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The challenges of spectrum allocation and sharing

An interview with Veena Rawat

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■ ***Ms Rawat, you chaired the Frequency Allocation Committee of WRC-97. What are the complexities of sharing what is said to be a congested spectrum?***

One of the necessary requirements for any new wireless service is that they must have spectrum allocations. A number of new services are coming up because of information technology and broadband multimedia requirements, and that means bandwidth. Every time we talk about multimedia, we are talking about bandwidth. To get that bandwidth, one of the things which new technology and new services are doing is that they are going into higher and higher frequency bands.

The lower frequency bands, up to a point, are quite congested. They are already being used extensively by a lot of the existing infrastructure and for which there has been much investment. So now the industry is looking at higher and higher frequency bands. However, even in those bands, it is becoming difficult to get spectrum for all new technologies and new services because of the growing competition in the provision of these services — as we move away from the days of monopoly in telecommunications to competition.

Against this background, spectrum allocation is becoming a challenge because what you are looking at is a finite resource — a finite spectrum in that there are a number of competing services and the challenge is to accommodate all of them because one thing we do not want to do in the ITU through regulation is to control competition. We want to do our best to make enabling provisions for these services and then let the market-place decide whether all of them survive, or how much is too much competition.

That is one side of the allocation/sharing story. However, if you are sitting on the other side of the fence and you have existing services in which you have invested millions of dollars, your attitude is: "sure that is new technology but is there any tangible proof that such technology can be used to co-exist or share with other services?" You will only believe it when you see it — proof on paper is not enough. If sharing is not possible, the fundamental principle is that you split spectrum. And when you do, then it is like splitting a pie. That is quite a challenge!

■ ***What were the most sought after frequencies at this Conference, who was seeking them and what is the attraction?***

It was important for this Conference to make provisions for systems that may be capable of providing global services. The operation of such systems requires a suitable amount of spectrum in appropriate frequency bands. Here, the non-geostationary satellite (non-GSO) systems in the fixed-satellite service (FSS) were a major candidate.

SkyBridge, for example, was looking for regulatory provisions in the Ku band which is around 12 GHz allocated to the broadcasting-satellite

service (BSS) and the FSS and sharing with the existing services of the geostationary satellite (GSO) networks was the major issue. These bands are very heavily used by the GSO networks. However, SkyBridge made the case that by introducing some technical and operational constraints, sharing should be possible. So this Conference established technical constraints, in the form of provisional power flux density limits, which it requested the Radiocommunication Sector (ITU–R) to review and if necessary revise.

The attraction is that the Ku band being lower in frequency, there is more off-the-shelf technology available and the propagation conditions are more favourable which relate directly to the cost and performance of the system. When you have to put a "bird" up there, you get into a lot of design issues and many other factors.

While the Ka band is relatively new for use by FSS, due to spectrum requirements of GSO and non-GSO FSS systems (*Teledesic* and *Celestri*) and other sharing issues, we are already running out of spectrum in this frequency range.

The other challenge for the Conference was to find an additional, very limited amount of spectrum for little LEO systems. They are not in very high frequency bands, they operate below 1 GHz where many services exist already. The Conference made some additional allocations for these systems in the band 454–460 MHz on a regional basis.

Another challenge was that for sometime now, we have been trying to make additional spectrum available for the mobile-satellite service (MSS) in the 1–3 GHz range. But because of the growth in the MSS requirements, MSS operators along with some countries were looking for additional spectrum particularly in the band 1559–1567 MHz. At issue was that aeronautical radionavigation and radionavigation-satellite services are allocated in the band 1559–1610 MHz on a primary basis and that these are safety services and must therefore be protected from harmful interference. In particular, this band is used by the global positioning system (GPS) and global orbiting navigation satellite system (GLONASS), both systems are components of the International Civil Aviation Organization's (ICAO) global navigation satellite system (GNSS).

The aviation community and some administrations were of the view that the Conference should not make any allocations until sharing studies were carried out. Another point of view was that we should make the allocations now and undertake the sharing studies later. Through compromise, the Conference managed to agree that the ITU–R should study first the technical criteria as well as the operational and safety requirements to determine sharing feasibility because, here, we are dealing with safety services and so one has to be extremely cautious. The Conference also urged all administrations and concerned organizations, including ICAO, the International Association of Lighthouse Authorities (IALA) and the International Maritime Organization (IMO) to contribute to those studies, whose outcome will be considered by the next World Radiocommunication Conference.

Veena Rawat

■ *What about the high-altitude platform stations?*

The high altitude platform stations also known as stratospheric platforms are considered as part of a fixed service. The idea here is to serve a much larger area by having a station at a very high altitude. That means, again, a cost-effective system and one which you can use to provide a number of services. But there are a number of challenges to power up that "beast", and to maintain it up there. These challenges are being addressed. But again it is a new way of providing some of the terrestrial services.

Sky Station International, Inc. is the only company in this arena at the moment. They are going again in a very high frequency band (the Conference made provision for high-altitude platform systems to operate in the bands 47.2–47.5 and 47.9–48.2 GHz), partly because it is not extensively used, but nonetheless, it still presents a lot of challenges in coordinating the frequencies for such application with other services. The next five to ten years could be quite interesting.

■ ***Why was there so much ado about country footnotes?***

When I came to the Conference I thought the question of footnotes would be an easy one. But I left with a different feeling, that it was not an easy issue after all. First of all, footnotes are an integral part of the Table of Frequency Allocations in the Radio Regulations and provide flexibility in the use of these allocations by different countries. The agenda only permitted requests from administrations to delete their country footnotes or to have their country's name deleted from footnotes, if no longer required within the limits prescribed in Resolution 26 [as adopted by WRC-95 and modified by WRC-97].

According to this Resolution, the Table of Frequency Allocations should include only those footnotes which have international implications for the use of the radio-frequency spectrum. One thing which every conference does is to allow changes to be made to footnotes which are related to its agenda. However, many administrations brought in proposals where they wanted to add their country's name to some of the footnotes, but this did not necessarily fall under any of the agenda items. For example, there were a number of administrations which were looking to add mobile services in broadcasting bands for a number of reasons and this item was not on the agenda. However, each conference is sovereign to decide a course of action, even on items that may not be specifically on the agenda.

Given that a number of proposals for additions to certain footnotes had been received as part of input documents to the Conference, we decided to set a deadline for receipt of any further proposals. All proposals received by that date were to be evaluated. We accepted those proposals for which there had been absolutely no objection. Then there was a footnote frenzy with a number of proposals pouring in after the deadline. However, we could not consider them because once you have set the rules, you must follow them. Of course, a few administrations were disappointed because of the delayed reaction on their part. Hopefully, they can come back to the next conference and meet their requirements. That is all I can hope for.

■ ***What are your views on the preparatory work at regional level?***

I would have expected more solutions and an easier time at the Conference because of prior extensive coordination between the regional groupings. However, I found that some issues on which consensus had been reached through interregional consultation were reopened for debate. They were all simple issues, but they took longer than what I had expected. The reason for this was, in part, because some administrations who were at the Conference never participated in the interregional meetings. Also, just like at any conference, people start thinking in terms of linkages and say, I am not ready to give up on this until I get something else in return. And because of that, some issues took longer in spite of the interregional coordination.

Other than that, I think regional preparations and interregional coordination are good and should be encouraged for every conference. However, we should build in some kind of flexibility at the regional level. Because what happens is, we bring in regional positions. We also bring regional spokespersons, but they have got their marching orders. They cannot show flexibility on the floor. If you are a regional spokesperson you will express your "party line" and if, during the discussion, another proposal is put on the table, it does not matter how good an idea it may be, because you then have to go back to the regional meeting again and see whether the region supports the idea

or not. So, that is the downside of it and a little more flexibility could make regional coordination more effective.

The other problem is that not all countries are active in regional organizations. Part of the time, when they come to a conference, before they accept their region's position they have to understand the issue in terms of what it means for their country.

Veena Rawat received her Ph.D. in electrical engineering in 1973 from Queen's University, Kingston (Ontario, Canada). Since then she has worked at Computing Devices of Canada and has held a number of positions within Industry Canada (formerly the Department of Communications) dealing with spectrum policy and engineering matters. She has been the Canadian spokesperson for major ITU–R meetings including World Radio Conferences over the last ten years, and has chaired a large number of Groups, the last one being Chairman for the Frequency Allocation Committee for WRC-97. Her present responsibilities include all technical matters concerning spectrum management both at the national and international level for all radio services except broadcasting.