



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 19.11.2003
COM(2003) 707 final

**COMMUNICATION FROM THE COMMISSION TO THE COUNCIL,
THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND
SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS**

Results of the World Radiocommunication Conference 2003 (WRC-03)

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1. INTRODUCTION

The ITU World Radiocommunication Conference 2003 (WRC-03) took place over four weeks in June and July 2003, providing a **global framework for negotiations** between over 2500 delegates representing 150 countries and other interests on updating the allocation of the radio spectrum and its usage conditions across the world as defined by the **ITU Radio Regulations**.

The results obtained at WRC-03 constitute the last milestone in a preparation process which was conducted over the last three years. For Europe, it involved the radio spectrum experts from national administrations cooperating within CEPT¹ in establishing common European negotiation positions². The European Commission supported this process by identifying the European Union³ policy objectives relevant in the context of the negotiation agenda⁴. Both the EU objectives and the CEPT negotiating positions were validated by the Council of Ministers⁵.

This Communication aims to respond to the request formulated by Council to the Commission to report on the results of WRC-03. Therefore, this Communication intends to:

- highlight the implications of the Conference results for EU policies (sect. 2);
- assess the achievement of EU objectives at WRC-03 for specific issues (sect. 3);
- identify possible regulatory action by the European Union post-WRC-03 (sect. 4);
- consider EU interests potentially at stake at the next Conference, WRC-07 (sect. 5)
- evaluate the WRC-2003 negotiation process (sections 6 and 7).

Further information on salient **negotiating items**, relevant EU policies, and the EU context in radio spectrum can be found in the Commission Communication prepared in view of WRC-03, which also provides a list of all the 48 Conference agenda items.

¹ See glossary for explanation of acronyms.

² So-called European Common Proposals, ECPs. See <http://www.ero.dk>

³ Strictly speaking, the European Community (first pillar of the EU). However, for reasons of clarity, and since the distinction between pillars is expected to be removed soon, the term “EU” is used throughout, except for specific references (e.g. “EC Treaty”).

⁴ COM(2003) 183.

⁵ Council Conclusions 9131/03.

2. THE IMPACT OF WRC-03 ON EU POLICIES

Before analysing Conference outcomes for specific ITU-defined radio services and technologies, it is meaningful to assess the main results of the WRC-03 negotiations within the overall context of established EU policies.

Information Society

The EU's goal for this policy is to ensure that Europe's citizens, businesses and governments can be provided with increasingly rich, advanced and diversified information services. This objective has been supported by the Conference's decisions, in particular to harmonise **RLAN** spectrum globally, enabling advanced broadband radio access networks to continue the rapid progress in this sector currently underway with *wi-fi*⁶, and as a key contribution to the *eEurope* broadband objectives⁷. A second important decision ensured the protection of **IMT-2000 mobile** services' operation in Europe (a.k.a. third generation or "3G"), while at the same time the Conference has begun preparations for the future spectrum requirements of advanced mobile networks. The WRC results also promote alternative means of providing broadband information services, via **satellite** platforms linking users on land, in aircraft and on ships.

Transport

The common transport policy aims to develop an integrated transport system in the European Union, inclusive of all transport modes. Of great relevance to the European Union were the WRC discussions affecting the **Galileo satellite radionavigation system**, which concluded with a wholly positive result for this European project. Aviation services, particularly exposed to harmful interference, are supported in the EU by the **Single European Sky initiative**⁸. Essential aeronautical systems, such as primary radar and DME were protected from RNSS and other services. Another element of EU transport policy, **maritime navigation**⁹, was enhanced via decisions on ESVs (Earth Stations on Vessels), but also on radio-based safety procedures at sea.

Research and Development

The objective of research and technology policy in the European Union is to enhance the gains in competitiveness which technological innovation can bring to European Society by coordinating national and EU policies and encouraging the networking of research teams. A major element of this policy is the funding of significant amounts of pre-competitive research and development by the EU, including for **commercial wireless technologies** and applications, but also to support scientific activities, such as the **Radio Astronomy** service. The implementation of the results of EU-sponsored research in wireless technologies was supported by the Conference decisions to regulate the access to spectrum of **IMT-2000** systems and systems beyond, and of various

⁶ IEEE 802.11b standard operating at 2.4 GHz.

⁷ http://europa.eu.int/information_society/eeurope/2005/index_en.htm

⁸ http://europa.eu.int/comm/transport/air/single_sky/reform_en.htm

⁹ http://europa.eu.int/comm/transport/maritime/index_en.htm

satellite platforms¹⁰. Additional frequencies were also granted to the **Space Research Service** at 26 GHz, to be used by space telescopes to send high data streams to Earth.

Space Strategy

Like the radio spectrum, **space represents an important strategic resource** for the European Union to implement some of its broader goals in areas such as broadcasting, communications, sustainable transport and mobility, weather forecasting, monitoring of environmental changes, and responses to emergencies. The WRC results have been favourable to these space-based policies, as they have extended the protection given to the active **Earth Exploration Satellite Service** in the 5 GHz range, while a spectrum allocation was given to EESS sensor systems in the 432-438 MHz band, to be used to carry out studies in global warning.

Audiovisual Policy

WRC-03 did not address directly the main radio spectrum issue currently concerning EU audiovisual policy, the **switchover process** from analogue to digital broadcasting. The technical bases for coordinating digital broadcasting transmissions and sharing the spectrum in Europe will be developed at the ITU Regional Radiocommunications Conference due to begin next year (RRC-04/06). Most of the technical work on broadcasting at WRC-03 was concerned with reviewing the conditions of use of high frequency (HF) bands for **short-wave (SW) radio**, in order to encourage the introduction of spectrum-efficient technologies such as the new digital **DRM system**. WRC-03 decided to move European radio broadcasters within the 7 MHz range from 2009 onwards, and they will now have to share part of this band with other services. However, a full re-organisation of the HF bands could not be accomplished at this conference, and this issue will be reviewed at WRC-07 (see section 5). The new **Broadcasting Satellite Service** plan agreed at WRC-00 was also reviewed, as was the possibility for other radio services to use parts of the UHF/VHF terrestrial broadcasting bands. This issue will be addressed again at the next conference.

Civil Protection Coordination

This EU policy aims to **improve the coordination and functionality** of national intervention teams from the EU Member States, including the interoperability of communication equipment. WRC-03 was concerned with seeking harmonised spectrum for the implementation of future advanced solutions at global or regional level. The different regions of the ITU identified their own bands for PPDR and, while some harmonisation has been established between Region 2 (Americas) and Region 3 (Asia-Pacific), **no global harmonisation was possible**, in particular on the band already used by Europe for PPDR¹¹. Furthermore, while regionally-harmonised spectrum expected to be used for digital narrowband PPDR systems was identified by all regions, Europe did not identify spectrum at higher frequencies for future advanced PPDR systems, unlike other regions. Thus, progress on this issue from the EU's point of view was limited.

¹⁰ As well as creating new demand for spectrum, RTD can also provide both challenges and solutions to the regulation of interference between wireless services. See the recent EC workshop at http://www.cordis.lu/ist/directorate_d/cnt/pubar/wshop/wshop_101003.htm

¹¹ CEPT ERC Decision 96(03).

3. ASSESSMENT OF SPECIFIC ISSUES IN THE LIGHT OF EU PRIORITIES

The policy priorities of the European Union at WRC-03 were described in a Commission Communication before the Conference and endorsed by the Council of ministers. With regard to the WRC-03 agenda items of particular relevance to EU policies, the following principal objectives were defined:

- **Protecting** the spectrum allocations gained in WRC-2000 by IMT-2000 and GALILEO, in order to further Information Society goals as well as transport policy objectives;
- **Making progress** towards regionally and globally harmonised frequencies for PPDR (Public Protection and Disaster Relief) systems, in assistance to the EU civil protection policy.
- **Supporting** the establishment of alternative wireless access platforms, and in particular of Radio Local Area Networks (RLANs), in order to increase competition and improve service provision for the benefit of the consumer.

Here follows a description of what was achieved at WRC-03 for specific issues related to policy objectives:

3.1. Third Generation (3G) Mobile Communications (IMT-2000):

Concerning **3G systems** in Europe, it was essential to **ensure that IMT-2000 systems could operate** without undue technical restrictions in a spectrum band chosen by Europe by protecting such systems from harmful interference by Asian broadcasting (sound) satellites. At the same time, the encouragement which this protection could provide to the **global harmonisation of spectrum** for IMT-2000 was important.

The European Union has decided to make the band 2500-2690 MHz available by 1 January 2008¹² for IMT-2000, in addition to the frequencies already licensed for the first 3G services¹³. However, part of this band will also be used outside Europe by the broadcasting-satellite (sound) service (BSS) to be launched by some Asian countries.

Difficult negotiations took place on this agenda, in particular between Asian delegations with conflicting interests and policies concerning the provision of wireless services. The protection modalities finally agreed at the Conference foresee a combination of power emission “hard-limits” below a certain elevation angle under which BSS satellites can be visible from Europe, with the obligation for administrations to “co-ordinate” their systems (i.e. ensure they do not interfere with each other) beyond this angle. Furthermore, some procedures in the ITU Radio Regulations were “tightened” to ensure that administrations would apply the constraints imposed on BSS systems.

¹² CEPT ECC Decision (02)06, pursuant to Mandate 4 of the European Commission.

¹³ Note that the “edges” of the band (20 MHz either side), also allocated to MSS by the ITU, might be used by the satellite component of IMT-2000 in Europe. A final decision has not been taken.

This result satisfies the European request for strict protection of the bands foreseen in Europe to accommodate IMT-2000 systems as of 2008. However, the risk of interference to terrestrial mobile systems by BSS remains greater in Asia, and this decision will therefore not motivate countries in this region to choose the 2500-2690 MHz band for IMT-2000 already selected by Europe, thus reducing the potential for long-term global harmonisation¹⁴.

The second issue for IMT-2000 at the Conference concerned the definition of future work on advanced mobile systems, including IMT-2000. The EU position on this topic was to **keep all options open** for additional spectrum identification in the future for IMT-2000 and for systems beyond IMT-2000, on the basis of actual market experience and technological progress. The migration between mobile technologies is a long-term **evolutionary process**, and it was preferable not to take premature decisions on a further mobile generation while third generation services are becoming commercially established, but rather to leave some time for industry and operators to develop services and applications in a **stable regulatory context**.

Europe's position at the **Conference** was that there would be a need for additional spectrum for advanced terrestrial mobile systems at some point beyond 2010. However, **more visibility in the market-place was required** before addressing in detail the possibility of further additional frequencies for future mobile systems. Furthermore, any new identification of spectrum for these systems would need to be based on technological progress and on a thorough analysis of the amount of additional spectrum needed and where to identify it. **Europe's request to ITU to continue such studies** on the future development of IMT-2000 and systems beyond, and address this question at WRC-07¹⁵ was **supported by the Conference and in line with EU objectives**.

3.2. Satellite Navigation Systems (GALILEO):

Europe's objective was the confirmation by WRC-03 of the technical characteristics of the frequency allocation granted to satellite navigation in WRC-00 to ensure that **Galileo could provide all its planned services**. For this to happen, Galileo, other RNSS systems and civil aviation systems had to co-exist, without unduly constraining each other. Concerning issues of future coordination of the various satellite radionavigation systems, the EU objective was to avoid **any possible regulatory discrimination against Galileo**. An equitable access to the allocated spectrum between RNSS systems was essential, on the basis of interoperability and mutually agreed levels of interference.

In order to ensure adequate protection to other important services, such as radionavigation aids for **civil aviation**, some operational characteristics of RNSS in two of the downlink bands identified in WRC-00 were left subject to confirmation at this Conference. The discussion on the 1215-1300 MHz band involved the protection of aeronautical primary radar. The result, accepted by the RNSS and aviation communities, was to deal with reciprocal protection via coordination, rather than operating limits. Concerning band 1164-1215 MHz, the agreement that was finally adopted to protect the operation of aeronautical Distance Measuring Equipment systems foresees maximum

¹⁴ This issue is however to be revisited at the next Conference, see section 5.

¹⁵ See also section 5.

power emission limits to be shared by all RNSS systems. **The result is positive for aviation, while it does not place an undue operational burden on Galileo.**

Another issue which assumed considerable importance during the Conference related to **satellite coordination procedures to be applied between different RNSS systems** and other satellites in the context of an industry moving away from a historical monopoly system (GPS) to a multi-system environment. This issue was held up until the very end of the Conference by the uncompromising opposition to formal ITU coordination of the US delegation, and could have had a negative impact on consensus achieved in other areas. Unjustified assertions that Europe was trying to get an “advantage” for Galileo with respect to other RNSS systems (notably the future GPS-3 system) via ITU coordination were also unhelpful to finding a rapid solution.

The position consistently sustained by Europe in favour of objective and non-discriminatory (so-called “Article 9”) ITU coordination was supported by a majority of delegations, but despite the very slow pace of progress in the negotiation, Europe opted to avoid a Conference vote on this question, but rather to continue seeking common ground and final consensus. In spite of sustained external interventions at all levels, the **cohesion of the European delegations**, fostered by the Commission’s policy guidance before and during the negotiations, together with the skill and commitment of the European negotiators on this issue, were instrumental in the successful resolution of this topic for the EU, with technical compromises which fully supported the overall policy objectives for Galileo.

After long debates, the Conference finally **accepted the principle of full co-ordination of all RNSS systems in ITU**. The ITU procedures for **co-ordination amongst all RNSS systems** (existing as well as future systems) are applicable as of January 1st, 2005. This means that all satellite systems which are “filed” (i.e. notified officially to the ITU) after mid-2004 will need to co-ordinate with existing systems. Some provisions have also been adopted to address fictitious RNSS satellite systems (so-called “paper satellites”), by introducing a “milestone process” (i.e. checking evidence such as existence of contracts to build or launch satellites to determine whether notified systems are “real”).

The overall results at WRC-03 are very good for Europe and the Galileo system, as the Conference has:

- **clarified and stabilised the spectrum usage conditions for RNSS systems**, thereby making the operating conditions of Galileo predictable, while protecting other important services, and notably aviation; signal specifications developed in the frame of the Galileo definition studies have been confirmed.
- **introduced through the RNSS co-ordination process a structured mechanism** to share the spectrum equitably between real current and projected RNSS systems, avoiding an “informal” bilateral coordination process outside of the ITU, which would have been open to GPS playing a dominating role.

Note finally that the Radio Regulations for RNSS are not to be reviewed once again at WRC-07, thus providing more operating certainty to the new European RNSS system.

3.3. Public Protection and Disaster Relief

The European Union's objective was to obtain spectrum harmonisation decisions at WRC-03 which could assist in improving the long-term coordination abilities and equipment functionality of European civil protection teams, in view of the reinforced coordination mechanisms established in the EU for this type of intervention. Greater spectrum harmonisation within the EU could support improvements in **equipment interoperability** in Public Protection and Disaster Relief actions by the EU.

However, it was understood that given the current extensive fragmentation in spectrum use in PPDR, and the lack of a common vision on how to address this sector's operational requirements, any additional step towards spectrum harmonisation would have to be **gradual**.

WRC-03 considered possible global and regional spectrum harmonisation for future public protection and disaster relief systems to address the fact that significant amounts of spectrum are provided for security and emergency functions on a national basis, but often using different frequency bands. Most PPDR systems are also presently based on narrow-band analogue technologies, and any decisions taken on harmonising radio spectrum for future technologies could assist in the implementation of new data-rich digital systems better supporting the modern needs of the emergency services.

WRC-03 did not succeed in identifying common global bands for PPDR. The Conference adopted a resolution encouraging administrations to use spectrum harmonised on a regional basis, while maintaining national flexibility. For future broadband PPDR applications (live video, etc.), other regions outside Europe have identified specific frequency bands, thus providing emergency agencies and equipment manufacturers with a "roadmap" for the future, and encouraging investments in the development of suitable technologies. However, Europe could not find sufficient internal consensus to associate itself to this approach, partly due a lack of agreement on future needs of PPDR, partly because one of the bands (4900-4990 MHz) proposed by other regions is already used by the military (NATO harmonised band).

The European Union's objective of seeing some progress in PPDR spectrum harmonisation has been achieved to a very limited extent. The digital narrow-band harmonised PPDR bands already identified by Europe have been confirmed by WRC-03 for Region 1 (including Europe), but not for the rest of the world. This will not help European intervention teams operating outside Europe to communicate adequately with the host country emergency services and to avoid interference problems.

3.4. Radio Local Area Networks (RLAN)

The identification of frequency bands in the 5 GHz area for wireless access systems (WAS, including RLAN) at global level was **a major objective** for the European Union at WRC-03, since it would drive down costs and increase the commercial opportunities for these systems, and provide a favourable environment for the development of another cost-effective means to access Information Society services. Additional bands are important to the growth of this application, since the 2.4 GHz band currently used by RLANs will be increasingly prone to harmful interference and saturation in the future. At the same time, the **protection of other radio services** already using the 5 GHz frequency range was **essential**, while limiting operational constraints on all systems.

The discussion in WRC-03 focussed on **fostering global harmonisation** of RLAN equipment via the introduction of a global primary allocation for the mobile service at 5150-5350 MHz and 5470-5725 MHz, allowing these systems to share the spectrum with aeronautical military radar and various commercial and scientific satellite services. Such an allocation would also protect RLAN systems from additional constraints that could be imposed on them by new future services in these bands. Europe supported an agreement at WRC-03 on the basis of the mitigation techniques already adopted in CEPT¹⁶, (notably the detection and avoidance by RLANs of channels being temporarily used by aeronautical radar).

The search for a globally harmonised approach was made more difficult by the many different services already operating in various 5 GHz sub-bands, services that are also important to EU policies, such as EESS active sensors and aeronautical and maritime radar. Various regions of the world took different approaches to the protection of these services. In particular, Europe considered that to protect EESS, part of the 5 GHz band ought to be used by RLAN in an indoor environment only. A negotiating compromise was reached on this issue, allowing outdoor use, but encouraging countries to take measures to limit this use. WRC-03 has also explicitly de-coupled the means to achieve the protection objectives for outdoor RLAN use from specific and mandatory mitigation techniques. This is in line with EU principles and approaches on the placement of radiocommunications equipment on the market¹⁷, which enable interference protection to be achieved via specific technical methods, while **leaving open** the possibility for future innovative technologies to meet the protection requirements in other ways.

The EU's objectives for RLANs were achieved. WRC-03 agreed on **world-wide** primary allocations to the mobile service of a sizeable amount of spectrum (some 455 MHz) for **RLANs in the required bands**. The agreement will enable RLAN systems to use **new, less cluttered frequency bands around 5 GHz** and foster the uptake of these wireless systems globally. Furthermore, since RLAN systems will move easily across borders due to their low costs and expected licence-free status, global regulatory harmonisation will avoid the danger to other radio services of *de facto* market harmonisation by the importation of equipment from countries adopting different operating parameters.

3.5. Other Broadband Access Platforms

Besides RLAN, there were other issues at WRC-03 relating to the provision and harmonisation of spectrum for radio systems able to provide other means of access to high-bandwidth voice and data services.

3.5.1. High-Density Fixed Satellite Services

Commercially-viable HDFSS systems could be expected to contribute to the EU policy objective of fostering viable platforms for future broadband interactive services in competition to each other. Future frequency requirements for these systems were to be actively considered, though in ways which would not hinder the operation of existing radio services. Any further global harmonisation of operating frequencies could also drive costs down and increase the attractiveness of HDFSS services to the customer.

¹⁶ CEPT ERC Decision (99)23.

¹⁷ Directive 1999/5/EC on radio equipment and telecommunications terminal equipment (R&TTE)

The issue addressed by this Conference was the possible identification of additional frequency allocations for satellite systems operating with small inexpensive user terminals to provide broadband interactive services. In general, the expected proliferation of HDFSS Earth stations means that any technical coordination with other services on a site-by-site basis (as happens with other satellite systems) would not be possible.

The decisions agreed at WRC-03 are consistent with the original EU objectives and in line with the proposals of CEPT, and the possibility to deploy large networks of small earth stations has been strengthened by economies of scale on user terminals. New allocations identified below 20 GHz are considered useful for commercial services, though costs for this technology need to be driven down further. Allocations have also been identified in the 40 GHz range, although currently the technology know-how to operate in these bands on a cost-effective basis does not exist yet.

3.5.2. *Broadband services in aircraft*

The EU supported the development of regulatory conditions conducive to the introduction of commercial broadband communication services within aircraft. Given the international scope of aviation, a favourable global regulatory outlook for these new services was particularly important to their success.

The negotiations at WRC-03 were motivated by the recent progress in the introduction of new broadband systems on board of aircraft to provide “in-flight access to the Internet” for airline passengers. Some countries were concerned about interference to their terrestrial systems by over-flying aircraft deploying this new system. Several issues had therefore to be solved, notably concerning the specify levels of protection to other services. After operational limitations to AMSS in this band were introduced, the Conference gave the AMSS (aeronautical mobile satellite service) a “secondary” allocation, in its chosen band.

The results achieved in WRC-03 are in line with the European goal to support the provision of ubiquitous Information Society services, including within aircraft, by fostering service competition between different approaches to delivering data services to airline passengers.

3.5.3. *Mobile Satellite Services (MSS)*

The European Union supported at WRC-03 the enhanced provision of spectrum for Mobile Satellite Service systems, as an alternative means to supply mobile communication services to customers, on the basis of **realistic market projections**, while protecting other relevant radio services potentially affected by new MSS allocations.

After several inconclusive discussions in previous Conferences, WRC-03 was able to identify an additional 2 x 7 MHz for MSS. This allocation in the 1518-1525 MHz and 1668-1675 MHz frequency bands is not usable in all regions of the world, but it provides MSS operators with an improved regulatory environment to deliver enhanced broadband services mainly to professional users requiring voice and data services whilst on the move outside the range of cellular networks. Another request by the MSS community for more spectrum in the congested bands below 1 GHz was turned down.

While a new truly global MSS allocation would have been preferable for satellite operators, the results obtained at the Conference are consistent with the original CEPT negotiating proposals, and **globally in line with the EU policy goal** of aiming for the widest possible penetration of advanced services.

3.5.4. *High Altitude Platform Stations (HAPS)*

The EU supported at WRC-03 sufficient spectrum for HAPS, as an alternative and complementary network topology for the radio delivery of various broadband services, but ensuring the adequate protection of other existing services, in particular IMT-2000 base stations on the ground.

Future aerial platforms operated from aircraft or airships high in the atmosphere (around 20 Km) are intended to replace a large number of terrestrial repeaters and provide additional network flexibility. WRC-03 investigated the possible identification of additional frequency allocations for HAPS besides the current allocation around 47 GHz where operation is sometimes constrained by water absorption in the atmosphere. The result was that outside Europe new bands at 28 and 31 GHz have been made available in additional American and Asian countries. In Europe, the protection of terrestrial and scientific services precluded this option.

WRC-03 also reviewed the constraints placed on HAPS operation in the IMT-2000 spectrum at 2.1 GHz that were determined at WRC-00, and the appropriate regulatory and technical provisions for the protection of other existing or planned fixed or mobile services from high altitude platforms operating as IMT-2000 base stations.

For both these issues, the results were in line with the European positions and broadly favourable to the development of viable HAPS systems in the future.

3.5.5. *Other Issues*

WRC-03 also addressed other issues of interest to the EU. Here are the main ones:

- **Earth Stations on-board Vessels (ESVs):** the issue addressed the provision of broadband voice and data services on ships. Some countries were concerned about interference with their on-shore terrestrial systems, in particular telecom microwave links in the Fixed Service, but an acceptable compromise was reached, allowing new service via ESVs to go forward.
- **Protection of aviation:** besides the negotiations concerning coexistence of aviation services with RNSS (see section 3.2), air transport issues were addressed in the protection of Airborne Weather Radar and Microwave Landing Systems in the 5 GHz band, which was satisfactorily achieved. A primary allocation was also given to the Aeronautical Mobile Service above 108 MHz, with some restrictions on the types of aviation services provided to protect FM radio broadcasts. This allocation will assist in the future introduction of GBAS, a system used to improve radionavigation accuracy.

- **Duration of ITU satellite frequency assignments:** some developing countries used a particular procedural agenda item to propose that satellite licences be strictly time-limited, beyond which period frequencies and orbital slots would automatically be returned to the ITU for further assignment. This proposal, driven by the wish for a more “equitable sharing” of resources, was presented with various provisions to protect some acquired rights. However, the principle of time limitation itself was not acceptable to the great majority of countries and to the whole satellite industry, and was therefore not retained¹⁸.
- **Spectrum sharing between military and commercial users:** the satellite industry requested WRC-03 to agree to a reduction in the minimum size of FSS receiver dishes operating in the 14 GHz band (currently 4.5 m). This large dish diameter had been introduced to limit the number of FSS systems sharing this band with US military and scientific systems. Europe essentially achieved its position of enabling more FSS services to use this band by allowing smaller and cheaper satellite dishes (so-called VSAT, min. 1.2 m diameter), but with adequate regulatory provisions for the protection of the other services.
- **Highly Elliptical Orbit Satellites (HEOs):** WRC-03 was seeking to regulate these new satellite systems, which because of their eccentric orbit can potentially affect many other radio systems. Given the complexity of this issue, progress achieved at this Conference was limited, and further studies will be needed, for instance on the possible modalities for HEO BSS systems to share the 620-790 MHz band with terrestrial broadcasting.
- **Radio Amateur issues:** WRC-03 decided to move out the radio broadcasting service from the 7100-7200 KHz band by 2009 to allow the radio amateurs to have a global fully-harmonised 200 KHz in this short-wave band, reversing a decision taken in an earlier Conference (Cairo 1938). The Conference also removed a global requirement for qualified radio amateurs to be proficient in Morse code.

¹⁸ Equitable access to radio spectrum resources is also being debated in the context of the U.N. World Summit on the Information society (WSIS), see <http://www.itu.int/wsis/index.html>

4. IMPLEMENTING WRC-03 RESULTS IN THE EUROPEAN UNION

WRC-03 results now need rapid implementation in the European Union¹⁹, to enhance the common and beneficial use of the radio spectrum. Until now, implementation of WRC results of particular EU interest have been undertaken by the Member States administrations acting individually or working together in CEPT, without the possibility to legally ensure an appropriate co-ordinated implementation at EU level²⁰. The recent decision of the European Community to strengthen spectrum coordination via the Radio Spectrum Decision²¹ provides a mechanism to ensure legal certainty to solutions coordinated at EU level by a constructive collaboration between national administrations, the European Commission and CEPT. Where necessary, the Commission issues mandates to CEPT for the development of technical implementing measures to harmonise radio spectrum use in the European Union. Such measures can be made legally binding in the EU by a Commission Decision where appropriate, after being approved by a majority of the Member States in the Radio Spectrum Committee.

Possible actions to assist implementation by transposing WRC-03 results into EC legislation include:

RLAN: the progress laboriously achieved at WRC-03 on the global harmonisation of the 5 GHz band is **an incentive for further European harmonisation**, since there are still differences in regulation between EU Members, with for instance some of them not allowing RLANs in the upper 5 GHz frequency band (5470–5725 MHz). This issue has already been discussed in the Radio Spectrum Committee (RSC) and is scheduled to be worked on further in the light of the WRC results. Progress in allowing second generation RLAN systems access to European markets will need to be rapid, in order to remain “in synch” with technological and commercial developments, and with the regulatory decisions in other countries, notably the US, to avoid the inconvenience of systems not allowed in Europe proliferating across borders anyhow.

Mobile Communications: the Commission has already mandated CEPT to undertake studies on the channelling of the European additional bands for IMT-2000. The result of this mandate is due by November 2004, following upon which the Radio Spectrum Committee may be used to transpose in EC legislation the spectrum harmonisation of 3G systems achieved thus far in Europe.

¹⁹ The US administration has already planned a structured implementation of the relevant results of WRC-03, see <http://www.ntia.doc.gov/ntiahome/press/2003/ImplementationPlan080703.htm>, while it is also considering improvements to its WRC preparatory process, see http://www.ntia.doc.gov/ntiahome/frnotices/2003/wrcrfc_10202003.htm

²⁰ Besides the requirements stipulated in the ITU Radio Regulations. However, as addressed in section 7, ITU Member States retain considerable flexibility in whether to apply or not many such regulations, while any non-compliance is not sanctioned in a tangible form, but only via “peer pressure”. Indeed, some countries still resort to active “jamming” of foreign TV or radio broadcasts they do not approve of.

²¹ Decision No 676/2002/EC of the Parliament and Council of 7 March 2002 on the regulatory framework of the radio spectrum policy of the European Community.

GALILEO: this European programme has successfully entered its development and validation phase with the creation of the Galileo Joint Undertaking, which will prepare the operational phase of the programme leading up to the selection of a private *concessionaire* for the deployment and the operations of the full satellite constellation. The first two satellites have already been contracted for early usage and validation of the frequencies allocated at WRC-00 and confirmed at WRC-03.

It is necessary to ensure that the European Space Agency is enabled to use Galileo frequencies during the development and validation phase of Galileo, as well as the Galileo *concessionaire* during the operational phase. For this purpose, those European national frequency administrations that have filed for Galileo frequencies at the ITU²² would give the rights to use the Galileo frequencies to the Galileo Joint Undertaking, holding the rights for ESA in the development phase and to the future Supervisory Authority²³ which will act similarly with respect to the Galileo *concessionaire*.

PPDR: this topic is not explicitly on the WRC-07 agenda, and Europe will need to consider its own approach on this issue in the light of the WRC-03 results. **This spectrum dossier will need to be associated more closely to EU Civil Protection Coordination** mechanisms, notably to establish some clarity on the different medium- and long-term operational requirements of the two distinct elements in this sector (Public Protection, which is typically permanent and long-term, and Disaster Relief, which is not). A high-level debate on the underlying EU objectives for spectrum harmonisation concerning PPDR is also planned in the Radio Spectrum Policy Group.

An initial EU action to validate the benefits of a harmonised approach may be to encourage the full harmonised uptake of the 380-385 and 390-395 MHz bands already identified in Europe for narrow-band digital systems used by emergency services. Further actions may then be considered for more advanced systems in the longer term, with the objective of supporting policy requirements and RTD efforts in this field²⁴.

²² It is to be borne in mind that these filings are not identical and have been registered by ITU at different dates.

²³ COM(2003) 471 final, Commission Proposal for a Council Regulation on the establishment of structures for the management of the Regulation on the establishment of the European satellite navigation programme.

²⁴ Such as the MESA project (<http://www.projectmesa.org/>) and the EU IST programme http://europa.eu.int/information_society/istevent/2003/cf/vieweventdetail.cfm?ses_id=112&eventType=session

Modification of use of TFTS spectrum: TFTS (Terrestrial Flight Telephone Systems), originally expected to provide telephone facilities to airline passengers, has not been successful. The spectrum identified for this service is therefore to be used for other applications. One of the two bands (1670-1675 MHz) originally harmonised in Europe for TFTS has now been allocated to MSS by WRC-03 (see section 3.5.3). To meet the EU's goal of furthering an effective spectrum harmonisation in Europe, the second TFTS band (1800-1805 MHz) will also need to be considered for one or more new harmonised applications²⁵. The Commission intends to work with the Radio Spectrum Committee and with CEPT to this purpose.

5. AGENDA FOR THE NEXT CONFERENCE (WRC-07)

Each World Radiocommunication Conference has to draft the agenda for the next Conference. This allows administrations to begin immediately the usually prolonged preparations, including compatibility and demand studies, for various issues.

In view of the inflation in the number and scope of agenda items at recent Conferences, the EU objective was to support initiatives to **limit, prioritise and rationalise** the agenda of the next Conference (WRC-07).

The desire to limit the number of topics and to reflect real spectrum needs in the Conference ensured that a more limited agenda of 21 items was drafted, pending final approval by the ITU Council. The WRC-07 agenda items with potentially greatest impact on EU policies will be:

IMT-2000 and systems beyond: WRC-07 has been tasked to debate "*frequency related matters*" for IMT-2000 and systems beyond IMT-2000. The timeline for the introduction of systems beyond is expected to be around 2015 to 2020. WRC-07 will look at the spectrum available in relation to what is needed for these mobile systems, with new spectrum identified perhaps in 2010. Frequency bands currently used by 2G systems will likely be considered for transition to systems beyond 3G. **The dynamics of this issue will be strongly dependent on the market demand** for advanced mobile systems in the years intervening between the two Conferences, as well as on RTD developments.

WRC-07 will also study the possibility of identifying bands below 600 MHz for IMT-2000, since coverage is much greater at these frequency ranges and therefore networks potentially cheaper, thus assisting developing countries and sparsely-populated regions to introduce third generation-type systems in the future.

Some EU activities will affect the preparation of WRC-07 for this issue. Besides the Commission mandate to CEPT on the IMT-2000 extension band, the work programme of the Radio Spectrum Policy Group includes a **high-level analysis of the relative spectrum needs** for different commercial wireless communications access platforms, with the aim to enable Europe to agree on a strategy to support this important sector. The EU RTD IST programme is currently negotiating a significant amount of funding to mobile technology projects. A number of them, under the umbrella of the Wireless World Initiative, are directly related to the identification of spectrum requirements for advanced mobile systems and will be of assistance in this respect.

²⁵ The band allocated to MSS at WRC-03 may also be considered for additional harmonised uses.

While the protection of IMT-2000 spectrum from satellites was already debated by WRC-03 (see section 3.1), other satellite systems also have allocations in the band, besides BSS (sound), and WRC-07 will review the sharing conditions between all terrestrial and satellite systems in the 2500-2690 MHz band. In the light of the planned use of this spectrum in Europe for IMT-2000, possibly from 2008, **Europe will need to ensure its interests are safeguarded** by an adequate protection of its mobile networks.

Future spectrum needs for aviation: the changing needs for spectrum dedicated to aeronautical systems will be debated at the next Conference, notably the requirements of line-of-sight air-ground communications, where the allocated VHF band in Europe might reach saturation by 2008, as well as the spectrum requirements of aeronautical telemetry systems.

The European Union will wish to ensure its interests in this area are protected (Single Sky policy) and seek to **provide the aeronautical sector with sufficient spectrum** to plan the required capacity growth to overcome congestion, while increasing safety, and at the same time **promoting the timely introduction of more spectrum-efficient technologies** in this sector. The formal relationship recently established between the European Commission and Eurocontrol²⁶, and the creation of the European Aviation Safety Agency²⁷, will be of assistance in translating policy objectives into technical positions for WRC-07.

Reorganisation of HF bands and other broadcasting issues: high-frequency (or short-wave) spectrum is essential **to transmit radio signals over a long distance** and the pressing and often conflicting requirements for these bands necessitate some in-depth consideration concerning band allocation and protection, in particular for **short-wave broadcast radio** and the **maritime mobile** service, thus affecting the relevant EU audiovisual and transport policies. The review is due to address the range from 4 MHz to 10 MHz, with the exception of the decision taken around 7 MHz for the radio amateurs (see section 3.5.5). This issue was on the WRC-03 agenda, but was generally not considered mature enough to be finalised at this Conference, given the strong opposition of mobile and fixed interests. The complex undertaking of restructuring the HF frequencies has political, social and cultural elements associated to it, and is expected to be debated at length at WRC-07.

The “core” VHF and UHF terrestrial broadcasting bands will also be addressed once again at WRC-07, following the results of the RRC04/06 planning conference, in view of requests for allocations to mobile, mobile satellite and broadcasting satellite services within them.

Support for scientific uses of spectrum: these include active and passive Earth Exploration satellites (EESS), meteorological satellites and space research systems, which are all relevant to EU policies in the areas of environment, space, and RTD. Further spectrum allocations will be considered for **EESS** at 9.8 GHz and meteorological satellites at 18.3 GHz. Protection of EESS, **meteorological** and **Radio Astronomy** services will also be reviewed in 2007.

²⁶ Council Decision 11053/02 AVIATION 121 of 17 July 2002.

²⁷ See <http://www.easa.eu.int/index.html>

The European Commission will work with all interested parties to support the underlying EU policies and related initiatives, such as GMES²⁸, and notably with the European Space Agency, with whom an integrated framework of collaboration is being put into place.

Review of procedures and requirements of GMDSS (safety and distress communications for shipping): this issue aims to assess whether the radio provisions for this on-board system are adequate for the needs of all classes of shipping in the light of the experience gained to date. The new European Maritime Safety Agency of the EU will be involved to ensure **EU maritime safety interests** are considered.

It cannot be discounted that, given the rapid pace of technological progress and commercial deployment of new wireless systems, additional issues may suddenly require some attention. Usually, each WRC has sufficient flexibility to address issues not explicitly on its agenda, in particular by the bias of on-going studies in ITU working groups.

What did not get into the WRC-07 agenda: various delegations requested that some topical spectrum issues, notably concerning common spectrum access criteria for **SRDs** (short-range devices, like RFIDs, medical telemetry, etc.) and **UWB** (ultra wideband technology, such as high-bandwidth short-range communication systems) ought to be included explicitly in the agenda of WRC-07. These suggestions were not retained. A decision on how to allocate “virgin” frequencies at the edge of the radio spectrum (**above 275 GHz**) was also postponed to 2010, as so it was not considered essential for the next Conference, as was a request to study the protection of the next generation of extremely-sensitive **radio telescopes**, which are currently being planned, and which will be implemented with the assistance of EU RTD funding²⁹.

Technological development is blurring the distinctions between ITU-defined services, such as between satellite systems (FSS, BSS, MSS)³⁰. The issue of allocations to reflect **convergent applications** between the fixed, broadcasting and mobile services is now on the agenda for the Conference after WRC-07³¹, though it will likely need to be addressed in Europe earlier than this.

The EU’s approach to WRC-07: The European Commission will accompany the WRC-07 process as it has done before, by co-ordinating EU positions and interests at the Conference while relying on the competent work of European experts organised within CEPT to prepare the technical approaches of Europe at the Conference, and to negotiate them successfully.

²⁸ See <http://www.gmes.info/>

²⁹ Project RadioNET at ftp://ftp.cordis.lu/pub/improving/docs/ari_projects_brochure_radionet.pdf

³⁰ Also *within* ITU services. For instance in the “terrestrial mobile” service, the market definitions for cellular and PMR networks are becoming difficult to distinguish.

³¹ Via two WRC-10 preliminary agenda items, “*to consider allocations to the mobile service in the band 806-863 MHz in Region 1, following the transition of analogue to digital TV*”, and “*to consider the progress of the ITU-R studies concerning the development and regulatory requirements of terrestrial wireless interactive multimedia applications*”.

It is increasingly **essential for policy-makers to direct more attention to complex technical-regulatory negotiations** that take place in the radio spectrum domain. Besides WRC, this also applies to spectrum planning conferences such as the recent CEPT Maastricht-02 digital radio plan and the forthcoming ITU Regional Radiocommunication Conference RRC04-06 to plan for digital switchover in broadcasting³². A degree of “policy oversight” ought to facilitate the emergence of consensus on general policy orientations and choices *before* the technical negotiations begin constraining these choices. The Commission has already requested the Radio Spectrum Policy Group³³ to establish clear EU policy goals for WRC-07 that will feed into the CEPT technical preparatory work. This approach will also be a useful baseline for policy discussions that may take place with non-EU countries.

It is also foreseen that **all relevant interests in Europe will be associated** to these activities via public workshops and consultations, in order to assist in the preparation of a Commission Communication on WRC-07 closer to the time of this conference, with the intention of obtaining political support from the EU Council of Ministers.

6. EUROPEAN COORDINATION AND CONFERENCE ORGANISATION

Coordination among EU Member States: EU delegations, working in the CEPT framework and supported by the Presidency and the Commission, closely cooperated during the WRC-03 negotiation process and succeeded in safeguarding the unity of the EU’s international representation. The Commission took part in WRC-03 on behalf of the European Union in line with the Radio Spectrum Decision’s provisions. The Commission’s participation was particularly significant for RNSS issues, where a team working on behalf of the Galileo programme was instrumental in convincing many non-European delegations of the merits of its position. In other areas affecting EU policies, such as Information Society and Transport, the Commission’s presence was limited not by the lack of interest for the outcomes of the negotiations, but by the difficulty in actively covering so many disparate issues over four weeks and hundreds of meetings.

The relationship between CEPT and the European Commission was mostly complementary and effective, notably in the negotiations on sensitive dossiers. The significant cohesion displayed by EU delegations did not warrant the application of any formal EU coordination procedure during the Conference. This cohesion was made possible by the preparation of European Common Proposals by national radio spectrum experts which most EU administrations could subscribe to and support. The common action within **CEPT was successful and efficient** in the negotiations. From an operational point of view, it enabled all European delegations to remain in touch with the many negotiation “strands” at the Conference. Furthermore, all EU Member States, though not all delegations affiliated to CEPT, followed closely the letter and the spirit of the modalities of CEPT participation to WRC.

Industry involvement: the WRC process is very important for major spectrum-using sectors, like telecoms, broadcasting and transport. It is usually easier for an operator or manufacturer to be allowed to use specific equipment by national administrations in particular frequency bands when it is in line with ITU allocations and recommendations.

³² <http://www.itu.int/ITU-R/conferences/rrc/rrc-04/index.html>

³³ http://rspg.groups.eu.int/documents/meeting_documents/index_en.htm

It is also easier to convince potential investors to commit to particular business strategies for the same reason. Proponents of new technologies or of other interests related to spectrum seek therefore to gather or to maintain “momentum” in the ITU context, in order to influence administrations, the majority of which typically do not have strong policy objectives one way or the other. This is also an important reason for getting particular spectrum issues on future WRC agendas³⁴.

In the past, some industrial sectors have felt that their role in ITU was not commensurate with their economic importance. To address this issue, Council requested the Commission to encourage the participation of industry and of other spectrum users in the WRC-03 process and in the European preparations. During the Conference itself, **European industry had a constructive role in the negotiations** and its support for overall European positions was essential to the successful resolution of a number of important issues. The Commission will continue to encourage a broad and transparent participation in the WRC process.

Conference Organisation: WRC-03 was a very large and well-organised event which delivered once again global radio allocation results acceptable to most interested parties. The success and smooth running of the Conference was distinctly helped by fewer “political linkages” between different technical issues being negotiated separately than in past Conferences, a welcome trend assisted by the working contacts before the Conference between all regional organisations, including increasingly with developing countries’ representatives. The near-“paperless” approach adopted by the Conference organisers via the extensive use of RLAN facilities operating at 2.4 and 5 GHz helped greatly in making the proceedings more efficient and cost-effective, and was a real-time demonstration of the added value of such type of wireless application.

7. THE ITU SPECTRUM COORDINATION PROCESS AND THE EUROPEAN UNION

WRC proceedings are ruled by the search for common ground between very different socio-economic and political interests. Although the ITU Radio Regulations (RR) have the status of an international treaty³⁵, often ratified according to national procedures, finding “consensus” is helped by the fact that there is sufficient flexibility for Member States of the ITU to “opt in” or “opt out” of specific provisions, and a large number of administrations use “footnotes” to the treaty to remove themselves from the spectrum harmonisation process for many issues³⁶. Furthermore, as long as it does not interfere with other services operating in accordance with the RR, in particular with other countries’ services, an administration can introduce any radio application in any frequency band with the operating conditions it wishes (Art. 4.4 of the ITU RR).

In overall terms, while not involved in the day-to-day work of the ITU study groups, the Commission aims to ensure that the approaches employed in the preparation and

³⁴ Another aspect then comes into play: how will the issue be prepared (“studied”) before the Conference – therefore the scope of the issue, the terms of reference and composition of the ITU study group dealing with the matter, and even the inclinations of the study group chairman become important.

³⁵ Article 54 of the ITU Constitution.

³⁶ Indeed, while at every WRC, ITU attempts to reduce the number of “opt-outs” or “footnotes” to the Radio Regulations, this number actually increased at WRC-03, demonstrating some weakness in the voluntary administrative spectrum harmonisation model.

negotiation of ITU conferences are in line with those EU objectives and principles which are applicable to spectrum allocation and assignment³⁷. The new EU electronic communications regulatory framework enshrines principles such as **technology neutrality**, **legal certainty** and **proportionality**, as well as fundamental EU objectives such as the promotion of **competition**, the consolidation of the **Single Market**, and the removal of technical barriers to **international trade**.

As the European Community is not a party to the ITU, whereas the Member States are, the obligations they assume in the ITU framework have to be implemented in accordance with their obligations under EC law. This was reiterated by a formal declaration signed by the 15 EU Member States and the 10 acceding countries and deposited with the ITU to be introduced in the WRC-03 Final Acts³⁸.

8. CONCLUSIONS

The ITU Radio Regulations are based on the achievement and maintenance of overall consensus about how the radio spectrum is managed globally, an issue all countries have an important stake in. Therefore, WRC Conferences usually end in agreements that support this overall framework. Declarations of “victory” after the Conference over one of the other agenda item at WRC-03 are inappropriate and not in the spirit of consensus required in this type of process. Overall, the Conference was once again able to balance all the many different interests involved in the use of the spectrum resource, and it fulfilled therefore its goals. **The major objectives of the European Union for this Conference were met to a significant extent.** The positive outcome of these negotiations will support major EU policies that rely on radio spectrum. The global harmonisation of conditions of use for broadband **RLAN systems** and the long-term protection of the **Galileo** satellite system’s interests are **especially noteworthy** in this respect.

The European Commission and the EU Member States will make use of the mechanisms set up by the European Union to develop its own coherent radio spectrum policy to implement relevant WRC-03 results. The end of WRC-03 also marks the beginning of the preparation process for the next Conference (WRC-07), which the Commission will again support by developing policy goals for the Conference, while accompanying the technical discussions held in CEPT and fostering a broad involvement of radio spectrum user constituencies.

³⁷ For context, see the Commission Communication COM(2003) 526 final, “The European Union and the United Nations: the choice of multilateralism”.

³⁸ The Declaration reads: “*The delegations of the Member States of the European Union declare that the Member States of the European Union will apply the revision of the radio Regulations adopted at this Conference in accordance with their obligations under the EC Treaty.*”

GLOSSARY

AMSS	Aeronautical Mobile Satellite Service
ARNS	Aeronautical Radio-Navigation Service
BSS	Broadcast Satellite Service
CEPT	European Conference of Post and Telecom Administrations
DME	Distance Measuring Equipment in aircraft
DRM	Digital Radio Mondiale broadcasting system
ECP	European Common Proposal adopted by CEPT
EESS	Earth Exploration Satellite Services
ECC	Electronic Communications Committee of CEPT
ESV	Earth Stations on board of Vessels
FS	Terrestrial Fixed Service
FSS	Fixed Satellite Service
GALILEO	European satellite-based navigation and positioning system
GBAS	Ground-Based Augmentation System for aviation.
GMDSS	Global Maritime Distress Safety System
GMES	Global Monitoring for Environment and Security
GPS	Global Positioning System of the United States
HAPS	High Altitude Platform System
HDFSS	High-Density Fixed Satellite Service
IMT-2000	International Mobile Telecommunications for 2000
ITU	International Telecommunications Union
MSS	Mobile Satellite Service
PPDR	Public Protection and Disaster Relief
RAS	Radio Astronomy Service
RFID	Radio Frequency Identification Tags
RLAN	Radio Local Area Network
RNSS	Radio Navigation Satellite System
RR	Radio Regulations of the ITU
RSC	Radio Spectrum Committee
RSPG	Radio Spectrum Policy Group
RTD	Research & Technological Development
TFTS	Terrestrial Flight Telephone System
VSAT	Very Small Aperture Terminals
WRC	World Radiocommunications Conference
WWI	Wireless World Initiative