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SPECTRUM NEGOTIATIONS AND THE GEOSTATIONARY SATELLITES

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The orbit spectrum, in a practical sense, is a finite common pool resource subject to potential pollution and congestion. As such it seems akin to the oil pool, the water shed, the deep sea mineral nodule or the migratory fishery. In fact, none of these common pool resources are owned by individual firms or countries and no exclusive property rights are enforced.

An economic analysis of the value of the radio spectrum and geostationary orbit resource¹ is something which has been conspicuously ignored in literature and international proceedings. It is a particularly useful way of assessing alternatives in the current debate which centers on the future utilization of this resource by the world community.

The key issue is how to induce the developing countries to forego the rigid, detailed and overspecified *a priori*² allotment planning proposed by the 1977 World Administrative Radio Conference (WARC), while at the same time keeping in mind that the developing countries, which represent two-thirds of the International Telecommunications Union (ITU), wield tremendous power because of the present voting formula.³ A solution to this problem would enable the world commu-

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1. The "radio spectrum" refers to the full range of radio frequencies from the lowest to the highest usable by communicating nations, firms or individuals to transmit information via electromagnetic energy. The "geostationary orbit" is located 22,300 miles above the surface of the earth. Objects which are placed in it rotate at the same speed as the earth and, therefore, appear stationary from any point on earth. Accordingly, costly, complex tracking equipment is not necessary, a factor of no small importance to the less affluent developing countries. Conceived in this way, moreover, there is a single geostationary orbit in the plane of the equator able to accommodate a large but finite number of satellites, delimited by signal interference effects as well as physical space. The geostationary orbit is distinguishable from lower, near-earth random orbits or elliptical orbits. H. Levin, *Regional Versus Global Strategies in Orbit Spectrum Management*, presented at the Ninety-Fifth Annual Meeting of the American Economic Association (Dec. 27-30, 1982).

2. *A priori* planning is a term of art for orbit spectrum allocation on the basis of a comprehensive, long-term scheme of pre-engineered assignments. See H. Levin, *The Political Economy of Orbit Spectrum Leasing*, presented at the Fifty-Seventh Annual Conference of the Western Economic Association (July 15-19, 1982).

3. There are 158 members of the ITU, some 60 of which joined the ITU only since

nity to gain the utmost economic benefits that the spectrum and geostationary orbit offer.

In developing a solution, the threshold problem is for the space-resource countries to convince the developing countries that the orbit spectrum resource will be available when they are ready to use it and that they will receive fair and equitable treatment in its distribution. The United States position has been that the orbit spectrum resource should be available on a first-come, first-served basis until the number of space-resource countries warrants an allotment system. This would prevent countries without space-resource capacity from impeding the efficient use of the orbit resource by space-resource countries.

Some possible options for reconciling the values of the developing countries with those of the space-resource countries merit examination. First, rather than the proposed *a priori* allotment plan, there should be periodic, near-term planning conferences where rights or assignments of orbits would be pre-engineered, although not readily transferable. Thereafter, countries should meet approximately every five years to formulate a plan in a structural arena, either regional or global, with near-term rights or attributes specified and vested in nations. More detailed, longer-term input specifications should be postponed until the technology and information emerge.

This approach would allow the space-resource countries to bargain with developing countries over the number of channels or the portion of the orbit spectrum that should be reserved for particular countries and the percentage of the orbit and the spectrum that should be left for free entry on a first-come, first-served basis. The fewer the number of channels reserved, the smaller the area of orbit control that would have to be planned. Further, the smaller the area of orbit spectrum that is planned, the more easily an advanced nation could afford to equip its satellites for speedy repositioning when latecomer nations propose to enter on a pre-arranged basis. For example, an advanced nation might agree to position and equip itself to reposition its satellites ten to twenty degrees, at its own cost, as part of the bargaining process.

A second mechanism is an option which I call the "credible guarantor concept." According to this option, the space-resource nations would induce the developing nations to forego their requirement for a detailed, long-term *a priori* plan in return for a guarantee to accommodate them with orbit spectrum when they come of age technologically.

the WARC conference in 1959. The present voting formula is one nation, one vote. This structure gives the developing countries, which represent two-thirds of the ITU, a great deal of control in the proceedings.

This guarantee would have to contain concrete commitments by space-resource nations in order to induce the developing nations to surrender the current one-nation, one-vote policy.

To safeguard their future access, the space-resource countries would promise to equip their satellites for quick repositioning. The countries that would already be using orbit spectrum would have sufficient motor fuel in space and would already have agreed to reposition their satellites to a significant degree provided that the developing countries agree to refrain from imposing their detailed planning approach. In addition, the user countries could guarantee a phased, time vacating schedule in which no satellite equipment would be launched after a date when such equipment would clearly impair the future entry date set by agreement with the Third World participant scheduled to occupy that specific orbit.

Another safeguard within this second option would be that of a "guaranteed accommodation procedure." The space-resource nations would be required to post a sizeable bond to insure that the interim occupant of the designated orbit spectrum would vacate on schedule. Ideally, this bond would cover the cost of the developing nation's next best terrestrial alternative and would be forfeited if, and only if, the advanced nation failed to withdraw from the orbit on schedule. This procedure would guarantee that when the developing country is ready to utilize its previously assigned orbit spectrum, the interim occupant would have sufficient motivation to vacate. The latecomer nation would also have its next best terrestrial alternative available if the interim borrower refused to vacate its orbit on schedule. Should this occur, the latecomer nation would receive its terrestrial alternative, and the interim occupant would forfeit its bond.

Another option, leasing, purports to reconcile the fairness and guarantees demanded by the Third World with the economic efficiency and flexibility needed by the developed countries. The mechanism of leasing has provided the West with a great opportunity to achieve economic efficiency. In the event that the developing nations are unable to use their own lease assignments, they could sublease their assignments to the developed nations, thereby sharing in orbit spectrum rents before having the technology needed to utilize the assignments. Another advantage is that the developed nations would acquire the additional orbit spectrum assignments necessary for economic efficiency.

The key problem presented by the leasing method is making the assignments easily transferable in order to reconcile the competing interests of the Third World and the advanced nations. The developing countries must recognize that concessions by the advanced countries can help them exercise their rights to the orbit spectrum resource.

Conversely, advanced countries must recognize the determination of the developing countries to maintain control over their potential frequencies and the necessity that they do so.

When examining the proposals of the WARC, the main obstacle to leasing is that, in the detailed, rigid, *a priori* long-term plan, rights are so minutely overspecified that only the nations vested with them could use them. The plan virtually destroys the economic value of orbit spectrum to next best users. The technical burdens inherent in such a plan would make it very difficult to initiate a leasing system. One way to make the orbits more readily transferable, thus enhancing their economic value, would be to delineate them not as unique points on the orbital arc, but as ranges of points, or segments, of the orbital arc. Then, an alternative user could not be prevented from using the assignment because of the orbit's designation as a unique point.

This remedy would require a loosely packed plan which would mean technical underutilization and possible disapproval by engineers. In purely economic terms, however, the net gain would offset the economic loss of technical underutilization. The loosely packed plan, notwithstanding its concomitant technical underutilization, could well facilitate more systematic movement of orbital spectrum from lower to higher valued uses and users. Thus, there would be offsetting compensation of greater net economic outputs.

One final obstacle for economic efficiency, flexibility and transferability, and an inherent part of the market approach, might be eliminated if we could sidestep the cash transaction itself (ITU disfavors cash transactions) and opt instead for payments in kind. For example, a United States company seeking to borrow an unused Mexican slot of orbit spectrum might offer to provide Mexico with domestic circuits, as payment in kind, at an incremental cost to the United States company. Payment in kind could eliminate a cash transaction, while at the same time encouraging flexibility and transferability of orbit slots between the space-resource countries and the less developed countries.

In conclusion, there are at least three mechanisms through which we could attempt to reconcile the conflicting demands of the West and the Third World countries. First, we could replace the long-term, detailed, overspecified plan with a short-term periodic approach (the dynamic approach), leaving inputs unspecified until technology and information emerge. Second, we could devise a guaranteed accommodation procedure with such safeguards as the imposition of a sizeable bond which would be forfeited if the first occupant of the orbital spectrum refused to withdraw when later occupants were ready to enter on a pre-arranged basis. The bond would provide a sum equal to the cost of the later occupant's next best terrestrial alternative. This guarantor con-

cept is geared to making an arrangement tantamount to a first-come, first-served criterion, which would allow the developed countries economic flexibility and would be more palatable to Third World countries. Third, we could institute a system of orbit spectrum leasing to make orbit spectrum planning more acceptable to space-resource countries. In this alternative, one requirement would be to generalize the rights to a specific orbit so as to make them more readily transferable, and a second requirement might be to permit payments in kind as well as in cash.

