Satellite Navigation, The Best Tools The Most Concern, In Developing Countries

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Abstract

Undoubtedly, using Global Navigation Satellite System (GNSS) is a revolutionary step in civil air traffic management. Improvement of safety and efficient use of very expensive industry are among the long list of the beneficiaries of implementation of GNSS for Air Traffic Management (ATM).

Utilization of the ground based equipments for ATM can be very expensive especially in large area with few air traffic.

Using GNSS in developing countries especially during the period which these services are available free of charge can be considered as important factor for safe and reliable operation of civil aircraft in these countries. However, Sovereignty, Security and national interest of each state in controlling its national airspace are the main concerns in using GNSS for ATM.

The main issues are: who controls the system, and how it is controlled, as the system has an international character due to the wide range of users on a global scope.

This paper attempts to shade some light on the legal framework for GNSS especially from the standpoint of developing countries concerns.

Introduction

In each second more than 20.000 aircrafts are in sky, flying from one part of the world to the other parts in different levels and directions at speed of more than 600 km/h. If these aircrafts had to fly in the same route and same level with minimum five minutes separation, there were a queue of 1000/000 Kms, 25 times round the earth. Fortunately not all these flights, are on the same route and same level, but in order to have safe operations still they have to be kept separated, which causes the congestion in some routes and crowded airports.

The existing ground based equipment and technology of the current air navigation system has its own limitation and it can not meet the needs and requirements of the foreseeable future.

The high cost of ground based equipment especially for developing countries and less traffic areas have negative impact on safety and efficiency of civil aviation.

Using space based technology for Air Traffic Management (ATM) enhance the safety and efficiency of civil aviation all around the world.

The space based system is designated as ICAO Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems.

Global Navigation Satellite System (GNSS) is the core of the CNS/ATM Systems. GNSS is an electronic device which can be used to determine in the course of aircraft flight the real time position of the aircraft. The course and distance to the desired destination, and the deviation from the desired track[1]. GNSS will render the same services as of today's ground base navigation radio services and promote efficiency and safety in the sky.

United States and Russian Federations are two countries which offer GNSS services free of charge for next 10 years. United States by Global Positioning System (GPS) and Russian Federations by Global Orbiting Satellite Navigation System (GLONASS), and European Community (EC) are going to provide the GNSS services within next few years through the Galileo services.

India announced that it will create an independent Regional Navigation Satellite System and China indicated that it will extend its Beidou regional system into a global system called Compass[2].

Legal Issues

In order for the GNSS to be established as the main system of air navigation, many legal issues have to be addressed, both at operational level and policy making. GPS and GLONASS were originally designed for military purposes, and there is no legal guarantees that these services will be available continuously to the users when it becomes the primary source for CNS/ATM.

At present time, under the international law, states have sovereign rights in their air space to regulate and control the operation and management of air navigation services[3].

However in case of GNSS, most of air navigation facilities of a state may be operated or controlled by other countries, which means big change in normal practices of sovereign States.

Key elements

Both users and service providers of GNSS have very important interest in this system, mainly national interest including security and economic benefits, technology progress and social welfare.

The Commercial space sector, including manufacturing, launch services, space products and operating insurance, accounted for an estimated $2.1- billion in revenues in 1980 and exceeded $100-billion by 2004. This growth is being driven by satellite services industry, including telecommunications, which accounted for 60 percent of 2004 commercial space revenues[4].

Up to now, there are 47 states which launched civil satellites to orbit either independently or in collaboration with others, from which 10 states had demonstrated independent orbit launch capacity. Russia, United States and China are the only powers with demonstrated manned space flight capabilities[5].

No doubt that each severing state would like to have direct control over the GNSS in its territory and prefer to use the systems which are operating under the national law of such sovereign state.

Elements such as economical concern, technological know how, and launching capability are the main restriction specially for developing countries which forced them to use the services which are available free of charge by other states.

The costs to launch a satellite into GEO have declined from an average of about $40.000/kg in 1990 to $26.000/ kg in 2000, with prices beginning to consolidate. In 2000, payloads could be placed in LEO for as little as $5.000/kg[6].

Taking into account the investment necessity for a GNSS services such as Galileo less than $ 4 billion with less than $300 million operation and maintenance cost per year. There are more than few developing countries which for their national interest may consider to run their independent GNSS, or at least some of them may decide to share the cost and hence share the control of GNSS.

Technological know-how for manufacturing a satellite is no more a big problem for developing countries and they can use their domestic resources as well as available international market.

However the capability of launching a satellite to orbit specially the GEO is the main obstacle for most developing countries to launch their independent satellite to the orbit.

On the others hand the states which are providing the GNSS are ready to offer for free or reasonable charge for the use of the facilities provided but when it comes to sharing the control of the system, they are not ready to compromise.

Conclusions

National interest, economical benefits, reduction in cost and technological achievements by developing countries from one side and resistance of states which are providing GNSS services to share the control of the system on the other hand, dispite all the efforts which are going on internationally, are the great danger to the success of global CNS/ATM. That means the people of the world will be deprived from the safe and orderly gross of international civil air transportation.

Although the solution for this problem is not simple but it seems that providing GNSS for Global CNS/ATM under the governing control of international body such as ICAO which all contracting states have legitimate rights in controlling of the organization is the long term solution which developing countries may enjoy for their sustainable development.

References

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