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Response to the Radio Spectrum Policy Group's "Consultation in the context of the development of an RSPG Opinion on priorities and objectives for the Community in the World Radiocommunication Conference 2007"

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Open Spectrum International (OSInt) welcomes this opportunity to participate in RSPG's public consultation on priorities and objectives for WRC-2007. OSInt is a global policy advocacy project launched last summer by Czech civic association "Mista v Srdce." Our goal is to increase licence-exempt access to the radio spectrum without harmful interference to licenced users. Our purpose is to facilitate technological innovation, promote more efficient use of public resources, enhance freedom of expression and accelerate economic development. Official documents at the Community level also recognise and endorse these general aims in the context of spectrum policy.¹ We particularly support universal adoption of the Community's policy of allowing "the least onerous authorisation system" to be used whenever possible, so as to encourage the rapid development of electronic communications networks and services.²

We do not represent any commercial firm or political faction. We are motivated by solely by the policy principles just mentioned. As the draft WRC-2007 agenda reflects these values only indirectly, our response to this Consultation focuses on **agenda item 4**, which is an opening for discussion of additional topics at the Conference, and **agenda item 6**, which is an opening for proposals made at the Conference for "urgent action by the Radiocommunication Study Groups in preparation for the next world radiocommunication conference..." Finally, we suggest possible changes in the draft agenda for WRC-2010 which partly depend on the results of our proposals for WRC-2007 agenda item 6.

¹ See, for example, Decision No 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 (Radio Spectrum Decision) *Official Journal* L108, 24 April 2002, pages 1-6; Green Paper on radio spectrum in the context of European Community policies such as telecommunications, broadcasting, transport, and R&D, COM(1998) 596, 9 December 1998; and Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions of 10 November 1999 on the next steps in radio spectrum policy - results of the public consultation on the Green Paper [COM(1999) 538 final].

² Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services, *Official Journal* L108, 24 April 2002, page 21.

We recognise the importance of the items already on the agenda referring to specific bands and licenced services, and we do not want to prevent their full consideration at the Conference. We further understand that the general scope of the agenda was meant to be established 4-6 years before WRC-2007. However, we ask the Community to reflect on the significant changes which have occurred in spectrum utilisation, national regulatory agendas and the aims of policy since 2001 – as well as the market disruption and opportunity costs that may result from postponing consideration of the issues outlined below. We believe that WRC-2007 should not ignore the challenges to long established spectrum management policies arising from recent technical innovations in radio system design and changing patterns of spectrum utilisation.

Thus, we encourage the Community to work with its major trading partners and exercise leadership at WRC-2007 by focussing attention on issues that are more fundamental than those now filling the draft agenda, and by presenting basic questions for study by ITU-R between WRC-2007 and WRC-2010. To the extent that the Community can contribute talent and resources to the study groups' work, it may trust the results to be compatible with the Community's aims and policies – elevated into global policies.

In terms of the questions posed in the Community's consultation paper, our comments relate mainly to numbers 2, 5 and 8:

2) Which are the broad objectives which Europe could set itself for these agenda items, bearing in mind that many technical constraints are not yet clarified, and the fact that non-European interests might not support such objectives during the negotiations?

We strongly support the following statements in the "First Annual Report on Radio Spectrum Policy in the European Union" and urge the Community to keep them in mind as broad objectives for WRC-2007. Some of these themes are explored in more depth below as our proposals translate these general observations into specific actions:

"In view of spectrum reforms in other countries, it is important that Europe is not left behind. Besides specific issues, the RSPG will continue assessing the possible benefits and difficulties associated to different spectrum management models, namely traditional centralised administrative decisions, market-oriented solutions and free or 'unlicensed' use of spectrum. Each one of such approaches may be most appropriate for specific instances...

"While no common understanding of the term 'efficient' exists, spectrum should be made available in the most flexible way possible so that spectrum scarcity is not created by regulation, without overlooking the future spectrum needs of services of public interest. Spectrum users must be encouraged to be more efficient, by moving from obsolete to more modern and 'intelligent' technologies...

"A reflection on how to encourage innovation in the Community via more flexible regulation on experimental rights to use the radio spectrum is needed. Large-scale real-life testing of new technologies enables their rapid introduction in the market-place, with provisions to protect existing spectrum users from unforeseen harmful effects. Without an appropriate framework for Community-wide experimental rights, new wireless technologies are increasingly being tested and introduced outside Europe first.

“Furthermore, the coexistence in the radio spectrum of very different technologies leads to difficulties in the development of regulation exclusively on the basis of theoretical interference models. Therefore, practical measurement campaigns ought to be used to validate such models...”³

5) How to ensure that generic regulatory principles enshrined in Community legislation for various spectrum-using sectors are supported in the WRC-07 process, and notably the principles of technology neutrality, fair competition, regulatory transparency, non-discrimination and proportionality, as well as the optimisation of spectrum use?

Our focus in these comments is the optimisation of spectrum use, which we understand to mean generating the maximum benefit to society – rather than, say, generating maximum benefit to existing licenceholders or maximum revenues from frequency auctions and licence fees. It is unfortunately easy to reduce the first while embracing the latter, since many social benefits cannot easily be measured or priced.

Unlicensed users of the radio frequency spectrum have no right to protection against interference and must not interfere with licensed users. Two practical (yet somewhat paradoxical) consequences are that many more unlicensed users can utilise a band simultaneously than can licencees authorised for more powerful emissions and endowed with enforceable rights of non-interference; and second, regulatory authorities normally ignore the interests of unlicensed users in favor of the interests of licenceholders.

Fortunately, some newer types of modulation which are available for unlicensed use provide adequate quality of service – and very significant use-value to society – under conditions hostile to older modes. Indeed the way spectrum is used by most short-range devices (SRDs) is different from the requirements of longer-range services like broadcasting or maritime mobile communications. Economic theory suggests that unlicensed activities which do not harm licencees should be permitted in any and all frequency bands so long as they produce social benefits.⁴ However, we are not such absolutists. We recognize the risks of allowing SRDs to operate in bands reserved for even weaker signals (e.g. satellite downlinks, radio astronomy observations, space research, etc.) as well as the costs that might be associated with “hardening” some existing licensed systems if unlicensed SRDs are allowed to operate in their band. Further studies are needed to improve receiving systems’ resistance to interference without greatly increasing manufacturing costs or forcing operators to master complicated manual procedures. We also need a deeper understanding of new problems arising from band sharing between licensed and unlicensed devices, including incompatibilities among dissimilar waveforms and among services with

³ Communication from the Commission to the European Parliament and the Council: First Annual Report on Radio Spectrum Policy in the European Union; State Of Implementation and Outlook, COM(2004) 507.

⁴ The Unlicensed Devices and Experimental Licensing Working Group of the US Federal Communications Commission’s Spectrum Policy Task Force said in its final report (November 2002, page 11) that although more spectrum is clearly needed for unlicensed SRDs, it is not now practical to estimate the optimal amount of spectrum that should be made available, nor is there a clear consensus on which bands should be open or closed to them.

different deployment geometries. Only then can we make consistent, technically justified decisions about what bands may be shared by these two complementary types of equipment and under what conditions.

8) If applicable, please indicate your early views on issues Europe could propose to be included in the agenda for the next conference after WRC-07 (see the preliminary agenda proposed by WRC-03 in annex 3).

The agenda for WRC-2007, in its current draft form, does not meet the needs of important pan-European industrial sectors, nor does it address challenges to traditional approaches to spectrum management arising from recent technical innovations and changing patterns of radio use. These needs and challenges exist now – 2007 is hardly too early to begin responding to them.

We believe that WRC-2007 is a suitable venue for reaching agreement on a forward-looking programme of research on technical issues raised by the burgeoning use of unlicensed SRDs, recognizing their social utility and aiming to maximize their benefits while minimizing harm to licenced services.

Unlicensed SRDs are now the most rapidly growing segment of the consumer electronics industry in most parts of the world.⁵ From cordless phones and GSM handsets to wireless ethernet links, to microwave ovens, to field-disturbance sensors, RFID tags and remotely-controlled toys, the global market for equipment in this increasingly diverse category is on the order of 10 billion euros annually – not including earnings from the communication network services which they facilitate. Moreover, the contribution of unlicensed SRDs to the quality of life for ordinary people, through increased productivity, more widespread, easier and more affordable access to information, greater convenience, flexibility, safety and freedom of movement, is incalculable. Perhaps most importantly (as mentioned in the “First Annual Report on Radio Spectrum Policy in the European Union”) the availability of unlicensed bands has freed entrepreneurs and product developers from the costly, risky and time-consuming process of seeking new spectrum allocations or frequency licences for innovative devices and services. “Next to slow developments being made in the licensed bands, formidable progress is made in the unlicensed band(s)”, note the authors of *Rethinking the European ICT Agenda*.⁶

Many unlicensed SRDs operate in the Industrial, Scientific and Medical (ISM) bands. This is because 19 years ago (when spread spectrum modulation was first authorised by the US Federal Communications Commission), there was hardly any risk of this novel waveform interfering with the established users of these bands. But the ISM bands today are far from ideal for routine communication by large numbers of people.

⁵ “Gartner Research predicts that by 2006 approximately \$5.6 billion per year will be spent on Bluetooth technology and more than 560 million Bluetooth-enabled devices will be purchased by businesses and consumers.” Report of the Unlicensed Devices and Experimental Licenses Working Group, US Federal Communications Commission, 15 November 2002. Bluetooth was developed by the Swedish firm Ericsson in 1994.

⁶ *Rethinking the European ICT Agenda: Ten ICT-breakthroughs for reaching Lisbon goals*, PricewaterhouseCoopers, published by the Dutch Ministry of Economic Affairs, Directorate-General Telecommunications and Post, August 2004, page 56.

The worldwide allocation for R-LANs in the 5 GHz band approved by WRC-2003 is a welcome recognition of the tremendous popularity – and social benefits – of wireless network access services, and it may alleviate some congestion in the 2.4 GHz ISM band. But we believe that a general set of guidelines from the ITU would help all administrations develop consistent technical rules enabling unlicensed SRDs to operate outside the ISM bands while minimizing the risk of adversely affecting the quality of licenced services. The most important feature of the guidelines we are suggesting here would be to identify bands where such sharing would be the least problematic and the most socioeconomically productive. If they would be willing to suggest bands that might be cleared of existing licenced users, that would be even better. Finally, it would be useful to have globally consistent standards for the maximum field strength of unlicensed emissions in various bands.

Drafting these recommendations will of course not be easy. But it is precisely because of the difficulties, the uncertainties and the very large number of interests which may be affected that a global approach is justified. Even though the range of SRDs is by definition limited, so that they clearly fall within the jurisdiction of national administrations, the advantage of having an international body provide uniform guidelines would be expressed in economies of scale in manufacturing, and the avoidance of problems arising from the unauthorized transport of SRDs into countries where the devices do not conform to local rules. In addition, administrations are more likely to take guidance about unlicensed devices from the top institution for spectrum management policy than, for example, from another administration halfway around the world – especially if ITU-R coordinates the research underlying the recommendations in visible partnership with technical experts from the private sector, professional electrotechnical bodies, regional institutions involved in telecommunications policy and interested national administrations.

There is a risk that ITU involvement might prove to be overly protective of licenced services, too heavy-handed, or that it may create new obstacles to the development of unlicensed devices. For that reason we urge the Community to insist that the private sector and other international technical bodies like CISPR⁷ have prominent roles in the proposed research programme and even in the drafting of standards for band sharing between licenced and unlicensed equipment. Given the ITU's budget constraints – and the controversies which may follow the release of these guidelines – the ITU might well appreciate the chance to share this burden.

Essential parts of this research are underway already, and by 2007 more will have been learned. Therefore, ITU-R's contribution might be oriented toward reviewing and integrating research conducted by partner institutions, and in identifying research gaps which still need to be filled. For these reasons, we do not want to be too specific about the research agenda that will seem most appropriate 3 years hence. Our general concern is that ITU-R should begin dealing constructively with issues related to the rapid proliferation of unlicensed SRDs, and particularly issues related to band sharing between unlicensed and licenced services.

⁷ In light of the important work on these subjects already performed by le Comité International Spécial des Perturbations Radioélectriques (CISPR), we would want to see them prominently featured in this cross-disciplinary effort.

We cannot help but note that the status of unlicensed SRDs in the international radio regulations contrasts sharply with their current socioeconomic significance. For example, RR2020 still says (in Article 24):

“No transmitting station may be established or operated by a private person or by any enterprise without a license...”

However, an important exception is provided by RR342 (in Article 6):

“Administrations of the Members shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations given in this Chapter or the other provisions of these Regulations, except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations.”

Most countries interpret these two recommendations as jointly indicating that unlicensed “transmitting stations” are permitted to operate so long as they do not cause harmful interference to any properly operating licensed station. But that has not led to regulators’ acceptance of unlicensed broadcasting, or many other forms of “outlaw” communication. Given that unlicensed SRDs have become a multi-billion-euro global industry, a beacon of useful innovation and an essential part of the lives of tens of millions of people, would it not be appropriate to give them a less flimsy foundation in the edifice of radio regulation, explicitly recognising – and defining – their right to use the spectrum (without causing harmful interference to licensed services, of course)?⁸ This might be an appropriate topic for WRC-2010, if not for WRC-2007.

There are other ways that modern technology offers new challenges – and new alternatives – to the traditional principles of radio frequency management which have existed since the days of the International Radiotelegraphic Union. Ultra-wideband (UWB) signals are characterised by very brief pulses spread over extremely wide spans of spectrum, often as much as several gigahertz.⁹ Over short distances, UWB systems can operate effectively at or below the noise floor, making it virtually certain that they can coexist with licensed stations using older modulations without causing harmful interference.¹⁰ UWB directly challenges the structure of band allocations which developed after spark-gap transmitters proved problematic.

The development of software defined radio (SDR) also challenges the assumptions on which channel assignments have been made for decades. Changing a waveform or an operating frequency may be as easy as changing a few symbols in an algorithm.

⁸ The ITU has already signalled its readiness to re-examine the role of licensing: the theme of this year’s Global Symposium for Regulators in Geneva (8-10 December 2004) is “Licensing in the Era of Convergence.” Subjects to be discussed during the first day include “Why License?”, “Is it Always Necessary to License?” and “Does the Traditional Licensing Approach Work in an Era of Convergence?” See http://www.itu.int/ITU-D/treg/Events/Seminars/2004/GSR04/pdf/Annex1_draftprogramme.pdf.

⁹ UWB devices were first authorized for civilian use in February 2002 in the United States. Instat-MDR recently predicted that products using this technology will become available in 2005 and will attain a “compound annual growth rate of over 400% from 2005 to 2008.” See *Ultra-Wideband: Coming With or Without a Standard*, Instat-MDR (Reed Elsevier), September 2004.

¹⁰ However, there is a risk that multiple UWB systems operating in the same space may collectively raise the noise floor and thus affect conventional systems.

Which underscores the practicality of dynamic frequency selection. The ITU's allocations of bands to services are static, and frequency licences typically provide for full-time access. The possibility of opportunistic, adaptive frequency use was not seriously considered when the norms of international regulation were set, although most technicians now recognise that opportunistic frequency use dramatically increases the efficiency of bandwidth exploitation – even to the extent that we might stop discussing the “scarcity” of spectrum. That may prove to be a utopian fantasy (some argue that there is no such thing as “enough” bandwidth), but the conventional system of spectrum management still seems like granting cars fixed individual lanes on a roadway.

Another issue worth mentioning is the rapid upward migration of the frequency limit on commercially exploitable spectrum. As the FCC's Unlicensed Devices and Experimental Licenses Working Group noted in their final report,

“While it is difficult to say what regulatory approach should be used for millimeter wave spectrum [above 30 GHz], the physics of this band are so different than lower bands as to bring into question most of the fundamental precepts of radio regulation. This results both from the high propagation losses due to gas absorption of radio signals and the ease of building antennas with very narrow beams. While licensing is the general presumption at lower frequencies, the physics of these frequencies appear to justify a *de novo* approach to considering regulatory schemes on a case-by-case basis. It may well be reasonable to question whether unlicensed use should be a major type of use in these higher bands, rather than one restricted to a small set of bands...

“As we move into the upper frontier of radio spectrum we should look back and review what aspects of legacy regulation are related to the propagation characteristics that existed for bands in use when the framework was developed. To the degree that new bands have very different propagation issues, we should consider all possible approaches to regulation in selecting the approach to use in a particular context and not be limited by legacy concepts.”¹¹

Ultra-wideband signals, software defined radios, adaptive/opportunistic frequency use and millimeter-wave devices all challenge traditional spectrum management policies in different ways. But they are also exciting developments which may lead to applications quite different from broadcasting, telephony, etc. Collectively they more than justify a critical re-examination of the assumptions on which the international radio regulations have been built, and WRC-2010 would seem to be an excellent venue for that re-examination. WRCs – and before them, WARC – often spent weeks mired in large numbers of specialised questions. We think the time is coming to pull back from a preoccupation with single trees and think about the future of the forest.

¹¹ Report of the Unlicensed Devices and Experimental Licenses Working Group, US Federal Communications Commission Spectrum Policy Task Force, November 2002, pages 11 and 14.