

ETNO Expert Contribution in response to the “Study on collective use of spectrum” performed by a consortium of behalf of the European Commission

Executive Summary:

As public network operators, among ETNO members' main business is the offering of radio services with Quality of Service (QoS) obligations/expectations for which licensed spectrum with low risk of harmful interference is a prerequisite. In addition to that, ETNO members offer a variety of supplementary services and applications according to customer demand, in particular WLAN access points in high density areas, and other applications based on SRD, e.g. traffic monitoring with RFID.

ETNO thinks a “collective use” of spectrum should be limited to some bands and technologies to remain manageable with regard to QoS and interference and the effective use of spectrum.

Introduction

ETNO is pleased to provide comments in reply to the “Interview guide for spectrum users”. ETNO represents the voice of 41 of Europe's largest, well established telecommunications operators in 34 countries.

As public network operators, ETNO members' main interest is related to licensed spectrum to offer QoS radio applications and services to a wide range of users without the risk of harmful interference. Thus, the offering of licence-exempt radio applications plays a secondary role.

General Comments

For the time being, collective use of spectrum (e.g. unlicensed) is restricted to particular devices, systems and applications such as:

- Short range devices which are consistent with short range of interference and high level of spectrum reuse.
- Communication systems, equipped with capabilities for self-management (DFS, listen before talk ...) enabling these systems to handle overcrowded use.
- Asynchronous communications based on packet data transfer which makes decrease of QoS less sensitive to the user.

In the foreseeable future, significant departure from this kind of use for unlicensed spectrum is not expected. While technological progress could allow the development of auto-adaptable equipment easing spectrum use, the control of QoS which is possible only by exclusive or shared use of frequency bands on a licensed basis remains the condition for the deployment of extended communication networks.

An increasing part of the new services developed by electronic communications operators include the utilisation of short range devices or more generally unlicensed equipment as continuation or terminations of telecommunication networks. Home or machine to machine communication services are good examples.

Progress in the development and implementation of the ECC REC 70-03 should then be supported as this Recommendation provides a clear framework for a harmonised growth of SRD equipment utilisation by the designation of dedicated frequency bands and relevant technical conditions of use.

Furthermore, the regulation for Ultra Wide Band devices should be carefully established in order to ensure their deployment while ensuring the protection of conventional equipment.

Hereafter some ETNO views are given on specific chapters (references in brackets) of the Commissions' information document "Summary of context and objectives" related to the "Study on legal, economic and technical aspects of "collective use" of spectrum in the European Community".

Context (1.)

When trying to “*optimise the distribution of spectrum*” the fundamental requirement of avoiding harmful interference between users and between different radio systems should be kept in mind, especially concerning public wireless services, where the network operators have obligations e.g. concerning QoS to be offered set by regulators and expected by the market (paying customers).

The argument that “... *with technological progress, the need for granting exclusive rights to use spectrum diminishes, enabling more efficient use of spectrum.*” should be duly justified. Efficient use of the spectrum is considered to be measured by how many users there are in the band, which in turn is determined by how much interference the users are able to accept. But tolerating interference has an impact on QoS. Hence there is a trade off between number of users and QoS, which is called "efficiency".

In many cases the spectrum efficiency (simultaneous users/area, users/band, Erl/MHz) is in reality higher in public mobile networks (2G, 3G) than in unlicensed networks (e.g. WLANs).

Review of technological bases for the “collective use” of spectrum (3.1)

Before outlining the most common interference models and their main characteristics, the different options and variants should be more precisely defined, e.g. the terms “*underlay*” and “*overlay*” use of spectrum.

As “collective use” of spectrum is critical as a general method, it should be limited to some bands only and should have limitations in order to manage QoS and avoidance of harmful interference.

Once the concept of “collective use of spectrum” is introduced, it will be very difficult or nearly impossible for regulators to change again the usage conditions. Thus, it will be hardly possible to reform the frequency band in question to a more spectrum efficient use - typically for licensed use - in the case that the “collective use of spectrum” turns out to be less efficient than expected.

Experience, State of Play and future prospects (3.2)

When making an inventory of unlicensed spectrum available and in use today, the outcome should be compared with the licensed spectrum available today, including the respective numbers of users in order to get an overall picture on spectrum efficiency. This should also be kept in mind when thinking about a possible recommendation covering requirements to increase the amount of spectrum to be made available on the basis of the “collective use” approach.

When making a comparison with other regions of the world it is evident that different approaches to spectrum management are taken. It would be useful to study and consider them, recognising that they may not necessarily suit the European environment. Therefore, the advantages and disadvantages for each method should be identified, and how they would relate to Europe.

Identifying the “right mix of approaches” (3.3)

It is acknowledged that some more flexibility is needed in the distribution of spectrum to allow spectrum access for innovative technologies or service convergence. But the “collective use” of spectrum should not lead to too much “flexibility” in interferences.

To enable an adequate role for “collective use” of spectrum, the approach must be limited to some bands and technologies only. In general regulators must be there and have their active role in the distribution of spectrum to manage the interference issue and the effective use of spectrum.

Economic aspects must fully be taken into account in the evaluation and cost/benefit analysis, e.g. this approach must not put at risk investments already made for licensed operations, nor discourage investments for future evolutions nor put continuity at risk of service offerings to an existing large customer base.

Innovation aspects (3.4)

The concept of “experimental commons”, when extended further by providing “open spectrum” with limited regulation, will tend to further the explosion of technologies and applications which bears the risk of harmful interferences or dropping the QoS level of neighbouring systems, which may cause market disturbance. Regulators must manage the potential interference risk situations and take their responsibility.

The concept of “experimental commons” together with EU-wide experimental frequencies should not be used for the full roll-out phase of new technologies.

Community dimension (3.5)

Measures like the creation of a general framework or model on “collective use” of spectrum applicable to the whole range of radio spectrum are unrealistic. A “collective use” of spectrum should be limited to some bands and technologies to remain manageable with regard to QoS and interference and the effective use of spectrum.

Concerning assessment whether general competition law remedies are sufficient, ETNO takes the view that fair access to spectrum should be market driven and thus there is no need for additional new regulation.

ETNO's comments on the specific questions from the Interview guide for Spectrum Users

Current Usage

Please identify your current use(s) of licence-exempt spectrum (e.g. PMR applications, Radio LANs, Home automation, SRD devices, telemetry)

As public network operators, our main business is the offering of radio services with QoS (Quality of Service) obligations/expectations for which licensed spectrum with low risk of harmful interference is a prerequisite. In addition to that, we also offer a variety of supplementary services and applications according to our customers' demand. In particular we operate WLAN access points in high density areas to offer fast internet access to our customers, but we offer also other applications based on SRD, e.g. road traffic monitoring with RFID.

Please specify the associated frequency bands and equipment used.

We use all bands available for licence-exempt operations according to the specific customer demand. Equipment used might comprise all devices available ranging from RLAN via DECT to SRD.

What (if anything) would be your alternative(s) to licence-exempt spectrum if it were not available, or if the quality / capacity failed to meet your requirements?

Depending on the degree of QoS required, licensed spectrum would be an alternative. However, spectrum costs and revenues need to be in balance.

What additional costs would such alternative(s) entail?

Additional cost will depend on the awarding process (auction, beauty contest, light-licensing ...).

Future needs

Do you have other needs for wireless communication that you feel could be met by new types of licence exempt product / application that is not currently available?

Yes, for instance for telecommand and telemetry with better protection from harmful interferences.

What is your view of the future needs in terms of spectrum availability for "collective use" applications?

- For your current application(s)?

- For other applications?

- In which frequency bands?

Do you have a view on the future demand for collective use of spectrum?

The future demand for collective use of spectrum will depend on the developments in radio technologies such as cognitive/adaptive radio or underlay/overlay systems.

For commercial radio applications, interference-free operation will continue to be a main requirement; the possibilities to operate the related radio networks/systems in a “collective” environment will have to be proven.

Do you think there should be various categories of spectrum for collective use, geared towards various levels of spectrum quality (some less crowded, some more monitored, etc) and if so would you be willing to pay for the right to access higher quality spectrum (e.g. where the number of users that can access the spectrum was limited)

Yes. As mentioned before, interference-free spectrum use to offer QoS is the main requirement for commercial radio network operators. However, spectrum costs and revenues gained from supplementary services need to be in equilibrium.

How feasible do you think it is to “refarm” spectrum that is used collectively –e.g. if spectrum is made available in a new frequency band how long should the current band be retained and how difficult is to change the frequency band that used for a particular “collective use” application.

Experience showed already that it is very difficult to refarm spectrum that is used for non-licensed applications (e.g. cordless telephones). Refarming will become nearly impossible if the spectrum is used additionally by a variety of different radio devices.

How do you think the technology deployed in collective bands will evolve over the coming years?

Yes, we expect improvements due to technological evolutions (mitigation techniques, adaptive/software defined radio, etc.).

Do you have a view on the potential benefits and/or likely future demand for UWB applications?

As public network operators, our main interest is to get sufficient protection from harmful interference caused by UWB devices into our current and future radio networks and systems (Fixed Wireless Access systems, IMT-Advanced services, RLAN, etc.) within the frequency band 3.1- 10.6 GHz.

The potential market for UWB communication devices is in our view the wireless connection between communication terminals and ancillary equipment, (e.g. PC – printer, mobile phone – PC, etc.). Wireless access to public networks will be done via WLAN/BWA technologies, e.g. IEEE 802.XX.

Would any of your current wireless applications or products be suitable for underlay or overlay operation?

No.

Monitoring of the frequency bands for "collective use"

Do you have a view on the potential capacity and quality of service that can be achieved in specific collective spectrum allocations (e.g. in terms of amount of data traffic or number of users/devices in a given area)?

No.

Are you aware of any monitoring or enforcement activities relating to your use of licence-exempt spectrum, and if so how effective do you think this is?

No.

Have you experienced any problems such as interference or congestion when using licence-exempt spectrum?

Yes. For instance within the 2.4 GHz band interferences and congestion in same usage area lead to lower QoS and lower data rates than expected for WLAN.

Are you aware of any other instances of such problems?

Yes. Problems with WLAN are the same around the world, especially in urban areas and for indoor usage.

Impact of Regulation on "collective use"

How familiar are you with national and international regulations concerning use of licence-exempt spectrum.

We know the specific regulation in CEPT and European countries.

Do you have any views on how these regulations might be improved in order to provide greater benefit from the use of licence-exempt spectrum?

How satisfied are you with your national regulator's current approach to managing collective use of spectrum and do you have any suggestions for improvement?

Do you think there is a need for more or less international harmonisation of frequency bands identified for collective use?

Harmonisation of frequency bands is generally considered as beneficial for radio equipment as it facilitates economies-of-scale, wide usability of terminals, easier handling of co-existence and avoidance of harmful interference, etc. This is valid for all kinds of spectrum usage: exclusive, shared or collective.

What are your views concerning the regulatory conditions associated with the frequency bands allocated to collective use (e.g. do you think there should be more or fewer constraints on use of specific bands)?

This question cannot be generally answered as the regulatory conditions are related to the QoS and protection requirements for particular radio applications.

Are current provisions to protect collective users of spectrum from interference adequate and if not what further measures do you think should be taken?

Generally yes.

Do you have a view on which types of licence-exempt systems can co-exist within a given spectrum allocation (e.g. 2.4 GHz, 5.8 GHz...)?

The mentioned ISM bands are only suitable for services/systems without QoS and reliability requirements.

Do you think collective use should be one of the options considered when spectrum is being re-farmed from one type of use to another?

Spectrum re-farming – which often requires compensation for the current user - usually takes place when the new use is expected to result in higher efficiency and economies of scale. Thus, spectrum being re-farmed might be more likely subject to auctioning or spectrum trading.

Do you think it is reasonable that licensed use of spectrum should attract a fee whilst licence-exempt use does not?

Yes, it is appropriate that radio authorities impose fees for protecting radio operations from harmful interference.

Collective use of spectrum outside Europe

How do you compare collective use of radio spectrum between your country and countries outside Europe (Japan, South Korea, USA, Canada...)?

In other regions of the world different approaches to spectrum management are used which not necessarily suit the European environment. Therefore, the advantages and disadvantages for each method should be identified, and how they would relate to Europe.

Licence-exempt radio application working without a network (e.g. Short Range Devices) bear the risk to cause harmful interference when the frequency bands are not harmonised and the equipment is taken and used around the world.