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Don't dither on space spectrum

India is already lagging in the competition for satellite-based mobile services

EVEN before the dust has settled in the 2G spectrum allocation scandal — in fact, with the Supreme Court serving notice to Telecom Minister A Raja and others on the issue, it looks like the last word is a long way from being said on the scandal-ridden issue — another controversy could well be around the corner.

This time, it is on the issue of the use of the spectrum available with India's space agencies for space-based communications. This is threatening to not only derail India's thrust into satellite-based mobile services, but its hard-won advantage in utilising space-based spectrum. There is also considerable risk to India's long term strategic interests if the current bid is scuppered, something which the government has been inexplicably silent on.

Typically, the 'controversy' has so far been restricted to the media. The department of space, the Indian Space Research Organisation, Devas Multimedia, the company which has leased spectrum for satellite based mobile services — have all been silent on the issue, as indeed the existing mobile service operators or their lobbies.

Rules

But it is not too difficult to see who the interested parties are. Terrestrial mobile service operators are clearly upset that after paying over Rs one lakh crore for 3G spectrum in the recently concluded auctions, an alternative, space-based spectrum option is going to someone for what appears, on the surface, to be a significantly lesser sum.

The issue, unfortunately, is not as simple as that. Space may be the final frontier, but it is a frontier which does not enjoy the happy absence of rules and regulations to be found in old-fashioned frontier country. Yes, here, as in any frontier, fortune favours the brave pioneer. First come is first served, so those nations which make the effort to put physical assets into space do reap the bounty.

But the laws of physics remain the same for everybody, and the available radio spectrum for any space-based application is limited. And, unlike terrestrial networks, any asset in space — like a satellite — has a footprint much larger than the sovereign territory of the country which has put it up there, so there have to be some rules everybody has to play by.

These rules are very simple. First come is first served. Space based spectrum is allocated between competing nations on a 'take it or leave it' basis. If India doesn't occupy a certain spectrum or orbital position, within a time span of some eight years, that is given to anybody else who wants it.

That is not all. In order to prevent the 'hoarding' of a scarce global resource, one more rule is applied — use it or lose it. In other words, once a country has filed for a certain spectrum allocation, if it fails to operationalise assets and services in that spectrum within the timeframe specified by the International Telecommunications Union (ITU) — a global body which oversees telecommunications affairs — then it has to make way for anybody else who is ready and willing to occupy that space.

Of the entire spectrum allocation for space services, the 1-3 gigahertz (GHz) frequency range has special significance. The physics of radio waves is immutable, so only a certain range of spectrum is suitable for certain types of services. So, spectrum in the C band is used for television, as India successfully managed to do with its INSAT series of satellites and the nationwide spread of television services relayed from these satellites.

The Ku band is more suited for smaller aperture terminals and has been used by direct to home (DTH) television and VSAT operators.

Band

For any kind of mobile service, which would rely on a hand held or at best manually portable receiving device, only the S band offers the necessary technical and operational characteristics. The mammoth C band satellite antennae are still not an uncommon sight in Indian cities — just imagine a 'mobile' device which requires an antenna that size!

India has already lost much headway in this area. Only three sub bands (L band, 2 GHz S1 band, 2.5 GHz S band) in the 1-3 GHz frequency range are used for space services, out of which India has access to only one band i.e. 2.5 GHz S Band. India has permanently lost the right to use any spectrum in the E, L, extended L and L2 bands, as well as the S1 bands, due to past errors of judgment and inaction.

In the remaining part of the S band, of the 247 filings currently with the ITU, 106 are by India. This places us in an advantageous position in exploiting space-based spectrum for mobile services.

But here too, there is a catch. Two catches, rather. First, the fact that ITU Radio Regulatory procedures are based on a "first come first served" and "use it or lose it" basis. You have to be not only first in filing for spectrum, but you also have to actually begin using it.

This is not as simple as it appears. The ITU Radio Regulatory procedures also include due diligence process in order to facilitate the actual use of orbit-spectrum and prevent hoarding of resources. Therefore satellite systems need to be brought into use within the time limits specified in the ITU RR provisions.

Once a filing has been received, a country has to co-ordinate with other nations which will be covered by the satellite's signal to ensure that there will be no interference with another nation's services. Then one has to build a satellite, deploy it in space and start using the spectrum.

Here, catch number two appears. The orbit/spectrum resource is the new 'black gold' of the post Industrial economy. It is "orbit/spectrum" because its value can only be realised through the simultaneous exploitation of both the geostationary orbit and the spectrum.

Satellites

The geostationary orbit, a ring of space 36,000 kms above the earth, is where a satellite needs to be placed to ensure that it occupies the same spot relative to the earth at all times. These fixed 'geostationary' positions are extremely desirable because a non-geostationary satellite — the so-called low earth orbital satellites or LEOS — drift out of 'sight' of a terrestrial receiver, which means they cannot function as a fixed relay station signals between geographically separated devices.

Such parking slots are limited. Here too, in order to prevent hoarding, one has to not only claim a slot, but actually have a satellite occupying the space within that specified time to avoid losing it.

But putting a satellite into geostationary orbit is not the same as erecting a telecom tower. It takes years of preparation and planning to do so. If we do not have satellites utilising the S band spectrum within the next couple of years, we run the very real risk of losing this asset. Currently, ISRO is building a satellite, the first of a series, which is scheduled to be launched by the end of this year or early 2011. If this satellite fails to go up on time, we will be sent back to the end of the queue, which could mean several years.

This is the reason nations lobby decades in advance on such regulations. India needs to have its own satellites in space for strategic and economic reasons, and needs to be using them as well. We have already lost irreplaceable space and spectrum by dithering on these issues. By now attempting to compare the apples of terrestrial spectrum with the oranges of space-based spectrum, we are once more busy shooting ourselves in the foot.

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