can promote sharing.
- f) The implementation of the LSA concept might have impact on the rights of spectrum used by incumbents.

The RSPG is of the opinion that:

1. LSA will provide a controlled environment enabling enhanced shared use of spectrum otherwise not available. LSA should be used to grant spectrum rights of use in specific bands on a shared and licensed basis, ensuring predictable QoS for all rights holders and consumers.
2. Harmonised measures under LSA focusing on a particular frequency band, where the combined net socio-economic benefits of multiple applications sharing the band is greater than the net socio-economic benefit of a single application, will support the EU internal market.
3. LSA could act as a key enabler to unlock access held by incumbents to spectrum, thus helping to create significant benefits for Europe.
4. LSA may also enable the timely availability of harmonised spectrum for mobile broadband and other applications
5. The implementation of LSA should rely on the concept of a “sharing framework” that is under the responsibility of Administration/NRA. Its development requires the involvement of all relevant stakeholders. In this context, the sharing framework is to be understood as a set of sharing rules or sharing conditions that specifies the change -if any- in the spectrum usage rights of the incumbents, as well as the spectrum and its technical and operational conditions that can be made available for shared usage under LSA.

The technical and operational conditions defined by an Administration/NRA under LSA should lead to an increase in the efficient use of the identified spectrum through alternative usage, while protecting the (planned) incumbent user(s) by offering legal certainty and offering the necessary possibilities to additional users (LSA licensees).

6. 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 users, in accordance with the sharing framework defined beforehand. The LSA concept does not prejudge the modalities of the authorisation process to be set by Administration/NRAs taking into account national circumstances and market demand.
7. The Licence granted by the Administration/NRA should provide the necessary legal certainty to the parties. In accordance with the Framework and Authorization Directives, the procedure for the assignment of individual LSA rights of use should be objective, transparent, non-discriminatory and proportionate. The sharing rules (or part of it) shall be part of the corresponding LSA licence granted by the Administration/NRA, thus reinforcing the legal certainty, in particular to the incumbent users.
8. LSA should provide the necessary flexibility in authorization of spectrum rights to account for national particularities.
9. LSA is compatible with the current EU Regulatory Framework, in particular with the Authorisation Directive (Directive 2002/20/EC). No additional regulatory measure is deemed necessary at European level.
10. LSA has the potential to enable spectrum to be brought into use in a more efficient manner and that active facilitation of spectrum sharing to reap the benefits of LSA is highly desirable.
11. The LSA could be initiated on a voluntary basis, but it also may be imposed by the regulator in order to ensure efficient spectrum use. The policy on this matter can be contingent upon national circumstances.

The RSPG recommends that:

- a) Administrations/NRAs should actively promote discussions and define the possibilities for LSA. These possibilities can be based on contributions, proposals and technical studies from incumbents and/or prospective LSA users.
- b) Technical conditions should be harmonised, as far as feasible, in order to be able to develop adequate standards and equipment, and to achieve economies of scale taking into account that sharing conditions to protect incumbent may vary amongst EU MS. In practice, a EC Decision based on the results of CEPT studies performed within the frame of a Mandate from the Commission could define a regulatory framework harmonising the technical conditions (e.g. BEM, radio interface) and leaving administrations, when it is necessary, to specify additional technical and regulatory conditions necessary for the protection of incumbent services under LSA .

- c) Fair competition and consumers' interest shall be preserved in the implementation of LSA. NRAs/Competition Authorities should be vigilant that LSA is developed in a way to ensure that any implementation of LSA does not distort competition.

ANNEX A: ABBREVIATIONS

ARCEP	Autorité de regulation des communications électroniques et des postes
CCTV	Closed-circuit television
CEPT	European Conference of Postal and Telecommunications Administrations
CRS	Cognitive Radio Systems
CT	Cognitive Technologies
CUS	Collective Use of Spectrum
DAA	Detect and Avoid
DFS	Dynamic Frequency Selection
ECC	European Communications Committee
ECN	Electronic Communication Networks
ECS	Electronic Communication Systems
EESS	Earth Exploration Satellite Service
ENG	(systems of) Electronic News Gathering
ETSI	European Telecommunications Standards Institute
EU	European Union
GSM-R	GSM Railway
IMT	International Mobile Telecommunications
ITU	International Telecommunication Union
LSA	Licensed Shared Access
MBB	Mobile Broadband
MCA	Mobile Communication services on Aircraft
MCV	Mobile Communication services on board Vessels
MFCN	Mobile and Fixed Communication Networks
MNO	Mobile Network Operator
MS	Member States
NRA	National Regulatory Administration
NTFA	National Table of Frequency Allocations
PMR	Private Mobile Radio
PAMR	Public Access Mobile Radio
PMSE	Programme Making and Special Event
QoS	Quality of Service [in context of LSA]
R&TTE	Radio and Telecommunications Terminal Equipment
RSPG	Radio Spectrum Policy Group
SAP/SAB	Services Ancillary to Production and Broadcasting
SDR	Software defined Radio
SRD	Short Range Device
WRC	World Radiocommunication Conference
WSD	White Space Devices

ANNEX B: SUMMARY OF RESPONSES TO THE PUBLIC CONSULTATION ON THE DRAFT OPINION ON LICENSED SHARED ACCESS

The Radio Spectrum Policy Group (RSPG) published its draft “Opinion on Licensed Shared Access” in June 2013. In all, 21 responses were received to the draft Opinion. A list of respondents is in the Appendix to this summary.

Respondents’ views were mainly focused on the definitions of LSA and incumbent, the regulatory framework and LSA scope, and the legal, regulatory and licensing aspects.

In order to manage the contributions received, respondents have been classified as follows:

- Public Mobile Operators and Trade Associations
- Industry
- Broadcasting and Entertainment
- Railway Infrastructure
- Internet related Trade Associations
- Satellite Operators Trade Association

The following sections summarise the responses received by the RSPG with regard to the LSA draft Opinion.

1. Public Mobile Operators, Trade Associations and Industry:

Deutsche Telekom, Digital Europe, ETNO, Globul, GSMA, NSN, Qualcomm, SSN, TAG, Telecom Italia, Telefónica, Wind Telecomunicazioni.

Comments from MNOs and Industry respondents were in the same line. They argued that exclusive access should continue to be the primary means to access mobile spectrum. They also noted that LSA should be regarded as a complementary instrument to improve the efficiency of underutilized spectrum currently assigned to non-commercial services like public administrations, civil aviation and defence, but not as a definitive solution for mobile spectrum scarcity.

They pointed out that the mobile industry and the wireless broadband service penetration may be severely affected in the near future if excessive expectations were set on the potentiality of the shared spectrum access, limiting the effort of investigating on new bands to be allocated on an exclusive right of use basis. In this regard they noted that sharing technologies remain largely unproven in full scale deployments with no proven business case that could achieve economies of scale to develop an ecosystem.

They suggested some modifications to the text of the Draft Opinion, mainly related to the definitions of LSA and incumbent. They also made some proposals regarding LSA framework and licensing aspects.

a) Definition of LSA

Respondents in this group made the following considerations regarding the definition of LSA:

- LSA should be applied in underutilised frequency bands (or parts of spectrum) assigned to incumbent users with non-commercial purposes.
- LSA should be focused on facilitating the introduction of Mobile Broadband Services.
- LSA targets should be limited to bands identified for IMT systems.
- The individual authorisation should provide exclusivity among LSA licensees for a specific frequency resource.
- LSA should be based on spectrum sharing under commercial terms and provide a light sharing regulatory framework.
- The additional new usage derived from LSA implementation should be identified in the National Table of Frequency Allocation.

b) Incumbent user

Almost all respondents suggested that LSA should be applied to spectrum resources that are currently assigned to non-commercial users. They also remarked that LSA should never be applied to bands where public operators have already acquired exclusive spectrum usage rights granted through an award procedure for commercial use.

c) Regulatory Framework and LSA Scope

Regarding LSA bands, some respondents in this group commented that LSA should be deployed in bands allocated to the mobile service and/or identified for IMT, which are currently used by an incumbent that does not fully exploit these spectrum resources. One respondent suggested that the definition of services that LSA additional users could provide, should be limited to mobile services. In addition, they claimed that the LSA concept should not be applicable to bands where MNOs have acquired exclusive spectrum usage rights.

With regard to a voluntary or mandatory LSA approach, most respondents pointed out that LSA should be implemented on a voluntary basis. One respondent suggested excluding the possibility for LSA to be mandatory. On the other hand, another

respondent considered the possibility of a mandatory agreement in cases where it is clearly demonstrable that spectrum is not used efficiently, and a third one suggested that commercial users should be made legally obliged to consider sharing offers.

In addition, some respondents indicated that the services provided by the incumbent and the LSA licensees should be different and that LSA should address sharing between incumbents and LSA licensees but not among LSA licensees. Furthermore, one respondent commented that the incumbent would not be entitled to offer any public Mobile Broadband Services as an automatic consequence of the band being made available for commercial Mobile Broadband under an LSA scheme.

d) Legal, regulatory and licensing aspects

Regarding sharing rules agreed between the incumbent and the LSA licensees, the following was mentioned by some respondents:

- LSA concept should be implemented for a particular range of spectrum resources by means of spectrum *sharing contracts* in a legally-binding agreement, negotiated between the incumbent and additional spectrum users and ratified by the relevant authority.
- The incumbent could allow non-interfering use of part of its assigned spectrum by a mobile operator, pursuant to a *commercial agreement* and subject to the terms defined by the relevant government authority, which should not impose additional constraints over those agreed in international and/or regional harmonization studies.

Concerning licensing, it was commented that the individual licence should provide exclusivity for a specific frequency resource allowing licensees to provide a certain quality of service. It was also mentioned that any sharing arrangement should be included in the authorisations granted by the NRA. Most respondents of this group noted that the LSA concept would be compatible with the current EU Regulatory Framework, and additionally that the LSA policy would not require a primary legislative change in national laws in order to be implemented.

Another point raised out by some respondents was that a market driven approach to spectrum sharing would work better than a regulatory driven approach. In this regard, it was also suggested that a market driven approach to spectrum sharing, accompanied by a light regulatory regime, would be the best solution to give confidence to the parties involved and to avoid negative impacts on investment by the new additional users.

With regard to the role of the NRA some respondents offered the following comments:

- NRAs should study the possibilities for LSA, conduct public discussions on the matter and define the technical and operational conditions related to the LSA in order to guarantee an efficient use of spectrum.
- NRAs should make sure that there are no unfair conditions or competition impacts and that sharing opportunities are developed based on commercial agreements between parties rather than on regulatory interventions.
- Authorisation to access additional spectrum using the LSA concept should be given by NRAs after public consultation and agreement between incumbents and MNOs. Before the implementation of the LSA concept, analysis would be required for more detailed consideration of: the number of LSA users with a similar QoS requirement that could successfully utilise the band, how competition rules would apply, or how the introduction of LSA might impact the future use of spectrum.

2. Broadcasting and Entertainment: *APWPT, BEIRG, EBU*

Respondents in this group expressed concern about the interference from LSA on PMSE. It was pointed out that in those countries where PMSE is license-exempt, LSA could drive a further loss of spectrum available for PMSE, and that it could further seriously compromise the ability of broadcasters and related industries to provide coverage of important cultural and social events.

They also remarked that PMSE has been, for a long time, a very efficient user of spectrum, and that PMSE industry is already threatened by the proposed introduction of unlicensed White Space Devices (WSDs) into spectrum already used by PMSE. Under their point of view, LSA should be applicable to ensure that there will be sufficient spectrum availability to enable long-term and peak-demand PMSE use.

It was also stated that there would be little scope for the use of LSA in the UHF broadcasting band beyond its possible application for PMSE.

3. Railway Infrastructure: *EIM, InfraBel, ProRail*

Railway Infrastructure respondents showed concern about the introduction of LSA in GSM-R bands, given that introducing LSA might encompass certain risks of non-compliance or reduction of service. In this regard one respondent, asked to state more clearly in the Opinion, the mitigation measures to be taken in order to neutralize their negative effects, and to describe the availability and capacity.

However, another respondent pointed out that for areas distant from railway infrastructure, the LSA concept could be used on the GSM-R spectrum and that the E-

GSM-R (873,0-876,0 MHz y 918,0-921,0 MHz) band is likely to be a good candidate for LSA as in some countries it is in use by the military.

4. Internet related Trade Associations: *DSA, VON*

Although respondents in this group commented that LSA could lead to more efficient and effective use of spectrum resources, they recommended license-exempt collective use to be fully employed as a means of sharing spectrum in Europe in addition to LSA. They pointed out that license-exempt collective use can provide a similar quality of service experience as LSA when being in a controlled environment.

One respondent was concerned about the level of quality of service for both, the primary and secondary users, that could be obtained through the use of LSA in comparison with license-exempt collective use. Also on the kind of input that primary licensees should have in deciding the economic and technical conditions under which secondary LSA access is permitted.

Both respondents pointed out that the LSA concept should be applied to both commercial and governmental incumbents to be successful. In addition, they remarked that it was critical that any harmonised regulatory framework be technology-neutral.

The comments of these respondents contained references to a study¹¹ from a former Ofcom staff member who also responded in a private capacity to the public consultation.

5. Satellite Operators Trade Associations: *ESOA*

The only respondent in this group expressed concern about the possible deterioration of the incumbent's QoS. It was pointed out that if a deterioration of the incumbent's QoS happened, European regulators should put in place adequate regulatory mechanisms to ensure financial compensation.

It was also claimed that licence exemption should remain the preferred method of authorisation for many satellite applications, and that licence-exempt services should continue to enjoy protection from interference through careful spectrum management decisions.

Another comment of the respondent was that too specific technical conditions agreed as a result of LSA negotiations might lead to a fragmented situation, with particular sharing conditions developing in the different countries, thus making unclear how the declared goal of promoting a harmonised approach would be satisfied.

¹¹ R.Thanki "Making the case for permissive dynamic access to the radio spectrum", August 2013

Appendix

List of respondents

Organisation	Group	Country	Date received
APWPT (Association of Professional Wireless Production Technologies)	Broadcasting and Entertainment	Germany	22/08/2013
BEIRG (British Entertainment Industry Radio Group)	Broadcasting and Entertainment	UK	23/08/2013
Deutsche Telekom	Public Mobile Operators and Associations	Germany	23/08/2013
Digital Europe	Industry	Belgium	09/08/2013
DSA (Dynamic Spectrum Alliance)	Internet related trade associations	Europe	02/09/2013
EBU (European Broadcasting Union)	Broadcasting and Entertainment	Europe	31/07/2013
EIM (European Rail Infrastructure Managers)	Railway Infrastructure	Europe (Belgium)	28/08/2013
ESOA (European Satellite Operators)	Satellite operators trade association	Europe	26/08/2013
ETNO (European Telecommunication Network Operators' Association)	Public Mobile Operators and Associations	Belgium	21/08/2013
Globul (Cosmo Bulgaria Mobile)	Public Mobile Operators and Associations	Bulgaria	23/08/2013
GSMA (GSM Association)	Public Mobile Operators and Associations	Belgium	27/08/2013
InfraBel	Railway Infrastructure	Belgium	23/08/2013
NSN (Nokia Solutions and Networks)	Industry	Finland	23/08/2013
ProRail	Railway Infrastructure	Netherlands	22/08/2013
Qualcomm	Industry	France	25/08/2013
SSN (Silver Spring Networks)	Industry	UK	02/09/2013
TAG (Telekom Austria Group)	Public Mobile Operators and Associations	Austria	23/08/2013
Telecom Italia	Public Mobile Operators and Associations	Italy	21/08/2013
Telefónica	Public Mobile Operators and Associations	Spain	22/08/2013
VON (Voice on the Net)	Internet related trade associations	Europe (Belgium)	23/08/2013
Wind Telecomunicazioni	Public Mobile Operators and Associations	Italy	23/08/2013