

## **ISSUES IN SPECTRUM ALLOCATION AND PRICING IN INDIA.**

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Radio frequency spectrum is a limited natural resource. The word 'Spectrum' basically refers to a collection of various types of electromagnetic radiations of different wavelengths. In India, the radio frequencies are arbitrarily confined between 9kHz and 3000 GHz and are being used for 40 different types of services like fixed communication, mobile communication, broadcasting, radio navigation, radiolocation, fixed and mobile satellite service, aeronautical satellite service, radionavigational satellite service etc.

Some of the important and typical characteristics of the radio frequency spectrum are as below.

1. Radio frequency spectrum does not respect international geographical boundaries as it is spread over a large terrestrial area.
2. Use of radio frequency spectrum is susceptible to overlapping interference and requires the application of complex engineering tools to ensure interference free operation of various wireless networks.
3. Unlike other natural resources, radio frequency spectrum is not consumed upon its usage. It is also liable to be wasted if it is not used optimally and efficiently. Radio frequency spectrum usage is therefore to be shared amongst the various radio services and must be used efficiently, optimally and economically in conformity with the provisions of national and international laws.

The limitation of the radio frequency spectrum is mainly due to the following factors.

1. Propagation characteristics of different types of radio waves.
2. Availability of technology and equipment for different types of radio frequency spectrum applications.
3. The suitability of frequency bands for specific applications.

### **ALLOCATION OF SPECTRUM**

The International Telecommunication Union (ITU) at the World Radiocommunication Conferences allocates spectrum frequencies for the use of various countries. Allocations are made on a regional basis and for different types of services. It is mandatory for all administrations to adhere to these allocations. For the purpose of spectrum allocation, each member country submits its proposals to ITU, based on their requirements and priorities for opening of the bands. During the conference all the proposals are discussed and decisions are taken for opening of the bands for new services or extension of the existing bands. These decisions are reflected in the International Frequency Allocation Table of radio regulation and other regulatory provisions for use of bands, which forms the basis for allotment by the member countries.

Need for spectrum allocation: Spectrum allocation is necessary in order to ensure interference free operation for each radio service. Each frequency band is shared amongst various radio services but the sharing is possible only with the use of similar systems. Sharing is also possible by way of geographical separation, time-sharing and through technical solutions like smart antenna and intelligent radio system.

### **NATIONAL FREQUENCY ALLOCATION PLAN: 2002.**

The National Frequency Allocation Plan (NFAP) forms the basis for development and manufacturing of wireless equipment and spectrum utilization in the country. It contains the service options in various frequency bands for India and also provides the channeling plan in different

bands. Some of the typical frequency bands allocated for certain types of radio services in India are as given below:

Sr.	Radio Service	Frequency Band
1	Radio Navigation	9 – 14 kHz
2	Mobile (Distress & Calling)	495 – 505 kHz
3	Broadcasting	535 – 1605.5 kHz
4	Maritime Mobile	2065 – 2107 kHz 2170 – 2178.5 kHz 2190.5 – 2194 kHz
5	Fixed, Mobile, Broadcasting Radio Astronomy	610 – 806 MHz
6	Mobile, Fixed, Broadcasting	890 960 MHz
7	Mobile satellite	942 – 960 MHz
8	Radio Location	1350 – 1400 MHz
9	Mobile, Fixed, Space operation, space research	1710 – 1930 MHz

### **Spectrum and Mobile telephone services:**

Mobile telephone service providers in India use GSM and CDMA technologies. GSM technology works in the frequency bands of 900 and 1800 MHz in India and CDMA technology works in the 800 MHz band. 800, 900 and 1800 MHz bands were earlier allotted to the defence services for their mobile communication usage. However, upon the launch of mobile communication services for public, coordination was sought from the defence department to make the spectrum available for mobile services. Since the mobile communication technologies provide international roaming facilities, it is essential to allocate spectrum in the common bands which are being used the world over. Also, the mobile handsets being used are imported hence conform to the GSM 900/1800 bands. If radio frequencies are allotted in other bands then handsets will not be compatible with it and new handsets will have to be developed which will be costlier and therefore the cost of mobile communication services will also increase.

Presently, 25 MHz spectrum in 900 MHz band (890 – 915 / 935 – 960 MHz) and 75 MHz in the 1800 MHz band (1710 – 1785 / 1805 – 1880 MHz) is earmarked for GSM services. However, out of this total 100 MHz, only 15 MHz in GSM 1800 band is available for use as the remaining 60 MHz is still to be vacated by the defence department. Also out of the total 25 MHz in GSM 900 band, a total of 20.2 MHz is available for GSM networks and Railways' train safety systems. The minimum amount of spectrum required for launching GSM services is 2 x 4.4 MHz. Presently, the government has allotted a cumulative maximum spectrum of upto 4.4 MHz in GSM 900 and 1800 MHz band to mobile operators.

For CDMA services, 20 MHz spectrum in the 800 MHz band (824 – 844 / 869 – 889 MHz) is available. In this 20 + 20 MHz spectrum, 14 CDMA carriers of nominal 1.25 MHz each are possible for assignment to service providers.

Spectrum for the roll out of 3G services (voice, data and video) will be allotted through e auction in the 2.1 GHz (1920 – 1980 / 2110 – 2170 MHz) band. However, the spectrum required for the launch of 3G services is yet to be vacated by the defence department.

### **SPECTRUM ALLOTMENT PROCEDURE:**

In the case of licensed telecom service providers spectrum was initially allotted in accordance with the relevant provisions of the service license agreements. However, due to an exponential increase in

the number of mobile subscribers additional spectrum is required by the mobile operators. Serving a larger number of subscribers requires, either a larger amount of spectrum or an increase in the number of base stations. Therefore, additional spectrum is required at some stage as a techno economic solution to meet the growth of mobile services. Department of Telecommunications has evolved guidelines for the allotment of extra spectrum, based on the justification and fulfillment of the prescribed criteria. The subscriber-based criteria have been formulated taking into account demographic characteristics of different categories of service areas, average traffic per subscriber, number of base stations in a specified area etc. Spectrum is allotted subject to completion of co-ordination and availability at a particular location.

As spectrum is a scarce resource, its equitable allotment for systems using different technologies seems to be the solution. The government while formulating its spectrum policy should try to create a flexible and technology neutral regime to allow new technologies equal access to spectrum. It should also enable market mechanisms to promote efficient use of spectrum by developing market incentives and differential pricing of spectrum in congested areas. Also auctions or fixed fee access can ensure that spectrum 'owners' will want to minimize the quantum of spectrum. The government may also permit public and private users to trade spectrum to allow new users access to spectrum and to provide them with possibilities to move to another non – wireless media or other frequency bands if possible. It can also mark off specific public and private use segments of spectrum and try to bring about transparency and openness in the spectrum allotment process so that this scarce natural resource is put to it optimal use in a more efficient manner.

(The views expressed herein are those of the writer and may not be taken as those of the Government.)