IISL-99-IISL.2.07

STRATOSPHERIC STATIONS: DO THEIR OPERATION CAUSE SOVEREIGNITY PROBLEMS?

Prof. Rosa Ma. Ramírez de Arellano
Gurría y Ramírez de Arellano, S.C.
Mexico City, Mexico

ABSTRACT

Communication services based on platforms located in the stratosphere are domestic services among determined fixed points. The advantage they present is that developing countries could explore new communication options to satisfy needs and requirements at a low cost. This document contains: operation characteristics (WRC-97); exclusivity of the spectrum allocation in 47 GHz; internal Mexican legal basis and international ones for its operation, in which we will conclude that it doesn't cause sovereignty problems.

Some of the characteristics of the stratospheric geostationary platforms are that they are based in a technology that allows to locate -lighter than air- repeaters, in fixed points of the stratosphere above all commercial aviation latitudes and metropolitan zones. Those radio-relay link systems that use stratospheric repeaters can provide national or international wireless broad band services to the user's terminal and could turn out to be a global linked system and locally controlled portable facilities to provide interactive services as Internet. According to those characteristics, through the usage of stratospheric platforms, any kind of service fixed, mobile and broadcasting can be provided and applications for tele-observation, among others. Those systems are intended to be developed and in operation worldwide by 2002, according to each countries' regulatory approvals.

INTRODUCTION

This document includes a great amount of technical information, which we shall only state. The experts shall be in charge of making relevant specifications regarding said technical information. However, it is necessary to refer to it, since this will allow us to specify the nature of the services that can be provided through stratospheric stations, the type of coverage they can have and what regulations they must comply with in order to provide telecommunications services, so that we can determine if problems regarding jurisdiction could arise from their installation and operation. If that should be the case, we can determine what provisions States could apply in order to solve said problem. Finally, we shall mention the mechanism that Mexico and the United States have implemented with regards to

telecommunication services on their common border.

GENERALS

The telecommunication system through stratospheric stations, also known as stratospheric platforms, constitutes an important technological innovation which generates new options to meet telecommunication needs. Consequently, it offers wider competition in the telecommunications market. Stratospheric stations shall operate at an altitude of 21 km. in the stratosphere, and shall provide different radiocommunication services, with the possibility of a regional or global coverage.

The concept of stratospheric platforms has existed for a long time. However, at present, the new technology consisting of amorphous solar cells and high efficiency propulsion systems, results in *geostationary* platforms. New composite materials, such as helium sealants and electric propulsion systems, result in *long duration platforms*. This combination of geostationary platforms with a considerable lifespan makes them competitive, with systems comparable to low orbit satellite systems, to enter the global wireless communications market.

Services to be provided

Stratospheric stations are designed to provide Broadband services. The broadband allows a very fast access to the Internet, electronic commerce, interactive TV, videophone, videoconferences and conventional telephone services. This technology represents strong competition for terrestrial and satellite networks regarding the provision of high density fixed wireless services.

The provision of the following services can be pointed out:

- Broadband services (as indicated above)
- Mobile telephony
- Wireless local loop (WLL)
- Remote sensing
- Cartography / management of resources
- Monitoring of the environment

Regional and Global Systems

Each stratospheric station provides instant telecommunications infrastructure for an entire region, and it does not require the deployment of additional stations or of a constellation of stations, in order to provide service. That is to say, each stratospheric station constitutes a stand-alone *Regional System*, which can be individually deployed.

The deployment of 250 stratospheric stations over the 250 most populous cities will create a *Worldwide System* covering more than 80% of the world's population.

The stratospheric stations can be linked directly to one another and can also be linked indirectly via satellite or the PSTN. The stratospheric station user terminals will be designed to share the same radio interface as traditional terrestrial systems. Therefore, a single handset will work with both a stratospheric station and traditional terrestrial towers. This will enable

regional and worldwide roaming with a single handset.

International Telecommunications Union (ITU)

The World Radiocommunications Conference (WRC-97) of the International Telecommunications Union (ITU) set the basis for the beginning of operations of stratospheric stations, which are defined as fixed service.

The definition for stratospheric stations was decided, designating them as "High Altitude Platform Stations (HAPS)";

"Station located over an object at an altitude of 20 to 25 km. and at a fixed and specified nominal point with respect to the Earth."

- 600 MHz (47.2 – 47.5 GHz stratosphere-Earth and 47.9 – 48.2 GHz Earth-stratosphere) were allocated for the HAPS service worldwide.

- It was defined that the notifications by countries of the assignations to these stations must reach the ITU in a period that shall not exceed five years as of the beginning of service of these assignations. The countries must also carry out a procedure of coordination with the countries that have stations that could be affected or which are in more advanced stages of coordination. For that purpose, the procedures for carrying out the coordination among satellite systems and high altitude platform based systems were indicated.

- It was decided that the World Radiocommunications Conference in 2000 should consider regulatory provisions and possible allocations of additional frequencies for the HAPS, bearing in mind the results of the studies on sharing issues stated above.

Operating Conditions

A HAPS is a helium filled, lighter than air platform, with a telecommunications payload. The platform is approximately 157 meters long and 62 meters in diameter. Solar cells covering the majority of the surface of the platform generate all necessary power for station keeping, telecommunications, and fuel cell charging. Fuel cells provide power for all operations during the night and eclipses.

A HAPS is deployed from a launch center through cleared airspace to the stratosphere. Helium carries it to an altitude of 21 kilometers within several hours and moves it to its service position. The HAPS is stationed at an altitude far above those used by commercial aircraft but below the protective covering of the outer atmosphere.

Redundant GPS receivers and the station-keeping technologies enable the HAPS to remain in a nominal fixed position and further enable the antenna assemblies to maintain a fixed coverage pattern on the ground.

HAPS are returned under a controlled descent to ground facilities for upgrades, routine maintenance, redeployment or recycling. Meanwhile, redundant platforms are deployed to provide coverage.

A HAPS does not generate pollution or debris, and does not impact the ozone layer.

In the unlikely event that a platform should develop leaks, the slight difference in pressure between the interior and exterior of the envelope would delay helium loss for several hours, and then the platform, which consists of a soft envelope, would begin a gradual descent. Besides, on-board sensors would indicate the failure and the platform would be brought under control to a service facility.

Regulation

A HAPS does not leave the atmosphere and therefore is subject to inspection and regulation by national aviation and telecommunications authorities. Therefore, proper measures should be established, measures which must consider an adequate regulatory framework, which will allow the implementation of HAPS and, mainly, the control by authorities of this type of systems.

MATTERS REGARDING JURISDICTION

States exercise their sovereignty, their authority, within the limits of their territories. It is feasible to identify and to mark the boundaries or limits of their terrestrial and maritime territory. The problem, as it is widely known, is to mark the limits or to establish the boundaries where outer (extraterrestrial) space begins and "air" space ends.

This issue is important for the purpose of this analysis. However, it is not my intention to go into a detailed analysis of this issue that is on the agenda of the work carried out by COPUOS, and which is the object of deep studies and discussions and which is, in fact, highly controversial and, therefore, has not been solved. In our opinion, due to the fact that all countries, specially, developing countries, are concerned about the definition and use of geostationary satellite orbits, with the objective of ensuring its rational, efficient and economic use, so as to allow equitable access to said orbit and associated frequencies.

It is worth mentioning that, at present, the problem goes beyond geostationary satellite orbits, since it involves other assigned orbits together with the associated frequencies, (low earth orbit satellites LEO's and MEO's) according to the provisions on this matter, established by Article 4 of the International Telecommunications (ITU) Constitution.

Reference to the two points mentioned above, that is to say, to the definition and use of outer space and to the nature of stratospheric stations, is important if we are to conclude that States have the right to place stations in the stratosphere, in objects of their property, within their territory, in order to provide telecommunication services, and, obviously, to have jurisdiction over such facilities and services.

DEFINITION AND DELIMITATION OF OUTER SPACE

Regarding this point, the Fundamental Laws of the majority of the countries, as it is the case in Mexico, consider as State assets, the space situated over its national territory, subject to their jurisdiction, to the extent and modalities established by international law, in this case, international instruments. This issue is not defined in the United Nations Treaties and Principles with regards to outer space, as we have already pointed out. However, this issue is established in other Conventions such as the International Civil Aviation Convention, dated December 7, 1944, which stipulates in its Article 1 that "Contracting States acknowledge that each State has the exclusive and absolute sovereignty over the air zone that encompasses its territory.

The context of the Chicago Convention is, naturally, of an absolutist and conceived character, due to the need to regulate air transportation and because of issues related to national security. At that time, concepts such as "outer", "deep" far or "extraterrestrial" space were alien to any type of regulation because, in essence, there was no issue to regulate as they were not interested in the space beyond the space where aircraft flew. The validity of such Convention could be delimited by the issue it regulates: aviation, and therefore, in relation with the height that aircraft can reach.

Therefore, the sovereign exercise by States responds, in this case, to control matters regarding aircraft that use their "air" space, regardless of whether the aircraft are civil or not. In any case, their authority is limited to allowing or not allowing aircraft, not only those registered abroad but also national aircraft, to operate in their territorial air space.

Thus, we can conclude that, at least up to this date, the height that aircraft fly does not include the use of the stratosphere and this point, due to the fact that outer space is not delimited or defined, may imply that high altitude platforms could be placed in what would be, either the "air" space or outer space.

Juridical nature of high altitude platforms

The second point that we must determine is the juridical nature of stratospheric platforms and, derived from that, if they shall occupy an assigned orbit or a place in the geostationary satellite orbit.

Unlike Conventions on the subject, most national legislation does define what an aircraft is, and most legislation coincides in that they are "vehicles capable of travelling with autonomy in the air space, with people, load o mail".

Regarding the definition of a satellite, the ITU Radiocommunications Regulation (RR) establishes it in the following terms: "Body that spins round another preponderant mass body and whose movement is mainly determined, permanently, by the attraction force of the latter".

From the content of both definitions, it is inferred that stratospheric stations are neither "aircraft" nor "satellites".
The Radiocommunications Regulation does not define stratospheric stations, but it does define the stations that shall

be placed in the platforms: "Station in high altitude platform: Station situated in an object at an altitude of 20 to 50 km and at a fixed and specified nominal point with respect to the Earth".

It refers to the "station" and the station which is being destined to be in, or which was in, or which will be in, an "object" which shall be located outside the atmosphere, falls into the definition that the RR establishes with regards to what a "space station is".

According to the above-mentioned, the stratospheric or high altitude platform is an "object" which shall be placed in the "space", in the stratosphere and, in the absence of a delimitation or definition of outer space, the platform could be considered, with all the reserves of the case, as a "spatial object". However, it is not considered a spatial object according to the terms of the Agreement on the registration of objects launched into outer space, since it shall be placed in an orbit, among other things.

Proprietary rights of the platforms

Besides the issues mentioned above, there is the issue of the proprietary right of the State or of an exploitation enterprise recognized by the State, on the object, in this case, the platform. This issue does not require the recognition by other States, but it does require to respect this right. This has to do not only with domestic legislation of countries but with international instruments, such as the Treaty on principles that must rule the activities of the States in the exploration and use of outer space, including the Moon and other celestial bodies.

Coverage area of the platforms

Placing a stratospheric platform is not, then, a problem regarding the delimitation of outer space in relation with air space. Any State, within its territory has the right to do it. The limitation could be:

1. If the platform is placed in the space of the territory of a third State without its consent, or

2. If, notwithstanding being over the territory of a State, the coverage area goes beyond the border of the other State and provides telecommunication services in the territory of the latter.

Therefore, if the high altitude platform is installed within the territorial space of a State, the sovereign right of third States shall not be affected; nor shall it be affected if the consent of a third State is obtained in order to install the platform in its territorial space. One of the characteristics of high altitude platforms is that they can provide service to several countries (regional).

Telecommunications Services

This aspect is fundamental because countries must provide telecommunication services within their own territory. In the case of platforms, if the problem of its installation is solved, the State the platform belongs to must provide telecommunications services only within its territory. In order for such country to provide services in the territory of another country, it must get the other country's consent through a bilateral agreement. This aspects

involves the right of each State to regulate its telecommunications and to decide, on the basis of its sovereign right, whether it accepts or not that a high altitude platform operator provides services within its territory.

STRATOSPHERIC STATIONS-FRAME AGREEMENT

Due to this type of coverage by telecommunication systems through stratospheric stations (up to 300 km), it is important to consider the need to establish coordination and agreements in border zones in order to ensure a satisfactory operation, in harmony with neighboring countries. The ITU establishes procedures that must be complied with before a stratospheric station begins providing services. This procedures consider giving notice to and coordinating with those countries that have stations that could be affected or that are in more advanced coordination stages.

In the case of Mexico and the United States, the coordination in the common border zone of the fixed and mobile services that share the band used by stratospheric stations, is contemplated within a juridical instrument framework which establishes the guidelines to be followed in order to reach technical agreements, which have been called Protocols. This instrument is denominated "Agreement between the Government of the Mexican United States and the Government of the United States of America regarding the allocation, and the use of frequency bands by Terrestrial Radiocommunication Services, excluding Broadcasting Service, along the common border" with the purpose of establishing and adopting common plans for the equitable use of available frequencies; and in order to establish the technical conditions and criteria to regulate the use of the frequencies.

The technical conditions established in a general way in the Agreement, are defined in detail according to the technical characteristics of each service that is being considered in Protocols, which form an integral part of the Agreement and, consequently, are incorporated to the Protocol. This practice has allowed both countries to reach a number of technical agreements in harmony with the needs of each country and with the advances and requirements of technology.

CONCLUSION

According to the aforementioned, and according to the technical and regulatory considerations stated, in my point of view, it is not possible to face sovereignty problems, as the hypothesis that could cause such problems and that could avoid them are completely identified:

- Platform installation. - Registration before ITU, according to the procedure established in the Radiocommunications Regulations, causes that the countries that could be affected, shall be notified of the technical characteristics and of course they could object the installation and point out that in case that a platform is installed, the existing and the projected services could be protected.

- Provision of telecommunication services. - The rule is that every

country provides the services within its territory and in the case that an operator intends to provide services in other country, he shall submit to the legislation of such country and be previously authorized for that.

RECOMMENDATION

As in the case of Mexico and the United States of America, we corroborate that the best mechanism for two or more countries to establish operation terms and conditions of any kind of telecommunication services, could be concreted through the execution of international agreements, which besides fortifying the International Law, could provide other advantages for the optimization of the usage of the frequency spectrum and reducing costs, advantages for all the countries and mainly for the developing ones.

BIBLIOGRAPHY

- Actas Finales de la Conferencia de Plenipotenciarios de la Unión Internacional de Telecomunicaciones (UIT), Ginebra, 1992; Kyoto, 1994, y Mineapolis 1998.

- Convención de Aviación Civil Internacional, Diciembre de 19994 (Convenio de Chicago).

- Reglamento de Radiocomunicaciones de la UIT, Ginebra, 1997.

- Aerospace Object.- Claudio Zanghi.- Outlook Space Law over the Next 30 Years.- Essays published for the 30th Anniversary of the Outer Space Treaty.- Editor-in-Chief Gabriel Lafferranderie.- Co-Editor Daphné Crowther.- 1997 Kluwer Law International.

- Ensuring Equal Access to the Benefits of Space Technology for All Countries.- Nendasiri Jalestuliyana.- The Use of Airspace and Outer Space of Mankind in the 21st Century.- Edited by Chiau-Jui Cheng.- Kluwer Law International.- 1995.

- Acosta Romero Miguel, "Notas para la Determinación del Concepto Jurídico de Espacio Aéreo", Revista de la Facultad de Drecho de México, Tomo XLV, Ed. UNAM, México, 1995.

- Alonso de Antonio, Angel Luis, "Soberanía del estado y Espacio Ultraterrestre", Temas de Drecho, Vol. VII, Ed. Area de Investigación Jurídica del Departamento de Derecho de la Universidad Gabriela Mistral, Chile, 1992.

- Francoz Rigalt, Antonio, Derecho Aeroespacial, Porrúa, México 1981.