Feedback and Comments on the Internet Society Policy Recommendation: Innovations in Spectrum Management

The Internet Society Paper "Innovations in Spectrum Management" is a well researched paper that lucidly explains the technical nuances of Spectrum and the methods of allocation. The paper presents a coherent argument for positive changes in allocation policy, provides creative solutions to solve some of the allocation issues and offers valid and sound neutral recommendations. The Paper rightly points out, "*communication networks are approaching the status of essential infrastructure for a modern economy*". This essential infrastructure requires more than Government - Telecom (Public-Private) contractual agreements- much more than that- in order to extend the networks for everyone, everywhere, always on, universally and at the same time in a manner that is affordable for all. The new approach outlined in this paper could mark the beginning of a fundamental change in approach to Spectrum Policy that would cause the networks evolve further at the pace of technological advances, and foster further innovations in spheres beyond Communications.

If policy-makers take note and act on these neutral recommendations, they would be ushering in innovations in access, widen Communication Networks for everyone everywhere, and significantly improve the quality of access while making it far more affordable for everyone.

Some of these policy recommendations could be implemented as immediate improvements. The licence-exempt spectrum in the 2.4 and 5.15-5.35 GHz frequencies could be expanded to include 5.47 -5.925 GHz in regions where the Spectrum Policy/ Conventions do not already include them, and also consider 6.425-7.125 GHz band for inclusion if feasible. The United States, by an exemplary shift in Government thinking, is actually considering flexible use, more widely, for example, on the midband range 3.7-24 GHz.

Measures such as this would make it easier for small operators and community networks to create networks and effectively deal with congestion in licence free spectrum. In expanding the license-exempt bands, the forerunners are considering 24 and 60 GHz MMWave Bands.

In India, the Telecom Regulatory Authority of India (TRAI) has proposed license-exempt use of the 60 GHz band; the United States and Canada have already harmonized their regulations and both countries allow license-exempt use of 200 MHz between 24.05 and 24.25 GHz for PtP links. As the Internet Society Paper points out, *these wavelengths establish another wireless alternative for fibre-like speeds for up to 5-6 km*; implementation of various internal recommendations such as these could be expedited in respective countries and good examples may thus be copied.

The paper notes that the *Digital Switchover from analog has freed up wavelengths previously needed for broadcast.* This TV White Space could be used to ease congestion in licence free spectrum, for the benefit of small operators and community networks.

In Spectrum allocation, as the paper notes, *there is a certain degree of disparity between countries in the power levels allowed for the different bands where Wi-Fi devices operate for*

both fixed infrastructure (point to point - PtP- and point to multipoint - PtMP) and user access (hotspot). If adequate flexibility in power levels are immediately allowed based on the levels allowed elsewhere, it provides the required room for small operators and community networks.

It is also important to pay attention to the requirement of suitable spectrum for backhaul links, perhaps by making it a light licence and a more affordable one, free of barriers. Also, the restrictions need to be eased for small operators to install towers of required height, where required.

A long term review and timely implementation of the required changes in Spectrum Policy could look at possible ways of transitioning from the "wholesale" approaches of Spectrum Allocation, find ways of reallocation by Spectrum re-farming and even shift from a Quick Revenue approach to an innovative financial model of Spectrum Co-Investment, or small investments, for wider 'distribution' of Spectrum for possibly even higher, periodical revenues. This is in a scenario where Governments consider the revenue from Spectrum significant.

Policy Innovations in Spectrum allocation would cause far reaching innovations to happen in the world we live in.

For instance, mobile towers around the world are too many, unnecessarily duplicated (multiplied), equipments are replicated by each operator in every cell due to limited peering arrangements (in contrast to submarine cable networks that carry all traffic without discrimination).

Towers are too many, and dangerously low despite the fact that there are known radiation hazards. New technologies and innovations (such as use of Tethered balloons and other types of aerostats in high altitudes for beaming signals over a relative vast coverage area) have not been adopted as widely as could have been, because of archaic restrictions from building laws or tower height laws that do not adapt to positive changes in technology.

By bringing about necessary innovations in Spectrum Policy, the Governments would actually be fostering a new class of investments, beyond Private investments, beyond public-private partnerships - a new class of social enterprise stakeholder investments.

The Myth of Spectrum Auction Revenues:

In India, Spectrum Auctions excluding broadcast spectrum since 2010 yielded $ 51 billion[1] (exchanging a dollar for INR 65), which is impressive, compared to United States spectrum auctions which are said to have raised about $60 billion[2] since 1994. (In India, the telecom

[1] http://wpc.dot.gov.in/WriteReadData/Orders/auction_analysis.pdf
[2] https://en.wikipedia.org/wiki/Spectrum_auction

sector is actually complaining through a news article[3] that Spectrum is nine times as expensive as that of the United States).

Internet Society's Spectrum Paper uses analogies to explain Spectrum and its allocation. Using a new analogy, it is akin to the United States Government receiving 60 billion, as one time license fee from a consortium of Parking Fee Collection Agencies who are granted exclusivity to collect parking fee by the hour for cars, trucks and cycles parked anywhere in United States, in all cities and small towns, roadside, in parking lots, in shopping malls and everywhere, for the next 15 or 20 years.

Spectrum Revenue looks like a windfall, (and figures in billions make impressive newspaper headlines) in India and elsewhere, but there is a different way of looking at this revenue. With the licencing term averaging 20 years, this amounts to a spectrum revenue of $ 2.5 billion per year. Even taking this approximate figure of $2.5 billion, by crude approximation, it would be a revenue of US $ 2.5 per connection (1.012 billion active mobile connections in India in total), which is about 20 cents per month per connection. $ 2.5 billion is 0.43% of India's budgetary revenues of $580 billion, or 0.11% of India's GDP of $2.26 trillion.

Why does the Government of India and the Government of United States, Europe and many others regard this revenue as of any significance? Or, why would the Governments consider it easier to regulate spectrum wholesale by restricting eligibility and affordability to 5-7 telecom firms, as in India? out small enterprises and community operators from the abundant wireless spectrum. Barriers are too many, including that of reserve prices, bid qualification, required deposits, guarantees, and other forms of stone walls that restrict the availability of Spectrum to the Telecom cartels, in exchange for this $2.5 billion. This amount may not actually be fully realized, a large part of what is paid up may probably be ploughed back by way of grants and concessions to Telecom firms for development and infrastructure (conjecture), and bundled with other indirect forms of concessions that might even be considered akin to cash-back, including perhaps direct or indirect provisions that allow Telecom firms to trade part or all of the Spectrum awarded to them. Viewed in this perspective, this revenue is not a sum so significant that in exchange for this 0.43% of its total budgetary revenues the Government locks out all but 5-7 qualified bidders, locks In the end, does this amount to a net-flow of any significance?

From narrow Cartels to a Zero Sum game of benefits to all players, Commercial and Non-Commercial:

The ITU and the Government's view the present method of Spectrum auctions as an effective means to fairly allocate resources, but the present pattern of Spectrum allocation has proved to be a system of unfairness as it has created and reinforced barriers that has created an Inner Circle of bidders with billion dollar cheque books.

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3 https://www.financialexpress.com/industry/telecom-disparity-us-spectrum-9-times-cheaper-than-india-even-though-auction-revenue-was-double/651614/

Dynamic and granular approaches to spectrum management as opposed to long term spectrum licencing strategies is a very good idea expressed in the ISOC Spectrum study.

The Dynamic and granular approaches are not only technically feasible, but financial innovations can also be brought in to ensure that there is no revenue loss for the Spectrum authorities. What if a small operator or a community network is even willing to pay $2.5 per connection per year, and what if the total from small commercial and community networks would add up to the same $2.5 billion (or even more)?

If Spectrum revenues are indeed important, there are other ways of ensuring the flow of Spectrum Revenues at the same rate or inflow, or perhaps even more. We live in a world of technology where banking and accounting mechanisms exist for micro retail transactions that add up to the same billions or more in revenues. If Google can raise invoices for sums so small as $ 2 on 100 million users every month, collect and account small sum revenues, why do Governments find it convenient to do business on Wireless Spectrum only by wholesale transactions? Why require the size of a conglomerate, a bank account in billions, fanciful technical certifications at the door? What if smaller networks could remit a dollar split away from consumer's monthly payments and routed to the Spectrum Authority?

At the same time, the regulatory objectives can also be equally or better achieved by moving away from a policy of restricted number of actors, by opening up the space for more entrants, big, small and charitable.

If Spectrum allocation moves away from its 'wholesale' approach to "Spectrum User's fee" collected from users above a certain class of usage, the Spectrum Revenues could actually exceed the revenues earned by the present model of 'wholesale" auctions. The user's fee could be a part or percentage of the Service Provider's fee collected every month, and automatically be routed to the Spectrum Authority, by using banking and accounting technology the same manner as Google or ebay uses these technologies.

By innovative approaches that distinguish between users who afford communication fees and those who do not, a new Spectrum Policy could take the users beyond operator inflicted service disruptions and keep all users connected for a lifetime at least for basic communications such as voice and short text messages, regardless of their ability to afford periodic payments.

Such an approach may even be designed as a Zero Sum Game:

1. If Spectrum is fully opened up or re-farmed, Telecom companies may have considerable relief from future spectrum commitments
2. Changes in Spectrum policy would cause the ripple effect of shared Investments in new technology, more infrastructure and new equipments, and even in related spaces such as new submarine cable / satellite equipment to minimise burdens of future investments for individual telecom firms, who find changes in Technology too swift to allow time to recover investments from technology already deployed.

3. The policy could cause the Telecom companies, smaller players and community networks to embrace a new and more generous telecom peering architecture, including the possibility of a new eco-system wherein a telecom company wouldn't actually require its own tower where another telecom company's tower and equipment are already in place.
4. New opportunities would arise from new business models (revenues from re-distribution of spectrum acquired by past auctions, some revenues from sharing towers and equipment, revenues from providing wholesale connectivity, revenues from stratospheric infrastructure (Shared stratospheric infrastructure such as balloons placed in orbit by one company could feed and draw from multiple telecom providers)

If the policy changes so as to allow the required flexibility, it would bring in more players to the business / service of Communication and several disruptive innovations would see light, for the benefit of the greatest common good.

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