

WARC: The First and the Last

Tomáš ČESKÝ
European Radiocommunication Office
Islands Brygge 81, DK-2300, Copenhagen S
DENMARK

WARC-92 was the last of its kind. The "Last Big WARC". The process was very difficult and some refer to the conference as consensus by exhaustion, clearly demonstrating one of the reasons for restructuring the ITU.

CEPT (Conférence européenne des Administrations des postes et des télécommunications) countries entered this Conference with their ECPs - European Common Proposals - extending thus the potential for frequency harmonization within Europe. The CEPT preparation for, and participation in, WARC-92 was the most effective yet and built on lessons learned at a number of previous WARC's. This WARC was the first Conference where CEPT was present with its new expanded membership.

European countries therefore had to be constantly on the guard to avoid giving the impression that CEPT was an inflexible political block with 31 potential votes. Lastly, the Soviet Union together with its satellites was, for the first time, no longer in evidence, although the Russian Federation was generally supported by other countries from within the new Commonwealth of Independent States.

The objective of this article is to point out principal WARC decisions from European point of view.

WARC Decisions

WARC-92 accomplished its task; the results not being optimum but nevertheless acceptable. The reasons why the whole process was so painful are quite straightforward. The wish to implement new technology whilst protecting existing radio systems was a recurring theme throughout the WARC. On occasions the same country or group of countries would support one or the other notion dependent on their national interest or the extent of external lobbying. This problem presented itself in most sectors of the Conference throughout the entire spectrum range.

The result has been a proliferation of footnotes to the international table of allocations together with regional or sub-regional variations. This has the overall effect of complicating the Radio Regulations at a time when simplification has been high on the agenda of the ITU.

Further effects include long implementation schedules for new technologies, or considerable operational constraints. Regional variations also reduce market sizes, especially at the commencement of service with a resultant increase in equipment costs. With a view to the long term, global solutions will increasingly become more difficult to achieve as spectrum usage is agreed on a regional basis.

HF (Shortwave) Broadcasting

Some extensions to HF broadcasting allocations were obtained, though far less than required. Only 200 kHz of additional spectrum below 10 MHz was obtained, whilst above 10 MHz, 590 kHz was agreed in the range 11 to 19 MHz. The new bands are reserved for SSB emissions and will be available from April 2007. It is however unlikely that these band extensions will significantly reduce the problem of out of band broadcasting.

Satellite Sound Broadcasting

The question of satellite sound broadcasting was perhaps the most difficult for WARC to resolve and the less than optimum solution of sub-regional alternative allocations is also reflected in Conference decisions on other issues.

The principal allocation available world-wide was decided as 1452-1492 MHz (1.5 GHz); however, the U.S. opted out of this decision with a national footnote provision that indicated that satellite sound broadcasting in the US would utilize the band 2310-2360 MHz (2.3 GHz). Far Eastern countries together with China, Japan and Russia preferred a third solution, taking a footnote provision for the band 2535-2655 MHz (2.6 GHz).

Perhaps it is difficult to understand how such a situation arose, especially when a considerable number of CEPT countries originally proposed a band at 2.5 GHz for this application. However, at the working level of the Conference, although there appeared to be a majority in favor of 2.5 GHz, a significantly large minority was in favor of 1.5 GHz and no significant shift of position seemed possible.

A compromise arose, which to Europe, seemed the worst possible scenario for the longer term, since allocations at both 1.5 and 2.5 GHz were proposed with the possible result that firm plans for the future could not be developed in either band. An added complication was a requirement of neighboring countries to protect satellite television broadcasting in the 2.5 GHz band.

In order to show flexibility and to avoid a potentially damaging deadlock CEPT countries changed their position on 1.5 GHz satellite sound broadcasting with the intention of effecting a globally acceptable solution for the long term without the problematical dual band approach. In addition an implementation date of AD 2007 was agreed for satellite broadcasting to achieve full status that it is hoped will ease the transfer of existing users.

In the event, a truly global allocation without regional variants was unfortunately not realized.

From the implementation point of view additional questions remain. At 1.5 GHz there are manufacturing, operational and technical benefits, however the frequency coordination that may be required in this band might im-

pose additional constraints resulting in a slower introduction of satellite DAB in some countries. Because of the enormous inertia involved in broadcasting this may turn out to be a critical point.

Terrestrial broadcasting

Although WARC decided that complementary broadcasting could take place in the bands allocated for satellite DAB, the Conference also agreed to European suggestions that a future ITU Conference might address VHF terrestrial DAB. It is not only because of WARC that VHF terrestrial DAB is now high on the list of new services to be introduced hopefully in the short term.

From the system point of view wide-band DAB is better than "channel-compatible" solutions. The task to allocate at least a band of 1.5 MHz (up to 8 MHz in some concepts) within existing broadcasting bands below 900 MHz and preferably in the VHF band, is anything but simple, but harmonization at the system and assignment level is highly desirable. The digital broadcasting system under development in Europe is optimized for wide area coverage utilizing a single broad band frequency assignment.

The consensus on the long term solution is clear, terrestrial DAB will replace existing FM sound broadcasting in the Band 87.5 to 108 MHz. Because of the channel width of the DAB signal this replacement will not be easy. Therefore a concept of identifying a "Parking Band" for the introductory phase of T-DAB is a possible solution for CEPT countries. The method of finding an acceptable "Parking Band", is currently under discussion within CEPT/ERC Working Groups.

Satellite Broadcasting HDTV

A global solution at WARC was also not forthcoming in respect of satellite frequency allocations for wide band high definition television (HDTV). This was principally due to numerous existing fixed services in the United States together with a concern from a number of countries which experience high rainfall rates that considered bands above 20 GHz to be technically unsuitable. It was in addition agreed by the WARC Conference to recommend that consideration be given to reviewing at a future ITU Conference the existing 12 GHz satellite broadcasting plans applicable in Europe, Africa, Russia, the Far East and the Pacific.

Mobile and Mobile-Satellite Issues

This again was another crucial area for the Conference which provoked considerable discussion especially since satellite sound broadcasting applications were competing for the same spectrum which other administrations were promoting for mobile and/or mobile-satellite purposes.

The key issues were improved status for the terrestrial mobile service in Region 1 (Europe) in the 1 to 3 GHz range, thus facilitating current generations of pan European systems and opening the door for a spectrum designation for FPLMTS/UMTS (Future Public Land Mobile Telecommunication Systems / Universal Mobile Telecommunications System), third generation mobile applications. Bands were also required for in flight telephones. Additionally, allocations were proposed for a variety of mobile satellite applications, both below and above 1 GHz, intended interalia for the extension of existing mobile satellite

systems, the introduction of low earth orbiting networks (LEO) and satellite systems in support of FPLMTS.

Terrestrial Mobile

A notable success at WARC 1992 was the agreement to designate 230 MHz world-wide for FPLMTS with implementation from the year 2000. It will now be for the ITU's technical radiocommunications body, the CCIR and regional standards bodies such as ETSI in Europe to develop the technology and service requirements for FPLMTS.

Mobile Satellite

The result of the mobile-satellite discussions are not particularly easy to digest and unfortunately regional variations have been introduced. Concerning LEO six bands in the interval 137 to 401 MHz was allocated.

Moving above 1 GHz, there are additional allocations for mobile satellite systems in the vicinity of 1.5 GHz. In Region 2 (the Americas) an additional band 1492-1525 MHz was secured and the band 1675-1710 MHz provides the complementary paired allocation. These allocations which are out of step with the rest of the world are however subject to both geographical and operational restrictions.

The band 1610-1626.5 MHz together with 2483.5-2500 MHz are intended for interalia LEO systems but are also subject to a number of constraints to ensure compatibility with other services and to provide equitable and standard conditions of access for all ITU members.

At 2 GHz again the Americas have secured additional spectrum to that allocated in Region 1. This part of the spectrum, as mentioned previously, is also designated for FPLMTS and the globally available mobile satellite bands 1980-2010 MHz and 2170-2200 MHz are intended to provide the satellite component of FPLMTS from the year 2005.

In addition to LEO applications, two 20 MHz bands available world-wide from AD 2005 have been allocated for mobile satellite purposes in the vicinity of 2.5 GHz.

Conclusion

The WARC-92 established a basis for future development but continued with the fragmentation of World wide frequency allocations. To combat this trend the convergence of spectrum usage must be a global objective, not just a European vision.

About author, ...

Dr. Tomáš Český graduated from Czech Technical University of Prague in 1975. In 1980 he joined the PTT Research Institute Prague. He was responsible for the team developing the complex Spectrum Management Support system MAKRO. In 1991 he joined the European Radiocommunications Office of CEPT in Copenhagen as a frequency management expert. He is still in touch with Department of Electromagnetic Field, Czech Technical University of Prague.