The Liability of Global Navigation Satellite System (GNSS) used for Air Navigation in Brazil

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ABSTRACT

The use of Global Navigation Satellite System (GNSS) for air navigation brings important advantages to aviation since it is able to reduce routes, save fuel and diminish greenhouse gas emissions. It is also a more flexible and precise navigational aid that improves flight operations at critical moments such approach, landing and take-off. However, the GNSS signal may fail; and depending on the moment of this failure, its failure could cause an accident. Therefore, air navigation service providers' liability in using GNSS is a concern. Since there is no international treaty that responds to the liability of the GNSS and of air navigation service providers, national solutions appear as a practical and necessary answer to liability claims. Brazil has already started using GNSS in air navigation, and it has a Ground Based Augmentation System (GBAS) that is being tested at Rio de Janeiro International Airport. Therefore, it is important to study the Brazilian liability regime in order to determine if its general liability rules, especially its governmental liability system could apply to the civil liability of the air navigation service providers using GNSS in case of an accident caused by a signal failure. These claims are mostly governed by government liability in Brazil and the legal system in place is able to respond to them. However, since there is much controversy regarding government liability under the Brazilian doctrine, a specific legislation that would be able to balance the different interests at stake seems a reasonable option.

ABSTRAIT

L'utilisation du Système de positionnement par satellites (GNSS) pour la navigation aérienne offre de nombreux avantages à l'aviation puisqu'il est en mesure de réduire les itinéraires, d'économiser de l'essence et de diminuer les émissions de gaz à effet de serre. Il constitue également une aide à la navigation plus flexible et plus précise qui améliore les opérations de vol à des moments critiques tels que l'approche, l'atterrissage, et le décollage. Cependant, le signal GNSS pourrait être défectueux. Dépendamment du moment de la défaillance du signal, celle-là pourrait causer un accident. Ainsi donc, la responsabilité des fournisseurs de services de navigation aérienne est sujette à préoccupation. Puisqu'aucun traité international ne se penche sur la question de la responsabilité du GNSS et des fournisseurs de services de navigation aérienne, des solutions nationales apparaissent comme des réponses pratiques et nécessaires aux revendications de responsabilité. Le Brésil a déjà commencé à utiliser la GNSS en navigation aérienne, et a un *Ground Based Augmentation System* (GBAS) qui est en train d'être testé à l'aéroport international de Rio de Janeiro. Ainsi donc, il est important d'étudier le régime de responsabilité brésilien pour déterminer si ses règles générales de responsabilité – et plus particulièrement son système de responsabilité gouvernemental – pourraient également s'appliquer à la responsabilité civile des fournisseurs de services de navigation aérienne utilisant le GNSS dans le cas d'un accident causé par une défaillance de signal. Ces revendications sont en grande partie gouvernées par la responsabilité gouvernementale au Brésil et le système légal en place pour y répondre. Cependant, puisqu'il y a beaucoup de controverse entourant la responsabilité du gouvernement sous la doctrine brésilienne, une législation spécifique qui serait en mesure d'équilibrer les différents intérêts en jeu semble être une alternative raisonnable.

ACRONYMS AND ABBREVIATIONS

ACC	Area Control Center
ACC-AO	Atlantic Ocean Area Control Center
ADS-B	Automatic Dependence Surveillance Broadcast
TWR	Aerodrome Control Towers
ICA	Aeronautic Cartography Institute
SIPAER	Aeronautical Accidents Prevention and Investigation System
CINDACTA	Air Defense and Air Traffic Control Integrated Center
ANS	Air Navigation Services
ATM	Air Trafic Management
ICEA	Airspace Control Institute
CISCEA	Airspace Control System Implementation Commission
APP	Approches Control
INFRAERO	Brazilian Airport Infrastructure Organization
COMDABRA	Brazilian Airspace Defense Command
SISDABRA	Brazilian Airspace Defense System
ANAC	Brazilian Civil Aviation Regulatory Agency
DECEA	Brazilian Department of Airspace Control
NATS	British National Air Traffic Services
CET	Certificate of Specialized Technical Operations
CGNA	Air Navigation Management Center
CANSO	Civil Air Navigation Services Organization
PNAC	Civil Aviation National Policy
SAC-PR	Civil Aviation Secretariat of the Republic's Presidency
CITEJA	Comité International d'Experts Juridiques Aériens
ADS-C	Automatic Dependent Surveillance - Contract

CPDLC	Controller Pilot Data Link
DAC	Civil Aviation Department
FAA	Federal Aviation Administration
1st GCC	First Group of Communication and Control
FIR	Flight Information Regions
SRPV	Flight Protection Regional Service
GNSS	Global Navigation Satellite System
GPMS	GNSS Performance Monitoring System
HF	High Frequency
ILS	Instrument Landing System's
ICAO	International Civil Aviation Organization
JJAer	Aeronautical Trial Commission
JPDO	Joint Planning and Development Office
LTEP	Legal and Technical Experts for the Establishment of a GNSS Institutional Framework Panel
NASA	National Aeronautics and Space Administration
PBN	Performance Based Navigation
PIC	Pilot in Command
RTCA	Radio Technical Commission for Aeronautics
RA	Resolution Advisory
RVSM	Reduced Vertical Separation Minimum
SARPS	Standards and Recommended Practices
SDAD	Administration Sub-department
SDOP	Operations Sub-department
SDTE	Technical Sub-department
SESAR	Single European Sky ATM Research
GEIV	Special Group for Inflight Inspections
SAGITARIO	The Air Traffic Information Management Advanced System

SISCEAB	The Brazilian Airspace Control System
CNS/ATM	The Communication, Navigation, Surveillance/Air Traffic Management
PAME-RJ	The Electronics Material Park of Rio de Janeiro
SRPV-SP	The Regional Service for Flight Protection in São Paulo
TCAS	Traffic Collision Avoidance System
UNIDROIT	International Institute for the Unification of Private Law
UPS	United Parcel Service
VHF	Very High Frequency

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INTRODUCTION

The idea of using satellites to improve air navigation services began several decades ago. ICAO established a Special Committee on Future Air Navigation Systems in 1983 with the objective of analyzing new technologies that could be used by air navigation service providers in order to keep pace with the growth of the aviation industry while maintaining or even improving global safety standards. Global Navigation Satellite Systems (GNSS) are one of the satellite technologies that makes it possible to identify the geographic location of an airplane even when it is flying in remote or oceanic areas because it provides satellite coverage of the entire earth as opposed to the more limited coverage provided by traditional radar. The use of GNSS in air navigation has helped to improve air navigation services and has also enabled the creation of more precise flying routes that save fuel consumption which in turn reducing greenhouse gas emissions. However, as with any technology, the GNSS signal may not always work properly, and depending on the moment during a particular flight when a signal failure occurs, can lead to an accident. This raises the question of what parties should bear legal culpability in accidents caused by a failure of the GNSS signal. Some countries, notably Brazil, have already started using GNSS in the operation of their air navigation services. However, because there is no international agreement relating to GNSS or air navigation services liability, it is necessary to determine if Brazilian national law is able to address specific claims of liability that could arise in the event of an accident caused by GNSS malfunction.

This thesis studies the civil liability of the Global Navigation Satellite System (GNSS), especially the Ground Based Augmentation System used for air navigation in Brazil, from the perspective of the air navigation service provider in order to determine the liability regime that applies in case of an accident caused by a failure or a lack of the GNSS signal. It also aims to analyze the Brazilian legislation and doctrine in place regarding liability, especially governmental liability, to investigate whether these general rules may answer the specific situation mentioned with its own particularities. Therefore, it uses a doctrinal approach, to study the law, the scholar theories and the court decisions in order to understand the Brazilian liability legal provisions and to propose any change it may

find useful to better approach the subject. During this analysis, it will identify if there is a need for the creation of new specific laws to deal with the problem.

The first chapter will introduce the subject, the use of GNSS to air navigation and it will give a picture of the international liability aspects of the GNSS and of the air navigation service provider. The International Civil Aviation Organization (ICAO) has studied the liability of the GNSS for many years, and it has tried without success to create an international convention on the matter. The International Institute for the Unification of Private Law (UNIDROIT) has been analyzing the possibility of a convention on third-party liability for GNSS. However, in spite of these international organizations' attempts, there is no international agreement regarding the liability of the GNSS, nor is there any agreement concerning the liability of air navigation service providers to date. Therefore, it is justifiable to investigate national law regimes to establish the rules that apply in case of accidents caused by GNSS signal failure used for air navigation proposes. The GNSS has many applications; however, this research focuses on its use in air transportation.

The second chapter explains the Brazilian air navigation framework and its legal regime to determine the applicable rules. Air transportation safety standards determine that the GNSS signal must be augmented through an augmentation system to be used at certain critical points of flight, such as approaching, landing and taking off. Brazil has opted for a Ground Based Augmentation System (GBAS) and this system has been tested at the Galeão international airport in Rio de Janeiro. This thesis will focus its liability studies on this augmentation system, since its use is critical for the safety of flights and the failure of the signal could occur either on the ground at the GBAS level or in space at the GNSS core constellation. Therefore, it seems a good example to analyze both possibilities of failure and their legal impacts, depending on where the failure happens. Air navigation services are mostly provided by the Brazilian Department of Airspace Control (DECEA), a governmental organization that is part of the Aeronautics Command. These services are generally considered a public service in the country. Therefore, governmental liability and its effects on the liability of the GNSS used in air navigation are important aspects to be analyzed. The study of the Brazilian Aeronautical Code provisions regarding the matter is also necessary. In addition, there is a new legislation in Brazil that authorizes the

delegation of certain air navigation services to private entities. The impact of this delegation of public services to private entities on liability will be discussed in order to properly determine the liability regime that may apply to the possible failure of a GNSS signal used for air navigation in Brazil. It will be determined whether the Brazilian legislation in place answers for the liability claims that may rise from a GNSS malfunction or whether it is necessary to adapt it or to create a new law to deal with these specific kinds of liability claims.

CHAPTER ONE

1. 1 GNSS as the Navigation Part of the CNS/ATM Concept

Air transport is an indispensable tool that easily connects the entire world.[1] More and more people and nations rely on air transportation to help them build and keep important government, professional and personal relations. Most places depend on it to keep their economies growing. "Transportation is a fundamental component of economic growth. It is the infrastructure foundation upon which the rest of the economy is built."[2] Vast nations like Brazil depend on aviation to integrate the entire country. When all the flights had to be cancelled for 3 days in the US because of the September 11 terrorist attacks, the aviation industry was profoundly affected.[3] During the 2010 volcano eruptions in Iceland, there was a disruption of air traffic in Europe that lasted for one week. It cost the global economy $5 billion.[4]

The numbers reveal the importance of aviation.[5] The number of people who use it has been increasing every year.[6] However, due to the limitations of the present system, this

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[1] There are 34,756 city-pair routes served globally. In 2011 there were over 2.8 billion passengers. There were 1,568 commercial airlines in 2010 and 3,846 airports with scheduled commercial flights and 192 air navigation service providers. Air Transport Action Group, *Aviation Benefits Beyond Borders* (March 2012), online: Irish Aviation Authority <http://www.iaa.ie/medicalaviationbenefitsbeyondborders.pdf> [*Aviation Beyond Borders*].

[2] Paul Dempsey, *The Social and Economic Consequences of Deregulation: The Transportation Industry in Transition* (New York: Quorum Books, 1989) at 5.

[3] "The stock market closed for four trading days after the attacks, the first time since the Great Depression. (In March 1933, President Roosevelt closed the markets for two days, as part of a bank holiday to prevent a run on the banks.) The stock market reopened on September 17, 2001. The Dow promptly fell 7.13%, closing at 8,920.70. The 617.78 point loss was the Dow's worst one-day drop ever. The 9/11 attacks aggravated the 2001 recession, which started in March 2001. The economy had contracted 1.3% in the first quarter, but had bounced up 2.7% in the second quarter. The attacks made the economy contract 1.1% in the third quarter, extending the recession. The 2001 recession was caused by the Y2K scare, which created a boom and subsequent bust in internet businesses." Kimberly Amadeo, "How the 9/11 Attacks Still Affect the Economy Today", online: About.com US Economy <http://useconomy.about.com/od/Financial-Crisis/f/911-Attacks-Economic-Impact.htm>.

[4] *Aviation Beyond Borders, supra*, note 1.

[5] Aviation served 2.7 billion passengers, and it planned to carry around 5.9 billion in 2030. It had 23.844 aircraft in service in 2010, and it will have around 45.273 in 2030. It supported 56.6 million jobs in 2010, and it is forecast to provide 82 million jobs by 2030. Of course, there are some factors that could cause a lower growth, as the case of growth in passenger and cargo traffic could be one percentage point lower during the period 2010-2030. *Aviation Beyond Borders, supra*, note 1.

[6] "At the dawn of the 21st century, more than 1.000 scheduled airlines operate more than 15.000 aircraft. The commercial airline industry carries 1.6 billion passengers and 22 millions of cargo annually, about 40% of the world manufacturers export based upon value." Paul Stephen Dempsey, *Public International Air Law*

growing use of air transport has represented for some years a constant challenge to all the services involved. These services are provided by different stakeholders, such as the Air Navigation Services (ANS), the airlines, the airports, the different authorities responsible for controlling safety and security, as well as those in charge of providing infrastructure. States have been building the necessary infrastructure for this growth to happen safely. However, if they are obliged to keep up the same pace of growth in the industry, present system constraints will prevent air transportation from being accessible to everyone in the near future.

Constraints in the airports and among the air navigation providers are easily identified: many airports do not have enough runways and slots for the number of flights requested. These problems lead to delays, to increase in the airlines' costs[7] and to environmental consequences from the fuel wasted by airplanes while waiting to land at congested airports. The air navigation systems have already faced the limits of the radar mode, which are terrestrial services[8] with Very High Frequency (VHF) and High Frequency (HF) communications only.[9] They are also based mostly on sky boundaries according to State sovereignty.[10] This thesis will deal only with the air navigation aspect of the problem.

(Montreal: Institute and Center for Research in Air and Space Law, McGill University, 2008) at xiii. In 2011, there were over 2.8 billion passengers. *Aviation Beyond Borders*, *supra*, note 1.

[7] The costs of the airline industry are very high. It is very difficult for them to make profit. To have its tiny margin of profit affected by lack of infrastructure is as bad for a nation as if lacked airlines to connect remote areas to help it build its economy. Paul Stephen Dempsey and Lawrence Gesell, *Air Transport Foundations for the 21st Century*, 3rd ed. (Chandler, Arizona: Coast Aire Publications, 2010).

[8] Radars can only be placed on the ground. Therefore, they are known are terrestrial services. They do not rely on satellites to provide the position of a plane, and they face some operational limitations: they need navigational aids to help them 'see' the location of a plane at some points on the route, and they cannot be used in oceanic areas.

[9] These two types of radio communications do not use satellite either. Therefore, they are limited in coverage and have performance limitations as well, which means they may be very weak in strength and may face more interference.

[10] There was no model in practice of an air traffic management or service that could be offered independent of state frontiers at that time. Today, Eurocontrol is in charge of the safety of air navigation operations for all the European countries. The European Organization for the Safety of Air Navigation is an intergovernmental organization made up of 39 Member States and the European Community. "What is EUROCONTROL" (2013), online: EUROCONTROL <http://www.eurocontrol.int/content/about-us>. However, the 1960 EUROCONTROL Convention, which essentially foresaw a function for EUROCONTROL as a supranational provider of Air Traffic Control ('ATC') services in Europe, turned out to be too ambitious in that respect for most of the present and prospective EUROCONTROL Member States, and the scope of the Convention was therefore amended in 1981. The possibility for States to avail themselves of EUROCONTROL ATC functions was retained when the Convention was amended in 1981.

Three limitations were considered as the specific reasons for the creation of a new navigation concept: propagation limitations of current line-of-sight systems and/or accuracy and reliability limitations, due to the different characteristics of the various systems in place; the difficulty of implementing the current Communication, Navigation, Surveillance (CNS) systems at present in some parts of the world; and the limitations of voice communications without the support of a digital exchange of data.[11]

New technologies have been introduced to the aviation industry to help it overcome its constraints. Satellites are the most important example of this kind of technology. They are responsible for the Global Navigation Satellite System (GNSS) and satellite communications, for example.[12] However, the introduction of the satellite to air transportation represents, besides all the technical improvements and problems that might come with it, many interesting new legal aspects that need to be dealt with by International Law, Public and Private International Air Law, Space Law[13] and national laws, depending on the case.

GNSS is one of the most important revolutions for air navigation providers. It makes possible "the use in oceanic and remote areas, where terrestrial systems are insufficient or unavailable…"[14] It is difficult to believe that in the recent past without the GNSS there was no way to 'see' an airplane over the oceanic areas.[15] "It also diminishes the separation minima among airplanes, increasing the airspace capacity. It creates dynamic routing, reducing fuel consumption and flight time and it increases the precision, particularly when augmented."[16]

Therefore, today it provides ATC services in only four states; set up in 1972, the Maastricht Upper Area Control Centre (MUAC), operated by EUROCONTROL on behalf of four States, provides air traffic control for the upper airspace (above 24,500 feet, i.e. approximately 7,500 meters) of Belgium, the Netherlands, Luxembourg and northwest Germany. E-mail from EUROCONTROL to Juliana Scavuzzi (31 May 2013).

[11] B.D.K. Henaku, *The Law on Global Air Navigation by Satellite – a Legal Analysis of the ICAO CNS/ATM System* (Leiden: The Netherlands: AST Law Monographs, 1998) at 72.

[12] Satellite communications will not be analyzed in this thesis.

[13] This space law analysis will be shown at Topic 1: Space Law Treaties.

[14] Huang Jiefang, "The Use of Global Navigation Satellites By the Aviation Industry," (Power Point Presentation delivered at the McGill University Faculty of Law, 2011) [unpublished] [*Jiefang*].

[15] Satellites made possible entire world coverage of flights. Before, since radar could not be over the oceans, there was no way for an air navigation facility to see an airplane flying over oceanic areas.

[16] *Jiefang*, *supra*, note 14.

The idea to use satellites to improve air navigation emerged almost 30 years ago. The Special Committee on Future Air Navigation Systems was established in 1983 by the International Civil Aviation Organization (ICAO) Council to study new technologies, including satellites, that would help improve air navigation services and manage air traffic at a global level.[17] It was clear the world needed air navigation services capable of easily connecting with one another, without different standards that could present a barrier to facilitation or jeopardize the growth of civil aviation.[18]

The Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM) concept was developed in 1991 at the 10th ICAO Air Navigation Conference to answer the needs of the future of aviation and the evolution of air transport. It proposed the use of satellite technology, digital communications and management of air navigation operations through the interaction of technologies, procedures and human resources.[19]

Rio de Janeiro hosted the ICAO World-Wide CNS/ATM Systems Implementation Conference in 1998. It was attended by participants from 123 Contracting States, 27 international organizations and 38 industry delegations.[20] At this Conference, GNSS "signal providers … focused on the need for co-ordination and regional co-operation to ensure that systems were interoperable so that the goal of a seamless, global air traffic management (ATM) system could be attained. In this context, the need to address CNS/ATM in global terms was repeatedly stressed."[21]

Taking into consideration the achievements, improvements and difficulties found by States and regional planning groups in implementing the concept, it was updated in 2003 and presented at the 11th ICAO Air Navigation Conference as the Air Traffic Management (ATM) Global Operational Concept. This document was conceived as the bible of concept implementation at a global level. However, the complex idea of having global services with interoperability required that the document be updated once again.

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[17] ICAO, *Manual on Required Communication Performance (RCP)*, ICAO Doc. 9869-An/42 (2006), online: ICAO <http://legacy.icao.int/anb/panels/acp/repository%5C9869_en.pdf>.
[18] Ghonam, *The Legal and Institutional Aspects of CNS/ATM Systems for Civil Aviation* (DCL Thesis, McGill University Institute of air and Space Law, 1995) at 4 and 5 [*Ghonam*].
[19] "Novo Pradigma," Aeroespaço: Conhecendo o CNS ATM (2011) at 7-8 [*Aeroespaço*].
[20] ICAO, *World-Wide CNS/ATM Systems Implementation Conference Report*, ICAO, Doc. 9719 (15 May, 1998) at ii-1 [*ICAO Doc. 9719*].
[21] *ICAO Doc. 9719*, *supra*, note 20 at ii-1.

Therefore, it evolved into the 2006 version of the ICAO Air Navigation Global Plan for CNS/ATM Systems.[22]

It was understood at that time that satellites have global coverage and the system had to be planned accordingly. The experts involved in the development of the CNS/ATM concept knew the system would face operations over several flight information regions (FIR) and state boundaries. It created the need for states to become part of the regional and global implementation plans.[23] Hence, the new Air Navigation Global Plan introduced in 2006 and designed to become a basic reference for the world has not only answered national and regional needs, but also attended to the call for a global air navigation system. This emerging concept focused on the differences of realities among states and regions in order to promote global integration in terms of standards and technologies.[24]

States have created their own plans to implement the CNS/ATM according to the basic references introduced by the Air Navigation Global Plan in 2006. Due to the high costs and complex infrastructure each state has to face, this will probably have to be done through a long process. Brazil established its CNS/ATM concept, called CONOPS,[25] in 2008 with 3 different timeframes, from 2008 until 2020.[26]

Eurocontrol, which is responsible for the modernization of the CNS/ATM systems in Europe, created the Single European Sky ATM Research (SESAR). The European Council decided to promote SESAR and called on the European Commission to initiate the necessary steps towards implementation of the project.[27] According to Abeyratne, the goal was "to eliminate the fragmented approach to ATM in Europe, bearing in mind that the traffic would double in 2030, which would necessitate that this growth be achieved

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[22] *See Aeroespaço*, *supra*, note 19 at 8.
[23] *Ghonam*, *supra*, note 18 at 9.
[24] *Aeroespaço*, *supra*, note 19 at 8.
[25] Brasil, Ministério da Defesa, *Comando da Aeronáutica, Concepção Operacional ATM Nacional* (DCA-351-2), (Rio de Janeiro: DECEA), online: Google <https://docs.google.com/viewer?url=http://publicacoes.decea.gov.br/download.cfm?d%3D3678&chrome=true.>
[26] *Aeroespaço*, *supra*, note 19 at 7-8.
[27] Communication EC, *State of Progress with the Project to Implement the New Generation European Air Traffic Management System (SESAR)* (2007), online: <http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0103en01.pdf>.

through significant performance enhancement.[28] This initiative is important as it does not limit its approaches to state boundaries. There have been some legal issues that have emerged from the discussions on the subject, such as competition law problems. According to Schubert, "in fact, the very notion of cross-border service provision, which is viewed as an unconditional necessity for the implementation of the Single European Sky, will unavoidably result in some level of competition as it will challenge the current geographical limits of the areas of responsibilities of each service provider, in other words, its market."[29] ICAO demonstrated its concerns about the subject when it stated that "air traffic management is a part of civil aviation that is more suitable to cooperation and cohesion than to competitive advantage."[30] This work will not go into the details of these issues; nonetheless, they are used as an example to demonstrate briefly how complex the implementation of the modernization of the CNS/ATM systems in many aspects through the world has been.

The United States has its own CNS/ATM process of implementation called NEXGEN, which means next generation transportation system. The NEXGEN project was established in 2003 by the Vision 100 – Century of Aviation Reauthorization Act which created the Joint Planning and Development Office (JPDO) to design and implement the system.[31] The idea was to create a new air transport system able to deal with present constraints and to offer environmental friendly, healthy and safe global interoperable air transportation that would respect concerns about national security for the future.[32] This is considered a holistic approach, since it addresses the technological advances, together with management, governance and corporate foresight, and is always focused on the needs of the costumer.[33] It is a very complex structure that has been created through the joint work of the Federal Aviation Administration (FAA), National Aeronautics and Space Administration (NASA), the Departments of Commerce, Homeland Security,

[28] Ruwantissa Abeyratne, *Air Navigation Law* (Heidelberg: Springer, 2012) at 225 [*Abeyratne*]
[29] Francis Schubert, "The Single European Sky Controversial Aspects of Cross-border Service Provision" (2003) XXVIII J Air & Space L at 36 [*Schubert I*].
[30] Assad Kotaite, "ICAO Users in a Revolution in Global Navigation Technology" (1994) XIX Part I AASL at 337-342.
[31] *Vision 100 – Century of Aviation Reauthorization Act*, online: The Joint Planning and Development Office <http://www.jpdo.gov/vision_100_law.asp>.
[32] *Abeyratne*, *supra*, note 28 at 221-222.
[33] *Ibid* at 222.

Defense, Transportation and the White House Office of Science and Technology Police and private partnerships.[34] Regarding GNSS operations for air navigation, according to NEXGEN plans, GPS is been used to implement the ADS-B (Automatic Dependence Surveillance Broadcast) in the American air navigation system. ADS-B is important since it is able to determine precisely where an aircraft is, helping to improve air traffic management. It also makes it possible for aircraft to broadcast their position to others flying in the same area. Precise airplane location improves air space capacity since airplanes may fly closer to each other and through more difficult weather conditions. Flying more precise routes, they may be more efficient and may also save fuel, which is considered an environmentally friendly consequence of the implementations of the ADS-B.[35] "United Parcel Service (UPS) voluntarily equipped approximately 100 of its aircraft with ADS-B avionics, knowing that it will recoup its investment by saving time and money on flights to and from its Louisville hub."[36] The use of GNSS for air navigation also affects safety positively, as has been proved in southwest Alaska, where the Capstone Project was implemented in 2001. This project aims to enhance safety and efficiency in aviation by using different technologies, including ADS-B. The rate of accidents in aircraft equipped with ADS-B is 37% lower than the rate of aircraft not possessing this advantage.[37]

NAV Canada, the Canadian Air Traffic Control authority, has also been using ADS-B since 2009 in its operations over Hudson's Bay in Northern Canada. It covers 250,000 square nautical miles of airspace. This is an area where most flights between North America and Europe occur, but it also includes flights to Asia and polar tracks. It is estimated that around 35,000 flights per year use these routes.[38]

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[34] *Ibid*.
[35] Geneva Williams, "GPS for the Sky: A Survey of Automatic Dependent Surveillance Broadcast (ADS-B) and its Implementation in the United States" (2009) 74 J Air L. & Com. 474.
[36] Federal Aviation Administration Press Release, *Automatic Dependence Surveillance Broadcast Fact Sheet* (May 27, 2010), online: Federal Aviation Administration <http://www.faa.gov/news/fact_sheets/news_story.cfm?newsid=7131>.
[37] Federal Aviation Administration, *Western Service Area (WSA)*, online: Federal Aviation Administration <http://www.faa.gov/nextgen/implementation/programs/adsb/wsa/>.
[38] Nav Canada, *ADS-B*, online: Nav Canada <http://www.navcanada.ca/navcanada.asp?language=en&content=contentdefinitionfiles\services\ansprograms\ads-b\default.xml>.

Privatization has also been an issue in the modernization of the ATM systems since the need for funding or financing this service became a reality, and it has created many opportunities for private entities to enter into it. ICAO has expressed its concerns about the privatization of ANS and airports, since they are considered monopolies: "Airports and air navigation services are, in essence, monopolies upon which users are highly dependent. With privatization and private participation in the provision of these services, it is important for governments to ensure that monopoly power is not abused."[39] ICAO has also been worried about the charges that could occur with privatization of air navigation services, in order to guarantee that States respect article 15 of the Chicago Convention,[40] which stipulates the rules to avoid unreasonable and discriminatory charging of fees to air navigation services and airports among national and international aircraft.[41] Therefore, in most States that have gone through privatization of this kind of service, regulatory authorities have power to control the abusive behavior of the monopoly.[42] ICAO also, concerning privatization matters, has stated its understanding of agreements signed by Contracting States, such as bilateral or regional air service agreements: "it is essential that before any movement towards private participation or privatization in the provision of … air navigation services is made, arrangements through legislation or regulations should be made to ensure that the provisions of the Convention and other international obligations of the State are fully complied with by the provider of airports and air navigation services."[43]

Although the implementation of the GNSS for air navigation is a very complex process that depends on different factors and needs in various regions of the world, especially to integrate this system at a global level, the GNSS's benefits have already been demonstrated in some areas, as in Alaska and over Hudson. It should not be forgotten that before satellite-improved technology, when controllers relied only on radar, all the flights

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[39] ICAO, *Privatization in the Provision of Airports and Air Navigation Services*, ICAO Circ. 284-AT/120 (2002) at executive summary, item 2, online: <http://portal.aerocivil.gov.co/portal/pls/portal/!PORTAL.wwpob_page.show?_docname=7965502.PDF> [*ICAO Circ. 284*]

[40] *Ibid*.

[41] *Convention on International Civil Aviation*, 7 December 1944, 15 U.N.T.S 295, ICAO Doc. 7300/6 [*Chicago Convention*] at Article 15.

[42] *ICAO Circ. 284*, *supra*, note 38.

[43] *Ibid* at 46.

over the ocean could not be 'seen'. Brazil has also begun using the Automatic Dependent Surveillance –Contract (ADS-C) in the airspace it is in charge of over the Atlantic Ocean. If there is a problem of airspace congestion, shorter and more precise routes will have less impact on the environment in terms of greenhouse gas emissions;[44] and fuel will also be saved, helping the airlines to deal better with their narrow margin of profit.[45] "ICAO estimates that $120 billion will be spent on the transformation of air transportation systems in the next ten years. While NEXGEN and SESAR …account for a large share, parallel initiatives are underway in many other areas, including Latin America, Russia and Japan."[46]

GNSS is already a reality functioning through CNS/ATM systems around the world. The fact that the complex process of implementation of CNS/ATM still has many years to be completed does not mean we can wait to address the legal issues that originate from its use. On the contrary, legal discussions on the matter, such as liability, need to be analyzed in order to determine the rules that States, the industry and consumers may rely on in case of necessity.

[44] The climate targets for the industry are the following: "Aviation will improve its fleet fuel efficiency by 1.5% per annum between now and 2020. From 2020 net carbon emissions from aviation will be caped through carbon-neutral growth. By 2050, net aviation carbon emissions will be half of what they were in 2005." *Aviation Beyond Borders*, *supra*, note 1.

[45] According to Dempsey and Gesell, "Profit … is the margin between revenue and cost. In the airline industry, it is this margin indeed, with net profits often hovering within only a relatively few percentage points (or fractions thereof) on either side of zero." Paul Stephen Dempsey and Laurance E. Gesell, *Airline Management: Strategies for the 21st Cent*ury, 2d ed. (Chandler, Arizona: Coast Aire Publications, 2006) at 111.

[46] "Aviation at a Crossroads: Defining the Future of Air Traffic Management" (2011) 66: 4 The ICAO Journal 6 at 7 .

1.2 The International Aspects of the Liability of Air Navigation Providers

At a time when air transportation was beginning with a limited number of commercial flights operating mostly in the United States and Europe, the first air traffic controller, Archie William, made his appearance at Saint Louis Airport in Missouri.[47] Air traffic management has greatly evolved since 1929, when Archie was in charge of simply using different colored flags to communicate with pilots.[48] Radio communication between pilots and controllers was eventually introduced, radar to locate the airplanes, and a special place for the controllers, a tower, or center, where they could monitor specific regions, which could be an airport, if they were responsible for the aerodrome area, or any other region they might be in charge of.

Today, air traffic control is a much more complex activity that depends on a division of its operations. In order to prevent collisions between aircraft, between aircraft in the maneuvering area and obstructions in that area, and to keep an orderly flow of air traffic, the services are divided among three areas: aerodrome control, approach control and area control.[49] At the aerodrome control, controllers are responsible for the aircraft maneuvering at the airport area during take-off, landing and also taxiing. To better respond to the pilots' needs, they are located in the airport tower, where they have a privileged vision. Approach control or terminal radar control is the region where the airplanes are getting closer to an airport or are leaving it, but are still close enough to be 'seen' by the airport radars. In this area, pilots receive instructions via radio and there is no need for the controllers to have 'visuals' of the airplanes. The approach control service may be established at an area control center or at the aerodrome control tower, depending on the need to combine both services (approach and aerodrome control) at the same place or the suitability of a separate unit.[50] Area control is the 'in route' region to another airport, where airplanes must have a minimum separation among themselves in order to

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[47] Chrystel Erotokritou, "The Legal Liability of Air Traffic Controllers," (2012) 4 Student Pulse, online: Student Pulse <http://www.studentpulse.com/articles/613/the-legal-liability-of-air-traffic-controllers> [*Erotokritou*].
[48] *Aeroespaço*, *supra*, note 19 at 6.
[49] ICAO, *International Standards and Recommended Practices: Annex 11 to the Convention on International Civil Aviation,* 1st ed. (February 1946) at Recommendations 2.2 and 2.3 [*Annex 11*].
[50] *Ibid* at 3.1.

reach their destination safely.[51] Air traffic services also exist to give advice and information for the safe conduct of flights (the flight information service), to notify organizations concerning aircraft in need of search and rescue help and to assist these organizations when required (alerting service).[52]

According to the Chicago Convention, article 28, this activity is the responsibility of a State as it shall "provide, in its territory, airports, radio services, meteorological services and other navigation facilities to facilitate international air navigation, in accordance with the standards and practices recommended or established from time to time, pursuant to this Convention."[53] Art. 28 should be read together with Art. 1: "The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory"[54] and Art. 12, which defines how States might insure every aircraft flying over their airspace or maneuvering within their territory and how they must comply with the regulations established there. Art. 12 also determines the legal regime over the high seas. It is the Chicago Convention that rules,[55] however, States can also agree to oversee some of these regions with the approval of the ICAO Council. The United Kingdom, Canada and Norway have been offering this service.[56] Brazil is another example: it is in charge of part of the South Atlantic corridor between South America and Europe, known as the EURO/SAM, "which lies within Flight Information Regions of Canarias, Dakar Oceanic, Recife and Sal Oceanic."[57] The Brazilian area control responsible for this region is CINDACTA III, which has its headquarters in Recife. It

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[51] Paul Stephen Dempsey, "Liability for Air Navigation Services" (Power Point Presentation delivered at the Faculty of Law, McGill University, October 2011) [unpublished], online: <http://www.mcgill.ca/iasl/sites/mcgill.ca.iasl/files/aspl636-ans-liability.pdf> [*Dempsey*].
[52] *Annex 11*, *supra*, note 49 at recommendation 2.2, items (d) and (e).
[53] *Chicago Convention*, *supra*, note 41 Article 28.
[54] *Ibid*, Article 1.
[55] *Ibid*, Article 12.
[56] *Erotokritou*, *supra*, note 47.
[57] AIS-Espana, *Implementation of RNP-10 in the Corridor between Europe and South America* (17 January 2001), online: South Atlantic Monitoring Agency <http://www.satmasat.com/AICRNP10.pdf> [*Implementation of RNP 10*]. In 1988, ICAO created the South Atlantic group (SAT) to enhance air traffic control services provided in that region. In 1998,the AFI Regional Group on Planning and Implementation (APIRG) agreed to assign to SAT the implementation of new Air Navigation technologies, and CNS/ATM systems to be introduced between the Europe and South-America (EUR/SAM) corridor (AFI routing area AR1). In 2000, the SAT/8 established the tasks to be performed by the South Atlantic Regional Monitoring Agency; and in 2001, the Spanish AIC 4/01 provided information about SATMA's creation and its responsibilities, "SATMA Competences: Maintain and Update the Central Registry of State RNP and RVSM," online: SATMA <http://www.satmasat.com/>.

operates air navigation services covering almost all flights from South America to Europe without interruption and oversees the specific airspace that exists from the Brazilian Coast to Meridian 10 West.[58]

Therefore, air navigation services have a direct relationship with state sovereignty and they are often provided by States. ICAO has already expressed the view that competition does not seem to help improve service, so they are mostly monopolies.[59] However, they could be offered by non-governmental entities with States' oversight and also by joint governmental organizations like Eurocontrol in Europe.[60] The amount of private and public investment and sharing of stakes in these institutions may vary from State to State.[61]

Therefore, even if the Chicago Convention defines State responsibility for air navigation service, the way this service is implemented in each country can affect the liability of this activity. The lack of a uniform international legal document that could easily answer the question of the liability of the Air Navigation Service is another problem. There have been many attempts to create an international convention for the liability of the ANS. One example is the Comité International d'Experts Juridiques Aériens (CITEJA), which has tried to adopt uniform regulation for the liability of air traffic controllers.[62] Argentina also made a formal draft proposal to ICAO of an international convention on the liability of air traffic control agencies during the 25th session of the ICAO Legal Committee in 1983.[63]

If there is a private organization involved or if there is more than one state offering the service, the question of liability becomes more complex. In cross-border provisions, for example, although the level of technical operations needed to adapt the service to more

[58] DECEA, *Brazilian Department of the Airspace Control*, online: DECEA <http://www.decea.gov.br/unidades/cindacta-iii/.>.
[59] *Kotaite*, *supra*, note 30, at 337-342.
[60] At the European level, there were many discussions regarding the competition problem when the services moved from single State operations to joint States services. *See Schubert*, *supra,* note 29.
[61] *Dempsey I*, *supra*, note 51.
[62] *Erotokritou*, *supra*, note 47.
[63] Republic of Argentina, *Draft of the International Convention on the Liability of the Air Traffic Control Agencies* (12-27 April 1983), online: <http://www.aviation.go.th/airtrans/airlaw/LiabilityOfAirTrafficControl.html>.

than one state might be simple, the liability issue is not.[64] It raises some legal questions, such as the need to determine three elements: "the person or legal entity bearing liability for damages caused by an Air Navigation Provider (ANSP) beyond the national borders of the State from which it is operating; the jurisdiction holding competence to rule on liability issues; and the laws which apply to liability issues."[65]

ICAO's Council has an important role when it comes to air navigation matters. Regarding improvement of air navigation facilities, the Chicago Convention, Art. 69 provides that if the Council finds the air navigation of a "contracting State … not reasonably adequate for the safe, regular, efficient, and economical operation …, the Council shall consult with the State directly concerned, and other States affected, with a view to finding means by which the situation may be remedied, and may make recommendations for that purpose."[66] The issue of state sovereignty seems to be one barrier to any action obliging a contracting State to obey the opinion of ICAO's Council, since article 69 only gives power to the Council to provide recommendations. Besides, there is no sanction for disrespect; according to the same article: "No contracting State shall be guilty of an infraction of this Convention if it fails to carry out these recommendations."[67] "If a contracting State so requests, the Council can agree to provide, man, maintain or administer … any air navigation facilities in order to protect the safe, regular, efficient and economical operation of the international air services of the other contracting States. In this case, the Council may specify reasonable charges for the use of the facilities provided."[68] It is also the responsibility of the Council to appoint the Air Navigation Commission.[69] Likewise, the Council may request, collect, examine and publish information relating to the advancement of air navigation.[70]

The Air Navigation Commission is composed of 15 members appointed by the Council from among the people indicated by contracting States who have qualifications and

[64] Francis Schubert, "The Liability of Air Navigation Services in the Single European Sky" (2003) XXVIII Ann. Air&Sp. L. at 57 [*Schubert II*].
[65] *Ibid* at 57.
[66] *Chicago Convention*, *supra*, note 41, Article 69.
[67] *Ibid*.
[68] *Ibid*, Article 71.
[69] *Ibid*, Article 54.
[70] *Ibid*.

experience in the science and practice of aeronautics.[71] Regarding the duties of the Commission, it shall consider and recommend to the Council for adoption, modifications of the Annexes to the Convention. It can also establish technical sub-commissions, on which any contracting State may be represented, and may advise the Council regarding the collection and communication to the contracting States of all information which it considers necessary and useful for the advancement of air navigation.[72]

ICAO establishes the Annexes of the Chicago Convention through the Council's approval; they are the SARPS (Standards and Recommended Practices),[73] and they deal with different aspects of commercial aviation, according to Art. 37. There are two annexes that are relevant to Air Navigation: annex 11, concerning Air Traffic Services, and annex 2, which states the Rules of the Air. "Under both, responsibility is placed on the nation to assure safety in the air."[74] Besides the abovementioned annexes and together with them, Doc 4444, PANS-ATM and the Regional Supplementary Procedures – Rules of the Air and Air Traffic Services, contained in Doc 7030, govern the application of the Procedures for Air Navigation Services – Air Traffic Management.[75]

Annex 11, on the Air Navigation Services, was first adopted in 1950. In 1945 it was made the first recommendation for the SARPS regarding Air Traffic Control by the Rule of the Air and Air Traffic Control Division. The Council approved the SARPS in 1946 after the Air Navigation Committee had revised them. The name was changed from control to service "in order to make it clear that air traffic control service was a part of the services

[71] *Ibid*, Article 56.
[72] *Ibid*, Article 57.
[73] Standards and Recommended Practices are adopted by the Council under the provisions of the Chicago Convention. According to Annex 11, a Standard is defined as "any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regulatory or international air navigation and to which contracting States will conform, in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under art. 38." A Recommended Practice, also defined in Annex 11 is "any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interests of safety, regulatory or efficiency of international air navigation, and to which Contracting States will endeavor to conform in accordance with the Convention." *Annex 11*, *supra*, note 49.
[74] Paul Stephen Dempsey, *Aviation Liability Law* (Toronto: LexisNexis, 2009) at Chapter V - Government Liability - 3 [*Dempsey II*].
[75] *Annex 11*, *supra*, note 48 at Applicability.

covered by Annex 11, together with flight information service and alerting service."[76] The purpose of annexes 11 and 2 is to "ensure that flying on international air routes is carried out under uniform conditions designed to improve the safety and efficiency of air operation."[77] The annexes apply to the airspace over the jurisdiction of a contracting State if the air traffic service is provided and also in areas over the high seas for which States take responsibility,[78] as in the case of Brazil, which is in charge of the EURO/SAM airspace corridor in the Southern Atlantic.[79]

Since SARPS make possible the uniform approach necessary for safe commercial aviation, they are taken seriously enough that a State must make a notification of differences, according to article 38, if it "finds impracticable to comply in all respects with any such international standard or procedure, or to bring its own regulations or practices into full accord with any international standard or procedure after amendment of the latter, or which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard.…"[80] Contracting States should take into consideration the types of aircraft involved and the density of the traffic, together with the meteorological conditions and other factors considered relevant in order to determine the need for air traffic services.[81]

International Air Navigation Services are governed by the Chicago Convention and its Annexes. Therefore, ICAO plays an important role in determining the SARPS and addressing legal issues regarding the matter through its Legal Committee. As will be described, ICAO has already spent many years studying the matter of liability of the GNSS services. Considering the importance GNSS has received in relation to the CNS/ATM concept and the paramount and sovereign service air navigation is, ICAO's interest in this matter is understandable. However, it is not the only international

[76] *Ibid* at Historical Background.
[77] *Ibid* at Applicability.
[78] *Ibid*.
[79] *Implementation of RNP-10*, *supra*, note 57.
[80] *Chicago Convention*, *supra*, note 41 Article 38.
[81] *Annex 11*, *supra*, note 49 at Recommendation 2.4.

organization that should act concerning the GNSS liability issue in order to create a legal framework on the subject.[82]

1.3 Air Navigation Service Liability Regimes

There are fundamental principles involved in the general provisions for civil liability of the Air Navigation Service. "The general rules which apply to ANS liability are strongly determined by two key-factors…: the status of ANS as sovereign functions and States' commitments under article 28 of the Chicago Convention."[83]

Air Navigation Service is considered a public sovereign service, not taking into account its own intrinsic nature, but much more concerning qualifications given by national legislation, which reflect the political and moral values of a specific society.[84] It is directly connected with the promotion of public safety, both in airspace while flying and also on the ground; and this protection is normally seen as provided by public services.[85] The sovereign aspect of ANS is connected to the fact that most of these services support police and national defense activities. Therefore, they are supposed to monitor and report any disrespect for the rules. They are considered in many European countries as 'police functions'.[86] Besides, the First and Second World Wars already demonstrated the importance of respect for the sovereignty of the airspace above the territory of any State, and this concern dramatically influenced both the Paris (1919) and Chicago Conventions (1944).[87] "With the taste of war fresh in the mouths of the delegates at Paris, they rejected the tradition of Hugo Grotius' 'freedom of the seas.'"[88] Sovereignty itself is still a

[82] These other organizations will be mentioned in the subtopic Space Law Treaties.
[83] *Schubert II*, *supra*, note 64 at 61.
[84] *Ibid*.
[85] *Ibid*.
[86] *Ibid*.
[87] According to Dempsey, "The World Wars have been catalysts for multilateral aviation agreements. At the end of the first World War, the major aviation powers draft the first multilateral air transport agreement … the Paris Convention, which, inter alia, confirmed State sovereignty over their air space. As World War II was drawing to a close, the United States invited the world community (absent the Axis powers) to attend a conference in Chicago … and drafted the Chicago Convention." Paul Stephen Dempsey, *Public International Air Law* (Montreal: McGill University, 2008) at 8 [*Dempsey III*].
[88] *Dempsey III*, *supra*, note 87 at 16.

fundamental principle of International Law.[89] In Brazil, for example, since the military had to provide the defense system and they could perform both defense (police service) and air navigation services with the same kind of radar technology, they were given both tasks. Aeronautics has been in charge of air traffic control in Brazil since the beginning.[90]

As a consequence of this close connection to the sovereignty and public service principles, together with the provision of article 28 of the Chicago Convention, "the delegation of the functional responsibility for ANS provision to a third party, even to a private company, does not affect in anyway the status of the activity. The sovereign nature of ANS is not related to the identity of the provider, but to the legal status of the activity…autonomous providers are entrusted to perform a public and sovereign task, upon a mandate from and within the limits of the sovereign airspace of the parent State."[91] For this reason, delegating the ANS to private entities does not redeem the State from its responsibility since it still remains in charge of the service, according to article 28 of the Chicago Convention.[92]

ICAO has shown that there is no prohibition in the Chicago Convention on contracting States' delegating their responsibilities, like the one defined in article 28, to provide air navigation services. They can delegate them even to private entities. Although "the ownership and management of… air navigation services may be delegated to the private sector, … the overall responsibility for the provision of services in compliance with the Convention and Standards and Recommended Practices remains with States."[93]

In the case of delegating ANS, States should strengthen their regulatory framework in order to exercise the necessary oversight on the ANS provider. The growing number of privatizations has affected States' responsibilities as they need "to monitor and take

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[89] "…in spite of the advances made, the International Community is still a society composed mainly of Sovereign States and is characterized by the decentralization of political power." Carlos Fernandez de Casadevante Romani, *Sovereignty and Interpretation of International Norms* (Madrid: Springer, 2007) at 3.
[90] Eno Siewerdt, "O Modelo de Controle de Espaço Aéreo Brasileiro e sua Integração com outros sistemas" (Paper delivered at Simpósio de Transporte Aéreo, November 2008), (2008) LVIII-LXII Sitraer 7, online: <http://www.tgl.ufrj.br/viisitraer/pdf/p07.pdf>.
[91] *Schubert II*, *supra*, note 64 at 62.
[92] *Dempsey II*, *supra*, note 74 at 1.
[93] ICAO, *Commercialization and Privatization of Airports and Air Navigation Services Providers*, AT Conf. 6-WP16 (18-22 March 2013), online: ICAO <http://www.icao.int/Meetings/atconf6/Documents/WorkingPapers/ATConf6-wp006_en.pdf>.

corrective action"[94] to guarantee the quality of service and to avoid the abuse of this monopolistic system. "Accordingly, it is necessary that the existing regulatory organization within the State be strengthened, not only quantitatively but also qualitatively. The regulatory body should be supported by an adequate legal framework and should be independent, at least in States with high volumes of traffic, to avoid conflicts of interest."[95]

"Regardless of the organizational structure or the legal status given to … air navigation services, the State remains ultimately responsible for safety and security. The State should consider implementing an oversight mechanism to monitor the monopolistic tendencies of … air navigation services, to measure performance and productivity and to ensure compliance with fair and equitable cost-recovery as well as with ICAO policies and principles."[96]

Although the Chicago Convention generally states the responsibility of States to provide ANS, there is no international liability regime that responds to this problem, like the regimes air carriers have in the Warsaw and Montreal treaties. States must use their domestic regulatory system to treat the matter. No compensation can be claimed directly from article 28, unless States have created a legal mechanism for this to happen. There seems to be no State that has already created a national law that specifically deals with ANS liability, taking into consideration its peculiarities.[97] As a consequence, the cases may be treated with more complexity and different approaches; and more space is also given to a wider difference of interpretations from the courts, which most of the time do not leave behind their ideology and political views. It is important to examine some countries' approaches in order to gain a better picture of the problem. It is for this reason that some States have already proposed the creation of an international liability regime for the ANS, as it would simplify the claims process and could also offer a clear solution to the issue. However, every State has its own approach and is influenced by its own government's liability regime. "Because of the sovereign nature of the ANS, most

[94] *ICAO Circ. 284*, *supra*, note 39 at 6.13.
[95] *Ibid.*
[96] *Ibid*.
[97] *Schubert II*, *supra*, note 64 at 64.

national laws recognize, in one way or another, the central position of States, in respect of such responsibilities, even when the service provision function is outsourced to an autonomous entity. However, the practical modalities foreseen reflect fundamentally different philosophies from one country to another."[98]

Therefore, government liability policies will influence ANS liability in most countries. The theory of government immunity may become a barrier for recovery, or it may only increase the complexity of the issue, depending on the case and the domestic system. "The principle of sovereign immunity prohibits law suits against the government brought by its citizens. However, some governments have provided a statutory means of redress in the courts. Often the right conferred is restricted in certain ways, so that a claimant does not have the same set of rights — procedurally and substantively — to sue his government as he does to sue a private or corporate person."[99] In Europe, however, this theory is normally not used; but one problem they face is the fact that in the matter of ANS liability, ANSs are considered public services and therefore fall under the jurisdiction of administrative courts rather than civil ones.[100]

Some doctrines of State Responsibility Law can be cited that could be used as an argument for defendants in different countries. Since the States have different national legal approaches to ANS liability, these doctrines are used in different national courts, depending where the case is brought. They are as follows: the State's primary responsibility, the State's ultimate responsibility, the service provider's exclusive liability and the practical consequences of the various doctrines.[101]

The primary responsibility doctrine "assumes that, regardless of the identity and status of the service provider, and independently from any fault or wrong doing of the State itself, that State stands liable on the front line for any damage resulting from ANS failures."[102] As a wrongful act might be the cause for a claim for compensation, in this case the State

[98] *Ibid* at 64-65.
[99] *Dempsey II*, *supra,* note 74 at 1.
[100] *Schubert II*, *supra,* note 64 at 69.
[101] *Ibid*.
[102] *Ibid* at 65.

has the right of recourse against the effective service provider, as in Germany,[103] where the right of recourse is possible in case of gross negligence.[104] In the German case, even though the ANS is provided by a private law company, it is state owned and the German State has control over it. Therefore, it is entirely responsible for the liability claims. This doctrine protects private citizens, who are considered innocent of the State's decision to delegate its functions to anyone else; for they should be protected from the bad consequences that could arise from this decision.[105]

The State's ultimate responsibility differs from the first — primary liability —because it imposes on the effective provider of the service the burden to pay compensation in case of damage. However, it recognizes the ultimate responsibility of the State in the sense that, if the effective provider cannot afford the claim, the State will ultimately be responsible for it. For example in Switzerland,[106] although Skyguide, the service provider, is a private-law institution, it holds 99% State capital and the service is offered through a federal mandate. It is also considered to exercise a sovereign function in the name of the State. Therefore, it does not rely on the same liability regime as a regular private company would. The regime that applies to Skyguide is the Federal Law on the Liability of the Confederation,[107] which states the direct liability of the State for damages caused by its agents. The liability, however, is passed on to the entity effectively offering the public service. The claim must be made against this institution, but the latter has the right of recourse against the agent in case of willful misconduct or gross negligence.[108]

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[103] The German Constitution, Article 34, defines the liability for violation of official duty: "If any person, in the exercise of a public office entrusted to him, violates his official duty to a third party, liability shall rest principally with the state or public body that employs him. In the event of intentional wrongdoing or gross negligence, the right of recourse against the individual officer shall be preserved. The ordinary courts shall not be closed to claims for compensation or indemnity." *Basic Law for the Federal Republic of Germany*, 1949, in the revised version published in the "Federal Law Gazette Part III", classification number 100-1, as last amended by the Act of 21 July 2010, online: <http://www.gesetze-im-internet.de/englisch_gg/englisch_gg.html#p0169>.

[104] *Schubert II*, *supra*, note 64 at 65.

[105] *Ibid* at 64.

[106] *Ibid* at 67.

[107] Article 1, f defines the scope of this law as including all persons entrusted directly with public law tasks by the Confederation. Since air navigation services are a State's responsibility according to the Chicago Convention, Article 28, they are a public law task. *Federal Law on the Responsibility of the Federal Government, Members of the Government and its Officials (Switzerland)* (1958), online: <http://www.wipo.int/wipolex/en/text.jsp?file_id=219925>.

[108] *Schubert II*, *supra*, note 64 at 67-68.

The service provider's exclusive liability obtains when the "State will only remain responsible and liable for damages caused by its own, direct fault. In all other instances, the effective service provider would stand alone on the liability front."[109] Normally, there is no possibility of the State's responding for damages when the effective service provider cannot afford it, as it has done nothing wrong. As an example, England[110] has the one completely privatized ANS in Europe, called the British National Air Traffic Services (NATS).[111] In this case, NATS would go directly to court to answer any liability claim.[112] According to Niels van Antwerpen, it functions as "the fault-based liability regime for which a damage claim should be filed with NATS."[113] Although the State has no legal obligation to step in place of NATS, if the latter has no financial resources to honor its claims, it could be assumed that "since the presence of the State as the ultimate safeguard for national security and public safety issues appears also in this Common Law model, …it is believed that it would be politically unacceptable for the State not to substitute for NATS in the event of financial insolvency."[114]

Given the responsibility invested by the Chicago Convention in contracting States, they will provide ANS, but also decide the way it should be done to be more suitable for their reality. They can do it in three different forms: offer the service themselves through a

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[109] *Ibid* at 68.

[110] Transport Act, 2000, Chapter 38, s 5 (4) determines that a license is granted to a company to provide air traffic services in accordance with the Companies Act 1985 or the Companies Order 1986 (Northern Ireland). This license is the legal chain which authorizes the provision of services. *Transport Act 2000* (UK), c 38, s 5(4), online: <http://www.legislation.gov.uk/ukpga/2000/38/contents> [*Transport Act 2000*].

[111] This privatization was done through a public-private partnership, with the majority on the private side. According to NATS: "the fundamental concept underlying the sale of the NATS Group by the Government was the concept of a Public Private Partnership, involving the selection of a Strategic Partner who would take on the management and control of the NATS Group. The associated legislative, corporate, financing and regulatory package that brought about that PPP is principally embodied in: The Transport Act, 2000, the terms of the NERL license, the existing corporate structure of the group, the finance and security package that was premised on all of the above and the conditions of the NERL License incorporating the ex-ante safeguards." "Letter from NATS, British Air Navigation Service Provider" (22 October 2012) in response to "CAA's Interim Report on its Ad-Hoc Review of NATS Related Risks at Item 44", online: <http://www.caa.co.uk/docs/5/NatsNATSRisks.pdf>.

[112] Transport Act 2000, chapter 38, s 10, (2a) determines a right of action in respect of an act or omission which takes place in the course of the provision of air traffic services; and s 24, (3) defines the obligation to compensate the license holder if a breach of duty occurs; and if it causes a person loss or damage, it is actionable by him. *Transport Act 2000*, *supra*, note 110.

[113] Niels van Antwerpen, *Cross-border provision of Air Navigation Services with specific reference to Europe: Safeguarding Transparent Lines of Responsibility and Liability* (Doctoral Thesis, Leiden University, 2007) at 167.

[114] *Schubert II*, *supra*, note 64 at 68.

governmental body; give it over to an independent entity to provide the service; or delegate it to another State. Even in the last case, the responsibility remains with the State delegating the service to another.[115] All in all, it seems that for the results of liability claims, although the three doctrines might be different in theory, in the end the consequences appear to be very close. The wrongdoer normally answers for the damages, either directly or through the right of recourse. The State mostly pays for the compensation as a substitute, be it to pay compensation for the insolvent wrongdoing provider or for its insolvency when the State has the right of recourse against it.[116]

The liability of cross-border service, however, is more complex. If the damages are experienced in a different country from that in which the ANS is operating, several questions will be added to the equation: which State is responsible for the damages, the one offering the service or the other one where the damage occurred? Is it the State of the provider or the ANS institution itself that responds? Which law should be applicable since there is no international regime? Should the law of the State where the damages occurred or the national law of the service provider be chosen? Last, but not least, which court has the jurisdiction: the national courts of the State where the damages occurred or the national courts of the ANS operator?[117] According to Schubert, conflicts of laws and jurisdictions could happen if no arrangements are made. The conflicts could be good if there are various States where the damages could be claimed; however, they could be bad if all States were to decline competence over the subject, leaving no place to receive compensation.[118] Europe faces all these discussions with the Single European Sky implementation. With geographically favorable characteristics and an airspace where demand and capacity had been posing challenges for some years, Europeans had to find a better solution for airspace by managing block allocations mainly according to State boundaries. Although the Single European Sky is a relatively new service in practice, cross-border provisions are not a new service option. They have already been done

[115] *Ibid* at 62-63.
[116] *Ibid* at 69.
[117] *Ibid* at 71.
[118] *Ibid*.

through ATS delegations.[119] ICAO allows States "to delegate to another State the responsibility for establishing and providing air traffic services in flight information regions, control areas and control zones, extending over the territory of the former."[120] The European community determines national supervisory authorities' cooperation to guarantee the necessary level of supervision of ANSP with a valid license for one member state that also provides services to other member state.[121] They need to include agreements to deal with the breach of the common requirements established, such us the technical and operational standards, safety, quality of service, liability, ownership and security.[122]

The problematic of the numbers of provisory or permanent cross-border provisions that exist without a formal delegation should be mentioned.[123] They could create situations even more complicated in cases of damage. The nature of the ANS sometimes routinely demands this kind of cross-border procedure. "It is recognized that in the interface between two adjacent control sectors, it may be necessary, on an expedient basis, for an ATC unit to intervene on aircraft operating beyond the limits of its own control sector, in case of potential conflict at the common boundary between the two control sectors."[124] Although ICAO specifies the responsibility of only one air traffic control unit per

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[119] *See* (EC) No 549/2004 of the European Parliament and the Council of 10 March 2004 laying down the framework for the creation of the single European sky ("the Framework regulation"). Article 3 defines the EU Regulations involved in the matter: "This Regulation establishes a harmonised regulatory framework for the creation of the single European sky in conjunction with: (a) Regulation (EC) No 551/2004 of the European Parliament and of the Council of 10 March 2004 on the organisation and use of the airspace in the Single European Sky (the airspace Regulation); (b) Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the Single European Sky (the service provision Regulation); (c) Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (the interoperability Regulation)." EC, *European Parliament and Council Regulation (EC) 549/2004 of 10 March 2004 laying down the framework for the creation of single European sky*, [2004] OJ, L 96 31.3/1 at Article 3, online: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2004R0549:20091204:EN:PDF> [*EC 549/2004*].

[120] *Annex 11*, *supra*, note 49 at Chapter 2, paragraph 2.1.1.

[121] *EC 549/2004*, *supra,* note 119 at Article 1.4.

[122] EC, *European Parliament and Council Regulation (EC) 550/2004 of 10 March 2004 on the provision of air navigation services in the single European sky*, [2004] OJ, L 96 31.3/10 at Article 6, online: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2004R0550:20091204:EN:PDF>.

[123] *Schubert II*, *supra*, note 64 at 72.

[124] *Ibid*.

airspace block,[125] it also recognizes the need for coordination between providers in this kind of situation.[126]

Besides the liability of the service itself, there is the liability that could arise from the regulatory body. It defines the rules that govern the ANS activity. "Although regulators have remained largely immune from liability litigation, their activities may generate legal liabilities and their legal exposure is far from being theoretical."[127] If the regulatory system fails to provide a safe and secure ANS through its regulations, it may also face responsibility for damages that could be a consequence of this failure. For example, the case of a controller being misguided by its own manuals during the implementation of a new system could be cited.

The lack of contract between the ANS and the air carrier, which is the most frequent user of this service, could also be highlighted. Although the airlines pay a fee for the ANS, since it is considered a public service directly connected with State sovereignty, it is not customary practice to have a formal agreement between airlines and ANS. This reality might change in the future with the increased amount of private participation in the market.[128] "Contrary to the air carrier that has a contract with the passenger under the Warsaw and Montreal Conventions, air navigation service providers or air traffic controllers themselves, do not generally enter into contracts with airlines.… In the same way, third parties on the ground do not enter into any contract transaction or agreement with air navigation service providers."[129]

There is, however, one example worth mentioning - New Zealand - which has a contractual framework that regulates the relationship between the air navigation service provider (Airways Corporation of New Zealand Limited or Airways) and the airlines. Airways is a State-Owned Enterprise (SOE) created under the SOE Act in 1987 to provide commercially air navigation services in New Zealand. It is authorized by Section 99 of the Civil Aviation Act 1990 and Part 172 of the Civil Aviation Rules to promote its

[125] *Annex 11*, *supra*, note 49 at Paragraph 3.5.2.
[126] *Schubert II*, *supra*, note 64 at 72.
[127] *Ibid* at 62-63.
[128] *Erotokritou*, *supra*, note 47.
[129] *Ibid*.

activities in accordance with the Standard Terms and Conditions for the Provision of Airway Services. These Standard Terms establish the contractual rules between the air navigation service provider and the airlines. Therefore, Airways regulates charges, payments, and limitations and exclusions of liabilities.

Regarding liability exemptions and limitations, Section 10.2 states that the air navigation service provider has

> "[ ]. . . no liability for loss, damage or delay suffered or incurred by an operator, whether such liability arises in contract or in tort or in any way howsoever, in respect of or arising out of or in any way connected with the provision of Airways services contemplated by these standard terms except as follows:
>
> a) In the case of claims for loss or damage to the hull of any aircraft, the liability of Airways (if any) shall be limited to the direct cost of repair or replacement up to the insured value of such aircraft.
>
> b) In the case of claims arising from the death of or injury to any person the liability of Airways (if any) shall be limited to the equivalent of 100,000 Special Drawing Rights per person.
>
> c) In the case of claims in respect of loss of or damage to passengers' baggage the liability of Airways (if any) shall be limited to 1,000 Special Drawing Rights for each passenger.

> d) In the case of claims in respect of loss of or damage to cargo the liability of Airways (if any) shall be limited to 17 Special Drawing Rights per kg of cargo."[130]

This example demonstrates that although a contractual framework is not the common practice globally, it could be established in other countries as a method of defining the rules that govern the relationship between airlines and air navigation services providers concerning liability that may rise from the provision of these services.

The free flight concept[131] should also be mentioned since it could affect the responsibility of pilots and air traffic controllers. This idea was introduced due to CNS/ATM, and it may affect in the future the study of a possible liability regime. It was introduced to air navigation with the objective of providing pilots during flight with the same knowledge air traffic controllers have on the ground, according to the kind of information given to the pilot about the aircraft's capabilities. On the basis of this accurate information, pilots would be able to decide by themselves, with the assistance of computer generated advice, about traffic separation.[132] Free flight would be possible during flights under instrument flight rules (IFR), and the pilots would have freedom to choose the path and the velocity.[133] Free flight is an American concept defined by the Radio Technical Commission for Aeronautics (RTCA). The RTCA as a federal advisory committee is a private, not-for-profit organization that creates recommendations for the FAA regarding CNS/ATM. The FAA takes its recommendations as background for policies, programs

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[130] *Standard Terms and Conditions for the Provision of Airway Services*, online: Airways New Zealand <http://www.airways.co.nz/documents/Standard-Terms-and-Conditions_1-July-2012.pdf>

[131] According to the Radio Technical Commission for Aeronautics (RTCA), free flight is "a safe and efficient flight operating capability under instrument flight rules (IFR) in which the operators have the freedom to select their path and speed in real time. Air traffic restrictions are only imposed to ensure separation, to preclude exceeding airport capacity, to prevent unauthorized flight through special use airspace, and to ensure safety of flight. Restrictions are limited in extent and duration to correct the identified problem. Any activity which removes restrictions represents a step towards free flight...." "Overview: the free flight concept from an ATC perspective", online: Air Traffic Control (ATC) Aspects of Free Flight <http://www.freeflightatm.org/overview.html>.

[132] Francis Schubert, "Pilots and Air Traffic Controllers: Allocating Legal Liabilities in a Free Flight Environment" (2001) XXVI Ann. Air & Sp. L. at 202 [*Schubert III*].

[133] "Report for the RTCA Board of Directors' Selected Committee on Free flight", (1995), online: RTCA <http://www.rtca.org/store_product.asp?prodid1040>.

and regulatory decisions.[134] The Europeans have adapted the free flight concept to their reality, as a practical solution for the implementation of the ICAO CNS/ATM concept and have renamed it Free Routing.[135] "Although from a theoretical perspective this ideal description of a new distribution of responsibilities appears straightforward, the concept nevertheless obviously includes a critical element, namely the definition of the exact moment at which the air traffic controller is required to intervene."[136] This might affect the responsibility of ANS providers, depending on the way it is interpreted in future. The moment when a decision must be made sometimes lasts for only seconds during a flight. It is important, therefore, to determine this point clearly since, depending on the time elapsed, the responsibility might switch very quickly from one to the other.

The Uberlingen accident, which occurred on July 1, 2002, illustrates how serious this moment can be. It involved a mid-air collision near the German city of Uberlingen between a Boeing B-757-200 and a Tupolev TU-154 M with 71 fatalities.[137] A conflict between information provided by the air traffic controller and the Traffic Collision Avoidance System (TCAS) was found to be a major contributor to the accident. In the investigation report by the German Federal Bureau of Aircraft Accident Investigations,[138] a systemic cause was determined: "The regulations concerning ACAS/TCAS published by ICAO and as a result the regulations of national aviation authorities, operations and procedural instructions of the TCAS manufacturer and the operators were not standardised, incomplete and partially contradictory."[139] The Russian Pilot in Command (PIC)'s decision not to follow the Resolution Advisory (RA) given by the TCAS might have been reasoned as follows: he could have had high expectations of the air traffic controller, and he might not have been inclined to contradict his orders; or he might not

[134] "About us: Who is RTCA?" (2012), online: RTCA <http://www.rtca.org/content.asp?pl=49&contentid=49>.
[135] *Schubert III*, *supra*, note 132 at 202. *See also* "The European Organization for the Safety of Air Navigation Document (EUROCONTROL) for Free Route Developments in Europe", online: EUROCONTROL <http://www.eurocontrol.int/sites/default/files/content/documents/nm/airspace/free-route-airspace-europe-feb2012.pdf>.
[136] *Schubert III*, *supra*, note 129 at 202.
[137] German Federal Bureau of Aircraft Accident Investigation, *Investigation Report on the B-757 Uberlingen Accident* (Braunschweig, Germany: Bundesstellefür Flugunfalluntersuchung, May 2004), online: <http://www.scribd.com/doc/53295413/B757-Uberlingen-Accident> [*Uberlingen Accident Report*].
[138] *Ibid*.
[139] *Ibid*.

have had enough trust in TCAS operations to act contrary to the controller's instructions; or he might not even have been aware that the TCAS system had issued a complementary RA to the other airplane at risk of collision. It is unknown if one or a combination of these reasons affected the PIC's final decision.[140] Besides, the accident happened at night when it was a common practice to leave just one controller working while the other went for an extended break. They believed the number of flights at night could be easily handled by only one controller.[141] Skyguide affirms that the report from the accident investigation has helped them to improve the safety of their system through its recommendations and further steps the company has taken based on studies they developed in order to improve safety.[142] This accident illustrates how difficult it might be to determine the responsibility of the ANSP in any accident, since several conditions may contribute to the occurrence, such as corporate behavior, lack of standards or confusion in critical safety operations and the close relationship between pilots and controllers. According to an official press release from Skyguide, the Bulach District Court convicted four of its employees of manslaughter. One of them had to pay a fine of CHF13,500 while the other three were sentenced to 12 months imprisonment. Four other employees were cleared of the charges. They all decided not to appeal the decision."[143] The Skyguide compensation fund was able to settle the civil liability aspects with most of the families involved by 2004.[144]

1.3.1 United States Government Liability

In the United States, the Air Commerce Act of 1926[145] states the sovereignty principle over the airspace above American territory. The same act gives the federal government the responsibility of creating airports and air navigation systems, but it places air traffic

[140] *Ibid* at 100.
[141] *Ibid* at 86.
[142] "The Uberlingen Accident: Learning From the Past", online: Skyguide <http://www.skyguide.ch/en/company/topics/10-years-of-ueberlingen/>.
[143] Skyguide, Press Release, "Überlingen-Prozess: Skyguide-Mitarbeitendeverzichten auf Berufung" (20 September 2007), online: <http://hugin.info/134388/R/1154863/222502.pdf>.
[144] "Skyguide Annual Report 2004", online: Skyguide <http://www.skyguide.ch/fileadmin/user_upload/publications/annual-reports/skyguide_AR_2004_e.pdf>.
[145] *Air Commerce Act*, c 186, s 1, 44 Stat 325(1926), online: <http://libraryonline.erau.edu/online-full-text/books-online/aircommerceact1926.pdf>.

control under the exclusive jurisdiction of the federal government.[146] The Federal Aviation Act of 1958[147] created the independent Federal Aviation Agency (FAA) with the primary objective of promoting safety.[148] There has been a federal waiver of the doctrine of sovereign immunity. Therefore, a federal government institution like the FAA could be liable in tort to claims the same way a private person under the same conditions is. This waiver was introduced in 1946, when it was ruled that a federal agency could be responsible for its torts.[149] Vicarious liability also plays an important role, since an employer could respond for the negligent acts of its employees while doing work-related activities. In this sense, the FAA could be liable for the negligence of its controllers. The exception is the case of an independent contractor.[150] However, the issue of non-delegatable duty could be a possible defense for an independent contractor since air navigation might be considered among 'inherently dangerous activities'. It is important to differentiate the inherently dangerous concept, which has a negligence dimension, from ultra-hazardous activities, on which strict liability is imposed. Strict liability is forbidden by the FTCA.[151] The inherently dangerous activity is non-delegatable because there is an obligation under the law to guarantee safety.[152] It applies when the FAA is vested with the primary objective to promote safety; and even if it delegates part of its function, it should retain the responsibility of oversight. The discretionary function defense can also be mentioned as the biggest exception to federal liability: however, there has to be a judgment or choice for an act to be considered done through discretionary power.[153] According to the US Supreme Court in *Berkovitz v. United States*, the discretionary function exemption applies only when there is a government action or decision based on evaluation of public policy.[154] "But once it has made a policy decision to regulate a

[146] *Dempsey II*, *supra*, note 74 at 4-5.
[147] *The Federal Aviation Act*, Pub L. No 85-726, 72 Stat. 737(1958), online: <http://libraryonline.erau.edu/online-full-text/books-online/Aviationlawpt1.pdf>.
[148] "A Brief History of the FAA", online: Federal Aviation Administration <http://www.faa.gov/about/history/brief_history/#origins>.
[149] *Dempsey II*, *supra*, note 74 at 9.
[150] *Ibid*.
[151] *Ibid* at 12.
[152] *Ibid*.
[153] *Ibid* at 19.
[154] *Bekovitz v. United States*, 486 U.S. 531 (1988), online: <http://www2.law.columbia.edu/faculty_franke/Civil%20Rights/Berkovitz.pdf>.

certain activity or perform certain functions, it must do so with due care, else it may be held liable for its negligence."[155]

1.4 ICAO's Attempt to Create an International Convention on GNSS Liability

GNSS is a multimodal application which can be used not only for air navigation, but also for other different services. However, it is a fundamental instrument of the CNS/ATM concept. Therefore, the international civil aviation community has felt the need to establish uniform rules regarding some legal aspects of the GNSS services, such as liability, in order to guarantee the continuity and universality of the service. GNSS is mostly provided by two States and all the others have to rely on the US's and Russia's willingness to offer the service. As a result of this need, ICAO, which is responsible for the standards and recommended practices to promote safety and security, possessing this active role in international aviation safety, and aware of the legal problems that can appear if there is an accident caused by a faulty GNSS service, has considered for many years the elaboration of an international convention on GNSS liability. These years produced important legal studies and political discussions that should be remembered.

The GNSS Panel created the SARPS for GNSS. In 2001, they became binding upon States by amendment 76 to Annex 10 of the Chicago Convention. There is also an attachment D to Annex 10 that offers guidance on the technical and SARPS uses related to GNSS.[156]

"Since the conclusion of the work of …FANS in 1993, ICAO has significantly progressed the development of material necessary for the planning, implementation and operation of CNS/ATM. Today, SARPs, PANS and guidance material defined elements and aspects of CNS/ATM systems are largely in place."[157]

[155] Dempsey II, *supra*, note 74 at 20-21.
[156] ICAO, *Global Navigation Satellite System (GNSS) Manual,* ICAO Doc. 9849-AN/457 (2005) at Foreword, online: ICAO <http://www.icao.int/Meetings/PBN Symposium/Documents/9849_cons_en[1].pdf> [*Doc. 9849*].
[157] ICAO, *Global Air Navigation Plan for CNS/ATM System,* ICAO Doc. 9750-AN/963 (2002), online: <http://www.icao.int/publications/Documents/9750_2ed_en.pdf> [*Doc. 9750*].

At the 28th session of the ICAO Legal Committee, it was decided there was nothing inconsistent between the CNS/ATM concept and the Chicago Convention or among GNSS, the Chicago Convention, its Annexes and the principles of international law.[158]

In 1995,[159] the ICAO Council created a dedicated Panel of Legal and Technical Experts for the Establishment of a GNSS Institutional Framework (LTEP) to investigate the prominent institutional problems related to GNSS. "This LTEP was invited to address, among other subjects, the question of 'liability, including the allocation of liability among the participants in the GNSS system.'"[160]

Through an official letter, the United States offered ICAO in 1994 GPS for the use of the international civil aviation community for at least ten years. Russia did the same with GLONASS in 1996, but for a longer period: 15 years. ICAO responded to both letters and, in the exchange, expressed its concerns about guaranteeing accessibility to all States on a non-discriminatory basis together with the respect of sovereignty principle.[161]

The World-wide CNS/ATM Systems Implementation Conference held in Rio de Janeiro in 1998 had the legal issues of GNSS on its agenda as item number 5. LTEP presented its results there: a proposed draft Charter on the Rights and Obligations of States Relating to GNSS services, with paramount principles, together with the recommendations on legal aspects related to certification, liability, administration, financing, cost-recovery and future operating structures of GNSS.[162] This Charter and its recommendations were deferred to be analyzed at the 32nd Session of the Assembly.[163]

Future aspects of the legal issues relating to CNS/ATM were considered at the Conference. A great number of contracting States, mostly users of the GNSS signals, present at the Conference agreed that there was a need for an independent international legal framework to rule on the legal aspects of the GNSS for air navigation in relation to

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[158] Jiefang Huang, "Developments regarding the Legal Aspects of CNS/ATM Systems," Ram Jakhu, Coursepack: Space Applications, (Faculty of Law, McGill University, Winter 2012) at 446 [*Huang*].
[159] *Doc 9719*, *supra*, note 20 at 5.1.
[160] Francis Schubert, "An International Convention on GNSS Liability: When Does Desirable Become Necessary?"(1999) XXIV Ann. Air&Sp. L. at 247 [*Schubert IV*].
[161] *Huang*, *supra* note 158 at 446.
[162] *Doc 9719*, *supra*, note 20 at 5.1.
[163] *Ibid*.

its operations and availability. Since there were mainly two States providing GNSS signals, the US and Russia, the others would appreciate having some guarantees necessary to the practical operation of the system, regarding universal accessibility, continuity, accuracy, reliability and integrity. This legal instrument could also govern the issues of liability, and it could make it possible for everyone involved in the GNSS chain to be part of its operations and control.[164]

However, some members, mostly the States that provided the GNSS signals, opposed this group of contracting States. They strongly believed there was no need for an international convention since the present legal framework in place, the Chicago Convention, would be able to answer all the legal questions, as the GNSS was considered just another aid to air navigation that would not face any new legal challenges.[165] Their argument could be summarized as: "while CNS/ATM systems were revolutionizing global air navigation, they need not revolutionize international aviation law."[166]

Others tried to find a practical solution: they understood that although an international convention was a good idea for the future, a decision affecting the present should be made through regional arrangements and a series of contracts should be established among primary signal providers, augmentation signal services and users. These contracts were designed during the LTEP meetings.[167]

The question of GNSS liability was discussed at the Conference. Some States argued the implementation of GNSS to air navigation would not raise new liability questions nor change its system as it had already become possible for some providers to reduce their insurance premiums. The majority of States, however, agreed on the opposite, since they believed "there was a need to address the question of liability within the long-term legal framework."[168]

The Conference concluded that there was a need for further studies on the legal issues related to the implementation of CNS/ATM, specially the GNSS aspect of this new air

[164] *Ibid* at 5.1.3.
[165] *Ibid* at 5.1.4.
[166] *Ibid*.
[167] *Ibid* at 5.1.7.
[168] *Ibid* at 5.1.9.

navigation concept. These studies should be carried out in accordance with two objectives: first, "to develop and build mutual confidence among States regarding CNS/ATM systems; second, to support the implementation of CNS/ATM systems."[169] Although these studies and outcomes were considered welcome and necessary, they should not be a barrier to the implementation of the CNS/ATM, since no incongruence was found between this new system and the Chicago Convention provisions. Regional agreements could also be considered as a contribution to the creation of an international legal framework if it were compatible with the existing one, supporting interoperability of regional CNS/ATM components."[170] The implementation of the Charter on the Rights and Obligations of States Relating to GNSS services should be considered as a provisional solution until the establishment of a legal framework was complete and the decision of adoption or not of an international convention had come into place.[171]

The Conference's conclusions revealed some of the difficulties that would be experienced after trying to establish an international convention regarding the liability aspects of the use of GNSS for air navigation. A lack of agreement still exists today, and it is due neither to the fact that there is no need for this convention nor because there are no new legal issues that should be addressed in a new convention. On the contrary, it demonstrates the interest of providing States not to compromise themselves when it comes to the provision of GNSS signals. It cannot be forgotten that GNSS is considered an important military asset. If there is a war, as already happened in the Gulf War,[172] the signals might be interrupted on purpose and it can cause damages to different States' service providers directly and indirectly related to GNSS provision.

The ICAO Assembly, at its 32nd meeting in 2001, introduced two new important Resolutions concerning GNSS: Resolution 32-19,[173] which established a Charter on the

[169] *Ibid* at 5, Conclusions.
[170] *Ibid*.
[171] *Ibid*.
[172] "During the Gulf War some States were denied access to remote sensing by satellite. However, denial of remote sensing service raises the question of whether access to GNSS could be denied to some States but continued for others." *See,* P.B. Larsen, "Issues Relating to Civilian and Military Dual Uses of GNSS", 17 Space Policy (2001) at 111-119 [*Larsen*].
[173] ICAO, *Charter on the Rights and Obligations of States Related to GNSS services*, ICAO Assembly Resolution 32-19, 32d. Sess (2001) [*ICAO Resolution A- 32-19*].

rights and obligations of States relating to GNSS services, and Resolution 32-20,[174] regarding the development and elaboration of an appropriate long-term legal framework to govern the implementation of GNSS.

The Charter is also part of a Document, as Appendix A to Chapter 11, which deals with legal issues.[175] It is solemnly declared by the ICAO Assembly through nine different but complementary principles.[176] According to the first principle, the recognition of the safety of international civil aviation in GNSS arrangements relating to its provision and services was established as a paramount necessity.[177] The non-discriminatory principle was second: it called for the universal and uniform access of GNSS services to all States and all aircraft, "including regional augmentation systems for aeronautical use within the area of coverage of such systems."[178] The sovereignty principle was recalled as the third provision of the Charter, together with the obligation of States to guarantee safe aircraft operations through their control and regulation in their territory. It was also mentioned that "the implementation and operation of GNSS shall neither infringe nor impose restrictions upon States' sovereignty, authority or responsibility in the control of air navigation and the promulgation and enforcement of safety regulations. States' authority shall also be preserved in the co-ordination and control of communications and in the augmentation, as necessary, of satellite-based air navigation services."[179] The fourth principle represented a concern regarding the continuity and quality of the service, together with the notion of a possible recovery system, requesting all States providing GNSS signals at different levels or States merely using the service to guarantee continuity, availability, integrity, accuracy and reliability of the service inside their territory, in order to preserve the ICAO SARPS, together with a back-up service that should be available to respond in case of necessity. States should work to have in place mechanisms to avoid or at least to limit the problems that could arise in case of failure or

[174] ICAO, *The Development and Elaboration of an Appropriate Long-Term Legal Framework to Govern the Implementation of GNSS*, ICAO Assembly Resolution A 32-20, 32d. Sess (2001) [*ICAO Resolution A-32-20*].
[175] *Doc 9750, supra*, note 157.
[176] *ICAO Resolution A-32-19, supra*, note 173.
[177] *Ibid*.
[178] *Ibid*.
[179] *Ibid*.

malfunction.[180] The fifth principle demonstrated the need for uniformity of operations of GNSS services among States. It called for all the regional and sub-regional agreements to be made taking into consideration the necessary compatibility among different States with the implementation of GNSS services and the principles established in this Charter.[181] The promotion of a non-discriminatory and fair charge for the GNSS services, independent of the nationality of the user, was defended as the sixth principle. It is the same idea established in article 15 of the Chicago Convention for other services related to civil aviation, such as air navigation and airport charges. Cooperation and mutual assistance were proposed as the seventh principle, requesting States to plan to implement GNSS services with these concepts in mind in order to facilitate the transition and to overcome any difficulties that might arise in the global implementation.[182] The eighth principle reminds States of the interests of other States that should be taken into consideration when providing or using GNSS services, and the ninth principle guarantees the right of States to provide GNSS services jointly.[183]

This Charter expresses some important principles, most of them, such as sovereignty, non-discrimination, safety and uniformity of operations, already in place in the general provisions of the Chicago Convention. Although the GNSS services could not have been considered during the elaboration of that Convention since they did not exist in 1944, there is nothing in it that could be considered incongruent with the Charter's principles. ICAO itself has already expressed this view. It reaffirmed at the 35th session of the Assembly "that there is no need to amend the Chicago Convention for the implementation of CNS/ATM systems."[184]

Therefore, this Charter could be considered an important practical step towards the implementation of GNSS services. It has been said that "… as the Resolution of an Assembly with world-wide competence within its field, it may be considered to be

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[180] *Ibid*.
[181] *Ibid*.
[182] *Ibid*.
[183] *Ibid*.
[184] ICAO, *A Practical Way Forward on Legal and Institutional Aspects of Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) Systems*, ICAO Assembly Resolution A-35-3, 35th Sess, (2004) [*ICAO Res A-35-3*].

significant."[185] User 5States also need some guarantees in order to move forward to the establishment of the CNS/ATM concept. However, it is not an international convention; and as a consequence, it is not legally binding upon States.[186]

It must be remembered that GNSS is a multimodal service and that it has applications in other sectors different from civil aviation, like maritime and military operations. Lyall and Larsen understand that seeing safety in civil aviation as a paramount principle to GNSS use is not realistic since there are other important services that are out of the reach of ICAO's jurisdiction. They defend the position that "other uses have equal claim of importance"[187] and "ICAO's interest cannot take precedence over those of non-aviation users."[188]

Through Resolution A-32-20, the Assembly recognized the urgent need for regional legal solutions to the implementation of GNSS, and it has asked for the implementation of paramount principles through regional and international arrangements that would rule the GNSS services. A permanent legal framework was also recommended to be implemented in the future.[189]

A study group was created, in order to analyze the legal issues that could appear in the elaboration of a long-term legal framework, especially questions regarding liability and institutional problems regarding the implementation of CNS/ATM around the world. Feedback from the CNS/ATM Systems Implementation Conference as well as from the LTEP was to be taken into account. This group was also supposed to consider the elaboration of an international convention and to present its findings at the next ordinary Assembly session that would be held three years later.[190] The LTEP recommendations are also present in the Global Air Navigation Plan for CNS/ATM Systems as Annex B of Chapter 11, which deals with legal issues. It proposes that the liability regime for GNSS should take into consideration aspects such as the following: fair, prompt and adequate

[185] Francis Lyall and Paul B. Larsen, *Space Law: A Treatise* (Famham, England: Ashgate Pub. Limited, 2009) at 407 [*Lyall & Larsen*].
[186] *Ibid*.
[187] *Ibid*.
[188] *Ibid*.
[189] ICAO Resolution A-32-20, *supra*, note 174.
[190] ICAO Resolution A-32-19, *supra*, note 173.

compensation; disclaimer of liability; sovereign immunity from jurisdiction; physical damage, economic loss, and mental injury; joint and several liability; recourse action mechanism; channeling of liability; creation of an international fund; the two-tier concept, namely strict liability up to a limit to be defined and fault liability above the ceiling without numerical limits.[191] The LTEP also recommended the recording of the signals as evidence in accordance with ICAO SARPS for discussions on liability based on fault.[192] The group also noted concern about equitable compensation in case of damage, adequate risk coverage and the joint liability of all involved in the provision and operation of GNSS services.[193]

The 33rd ICAO Assembly session agreed to continue the legal studies in order to conclude the CNS/ATM contractual framework as an interim decision and to analyze the possibility of an international convention, taking into consideration, among other things, the responsibility of each State for the services provided on its behalf, according to the Chicago Convention. Security arrangements and unlawful interference with CNS/ATM services should be studied and reviewed.[194]

The US presented a working paper at the ICAO 35th Assembly in 2004 that clearly expresses its views on the feasibility of an implementation of an international convention on CNS/ATM legal aspects:

> Despite fourteen years of work, no consensus has been possible on proposals to alter the current, effective, long-term legal framework for CNS/ATM. Proponents of change have not met the burden of persuasion. In any case, a convention that cannot be brought into force will be of no help to States and regional organizations implementing CNS/ATM. Instead, ICAO should build on the work that has been done under the existing framework. It should call for practical measures to strengthen regional navigation

[191] *Doc. 9750*, *supra,* note 157 at Annex B, Chapter 11, Item 9.
[192] *Ibid* at Item 10.
[193] *Ibid* at Item 11.
[194] *Huang*, *supra*, note 158 at 448-449.

> plans and help Contracting States get the technical and economic assistance they need.[195]

In the same working paper, the US proposed a draft agreement that would establish this practical move and would make the Secretary General responsible for determining the suspension of the legal studies leading to an international legal framework, which could be reopened only in case of real identifiable issues that could not be ruled on by existing legal and institutional assets.[196]

The European Community also presented a working paper at the same 35th Assembly, proposing the establishment of a contract framework "as concrete initiatives towards the implementation of an appropriate GNSS legal and institutional framework,"[197] but also recognizing "the need for an appropriate short and long-term legal and institutional framework to govern the effective implementation of GNSS…."[198] The idea was to start with a contractual framework that would evolve into an international convention. This paper was drafted with the assistance of EUROCONTROL and the European Commission.[199]

Assembly Resolution 35-3 also relates to GNSS services. It notes the importance of the Legal Committee's consideration for the creation of a legal framework to deal with the new legal issues brought about by the implementation of the CNS/ATM concept, but it again states that there is no need to amend the Chicago Convention.[200]

Since one single international legal framework could not be achieved, and taking into account the need for solutions to legal problems that could arise with the implementation of GNSS services, ICAO has proposed regional agreements as a solution to the lack of commitment of States to creating an international convention. Such regional solutions

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[195] ICAO, *Assembly Resolution on a Practical Way Forward on Legal and Institutional Aspects of CNS/ATM*, ICAO Assembly 35th Sess., A-35-WP/216 (28 September 2004) at summary, online: ICAO <http://legacy.icao.int/icao/en/assembl/a35/wp/wp216_en.pdf >[*ICAO A-35-WP/216*].
[196] *ICAO A-35-WP/216, supra*, note 195 at A-1, 7.
[197] ICAO, *Development of a Contractual Framework Leading Towards a Long-Term Legal Framework to Govern the Implementation of GNSS*, ICAO Assembly 35th Sess., A-35-WP/215 (21 September 2004), online: ICAO <http://legacy.icao.int/icao/en/assembl/a35/wp/wp125_en.pdf> [*ICAO A-35-WP/215*].
[198] *ICAO A-35-WP/215, supra*, note 197.
[199] *Ibid*.
[200] *ICAO Resolution A-35-3, supra*, note 184.

should be established given the binding provisions of the Chicago Convention and public international law.[201]

This Resolution also directed "the Secretary General to monitor and, where appropriate, assist in the development of contractual frameworks to which parties may accede, inter alia, on the basis of the structure and model proposed by the Members of the European Civil Aviation Conference and the other regional civil aviation commissions, and on international law."[202]

Member States were also encouraged to bring their regional approaches to the Council in an attempt to influence other States to copy any successful arrangements.[203] The Council should publicize all these regional agreements received from the contracting States, taking into consideration their value among the civil aviation international community, in accordance with Articles 54, 55 and 83 of the Chicago Convention.[204]

Since it has not been possible to complete an international legal framework for GNSS liability, ICAO has proposed regional solutions, understanding the difficulties States may face when the time comes to determine liability of a faulty GNSS service. However, it should be stressed that attempts to create an international convention may not be done in isolation. Besides, liability of GNSS cannot simply be restricted to the activities of various actors that provide and process the space signal. This line of thinking would strongly undervalue the global dimension of GNSS. It should be considered global not only for its geographical coverage, but also because of the number of partners involved in GNSS services.[205] It is important to learn from all these years of ICAO studies and to move on to practical solutions. Domestic law seems to be the only answer at the moment. Therefore, it is necessary that States, like Brazil, already using GNSS services for air navigation clarify their rules in order to determine the law applicable to the liability of GNSS services to ANS.

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[201] *Ibid*.
[202] *Ibid*.
[203] *Ibid*.
[204] *Ibid*.
[205] *Schubert IV*, *supra,* note 157 at 251.

1.5 Space Law Treaties

The Global Navigation Satellite System (GNSS) is a space asset that has many different applications. Air navigation is only one of its beneficiaries; it can be used by other means of transportation, for example, ground-based transport, trains, and maritime transport, but also for other services, such as mining, search and rescue, fishing and many others. As a space application, it should be considered primarily ruled by space law treaties. However, since it affects different areas of the law, it may produce complex answers to simple questions, depending on the case, the State involved or the type of service provided. GNSS is also a new technology, if we consider it in relation to the time when the space law treaties were designed. Therefore, it may give rise to some gaps or complex discussions in the case of specific issues, such as liability for a signal failure or liability for radio interference. Independently of its end user, it is important to determine which space law treaties could affect the liability of GNSS.

Increasing the complexity of the legal issues related to GNSS is the fact that it is a dual-use system offering important services for both the military and civilians. Most of its civilian users are concerned that at some point the signal might be intentionally degraded or even cut as a result of national security reasons including war.[206] Taking into consideration this concern, ICAO has established as paramount principles the continuity, availability, integrity, accuracy and reliability of the GNSS service on a non-discriminatory basis.[207] One could thus easily consider if an end-user could ask for reparation for damages caused in case of lack of service, whether intentional or unintentional. Which reasons could be legally considered justifiable to cut the GNSS signal in order to avoid any kind of liability? Humanitarian law could be of great importance in case of war if GNSS could have been used to avoid genocide, but for political reasons it was denied. National laws could also play an important and difficult role as they might provide open possibilities for claims not regulated under international law. On the other hand, the American GPS civilian signal is offered for free, and this precludes the US from answering for damages. "The US military GPS provider is of the view that, if the GPS service is free for all users, then the civilian users do not have a

[206] *Larsen*, *supra*, note 172.
[207] *ICAO Resolution A-32-19*, *supra*, note 173.

legal basis for complaint if the service is faulty."[208] GALILEO, the European counterpart of GPS, which is still under development, may represent a different legal response to the question of liability since the Europeans plan to charge for the use of their system. The third and fourth satellites of GALILEO's constellation were launched in October 2012 at the European Space Port in French Guiana.[209] It was announced by the European Parliament in September 2012 that new legislation has been approved to guarantee the funding and full operation of GALILEO's satellite navigation system, including the EGNOS augmentation system, from 2014 to 2020.[210]

Every State currently providing GNSS services is party to most of the Space Law treaties: the Outer Space Treaty, ARRA, the Liability Convention and the Registration Convention. Consequently, GNSS comes under the common space regulations on the use of outer space.[211]

The liability of GNSS could be influenced by the Outer Space Treaty (OST) and the Liability Convention. The OST's article III determines that States are to operate their space activities "in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding."[212] If GNSS is used for purposes of self-defence, it should fall under article 51 of the UN Charter.[213] Therefore, if liability were to be claimed as a result of a war scenario, the UN Charter and other provisions of public international law could be invoked.

Article VI of the OST stipulates the responsibility of States for national activities carried out in space by governmental or non-governmental entities, including the control of the

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[208] *Larsen*, *supra*, note 172 at 111-119.
[209] ESA News Release, "Deployment of Europe's Galileo Constellation Continues" (13 October 2012), online: ESA <http://www.esa.int/esaCP/SEMTBB3S18H_index_0.html>.
[210] Diplo News Release, "European Parliament Announces Galileo Satellite Navigation System to be Up and Running from 2014" (19 September 2012), online: <http://www.diplonews.com/feeds/free/19_September_2012_41.php>.
[211] *Larsen*, *supra*, note 172, at 111-119.
[212] *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, January 1967, 610 U.N.T.S. 205 [*Outer Space Treaty*] at Article III.
[213] *Larsen*, *supra*, note 172, at 111-119.

activity, according to the rules of the treaty.[214] This is an especially important provision since States will be considered responsible for private entities within their jurisdiction carrying on activities in outer space. With the increased participation of private institutions and organizations in space, this could create problems for States. "This State liability for damage caused by the space object of its private persons is a new principle of international law."[215] In the case of GNSS, at least until now, all the service providers, GNSS and GLONASS, including the augmentation systems, have mainly been States. Sovereign immunity can represent a barrier from liability whenever a State is involved, depending on the case and on that State's responsibility according to national law.

OST, article I ensures that the exploration and use of outer space have to be for the benefit and interest of all countries, independently of economic or scientific concerns, since outer space shall be considered a province of all mankind.[216] However, this does not mean that all States must specifically benefit from all space activities.[217]

OST, article IX requires States to act in outer space with cooperation and mutual assistance. They must avoid activities that could cause harmful interference with activities of other States in the peaceful exploration and use of outer space.[218] This provision could be used together with the ITU provisions, which exist to prevent harmful interference with radio signals. Since satellites communicate mainly through radio waves, these regulations are very important as they affect every single activity in space. GNSSs are no different. They depend on the work of the ITU to provide international protection from harmful interference with their radio signals. Could liability be claimed against acts of harmful interference?

Liability is specifically mentioned in OST, article VII:

> Each State Party to the Treaty that launches or procures the launching of an object into outer space … and each State Party from whose territory or facility an object

[214] *Outer Space Treaty*, *supra*, note 212, Article VI.
[215] Ram Jakhu, "Legal Issues Relating to the Global Public Interest in Outer Space" (2006) 32 J Space L 31 at 53.
[216] *Outer Space Treaty*, *supra*, note 209, Article I
[217] *Larsen*, *supra*, note 203 at 111-119.
[218] *Outer Space Treaty*, *supra*, note 209, Article IX.

> is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies.[219]

The problem is that OST, article VII mentions damage caused by the space object or its components parts on the Earth, which suggests the idea of physical damage. GNSS satellites may cause physical damage if they crash directly into an object in outer space, airspace or on Earth. However, when there is failure of the GNSS signal, an accident can still occur without any direct damage caused by the GNSS as a space object itself. There is no need for the GNSS satellite to crash into anything to indirectly cause an accident. It may just send misleading signal information to an airplane in flight, which has no knowledge of this failing, to contribute to the airplane's crashing. The following is the sort of question this kind of situation can give rise to, "…whether GNSS providers have liability if their system fails or delivers inaccurate positioning thus causing damage to a user reliant on it."[220]

The Liability Convention sets the rules for compensation in cases of damage. It is believed, however, that it does not solve the issue of international responsibility for GNSS signal failures. Larsen has already expressed this view in analyzing the GPS: "International liability of the GPS provider for faulty GNSS remains an unresolved issue. Coverage by the International Liability Convention does not appear likely."[221] This is not a clear issue, though, as Larsen, together with Lyall, defines the situation in relation to an alternative interpretation:

> The language of the Arts II and III might at first sight appear to apply to damage caused by reliance on faulty GNSS. However, the Liability Convention has been interpreted by some to apply only to direct damage attributable to a crashing space object or a collision

[219] *Ibid,* Article VII.
[220] *Larsen*, *supra*, note 172 at 117.
[221] *Ibid* at 111-119.

> between space objects in outer space. On this view the Liability Convention would not apply to damage caused indirectly through an orbiting GNSS space object transmitting faulty navigation and positioning information. On the other hand the language of the Convention does not specifically dictate such a narrow interpretation. Some are of the view that the Liability Convention applies to direct and indirect damages caused by space objects.[222]

It is difficult to ascertain how the Liability Convention would answer the problem of GNSS signal failure since this convention explicitly defines the concept of a space object, including "component parts of a space object as well as its launch vehicle and parts thereof";[223] but it does not include the signals a space object may send or receive. Article II rules on the absolute liability of a launching State to pay for the damages caused by its space object on the surface of the Earth or to aircraft in flight.[224]

Article III determines the liability regime for damages caused elsewhere than on the surface of the Earth: the State is responsible only in case of fault of the State itself or anyone it is responsible for.[225] Article IV expressly says that States are jointly and severally liable if they have contributed to damage caused elsewhere than on the surface of the Earth. The burden of proving fault falls upon the State that makes the claim.

Considering the controversy concerning the provisions of the Liability Convention to be adapted to GNSS signal failure, national laws[226] may at some point be used in order to determine compensation. This could lead to different solutions and lack of uniformity, which is not a good solution for a problem that should have one clear international mechanism establishing its rules and limits. Sovereign immunity could be used by some

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[222] *Lyall & Larsen*, *supra*, note 185 at 405.
[223] *Convention on International Liability for Damage Caused by Space Objects*, 29 March 1972, 961 U.N.T.S. 187 [*Liability Convention*].
[224] *Ibid* at Article II.
[225] *Ibid* at Article III.
[226] Ram Jakhu, "Iridium- Cosmos Collision and its Implications for Space Operations" in Kai-UweSchrogl, Wolfgang Rathgeber, Blandina Baranes, Christophe Venet, eds., *Yearbook on Space Policy* (Germany: Springer,2010) at 254.

States, and certain actions like "…action against a manufacturer of a defective satellite might be contemplated."[227]

The creation of an international agreement on GNSS liability would be a better answer. Other international law treaties, like the Warsaw Convention as amended in 1929 and the Third Party Liability in the field of Nuclear Energy could be interesting models for this new convention.[228]

When dealing with the idea of an International Convention on third-party liability for GNSS activities, some scholars have suggested considering the 1963 Vienna Nuclear Convention as amended by the 1997 Protocol 23, which establishes Civil Liability for Nuclear Damage. This convention rules the absolute liability of the operator of the nuclear energy facility as the party who engages in a hazardous activity and therefore should pay for the risks resulting from the activity.[229] It is believed that "channelling the liability on one person entails attributing responsibility to a party that can be easily identified, is economically reliable and engaged in presumably extremely hazardous activities while simultaneously making it possible to exclude from responsibility any other party involved in performing such services, at least towards third parties."

The Chicago Convention has already been analyzed. ICAO's attempt to elaborate an International Convention for GNSS liability has also been described in another subsection. Nevertheless, it should be remembered that there are other international organizations with a clear and fair interest in the subject. Other organizations that can play an important role in relation to GNSS are the International Telecommunication Union (ITU) and the International Maritime Organization (IMO). Although ICAO's initiative may be seen by some as unrealistic since GNSS liability is a much more complex issue than GNSSs' use in air navigation, and all these interests should be taken into consideration, all serious attempts to create an international convention or to work on a legal framework to solve the legal aspects of GNSS, such as liability, should be respected and considered useful. Every time the nations of the world try to find a common

[227] *Lyall & Larsen*, *supra*, note 185 at 406.
[228] *Ibid* at 406.
[229] Sergio M. Carbone & Maria Helena Maestri, "The Rationale for an International Convention on Third Party Liability for Satellite Navigation Signals" (2009) 1:2 Unif L Rev 35 [*Carboni & Maestri*].

denominator to an international legal problem, it should be understood as a positive approach. If the solutions found are not practical, then other organizations should join in the effort to make them more feasible. This will help in strengthening the efforts towards achieving actualization. Due to the importance of GNSS, the United Nations has an International Committee on Global Navigation Satellite Systems, which is a forum to discuss how GNSSs benefit people around the world.[230]

"Radio is fundamental to all GNSS and their augmentations. The navigation and positioning satellites cannot function without clear radio signals."[231] The ITU determines the rules for sharing orbital slots and radio frequencies in an economical, efficient and rational way to avoid harmful interference. Its Constitution, Convention and Radio Regulations are considered as binding treaties. There are proceedings to register an assignment in an International Master Frequency Register; and once done, international protection from harmful interference is initiated.[232] There could be some discussion over the issue of damages caused by harmful interference. For example, no satellite could be assigned a place or operate without going through the ITU process. Therefore, ITU is an essential component in any discussion related to this issue.

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[230] "Following the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), held in 1999, in its resolution 54/68, the United Nations General Assembly endorsed the 'Vienna Declaration: Space Millennium for Human Development'. The Vienna Declaration called for action, among other matters, to improve the efficiency and security of transport, search and rescue, geodesy and other activities by promoting the enhancement of, universal access to and compatibility of, space-based navigation and positioning systems. In response to that call, in 2001 the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) established the Action Team on Global Navigation Satellite Systems (GNSS) to carry out those actions under the chairmanship of Italy and the United States of America. The Action Team on GNSS, consisting of 38 member States and 15 inter-governmental and non-governmental organizations, recommended, among other things, that an International Committee on GNSS (ICG) should be established to promote the use of GNSS infrastructure on a global basis and to facilitate exchange of information. The Committee included this recommendation in the Plan of Action proposed in its report to the General Assembly on the review of the implementation of the recommendations of UNISPACE III. In 2004, in its resolution 59/2, the General Assembly endorsed the Plan of Action. In the same resolution, the General Assembly invited GNSS and augmentation system providers to consider establishing an ICG in order to maximize the benefits of the use and applications of GNSS to support sustainable development (A/AC.105/846)." "International Committee on Global Navigation Satellite Systems" online: United Nations office for Outer Space Affairs <http://www.oosa.unvienna.org/oosa/en/SAP/gnss/icg.html>.

[231] *Lyall & Larsen*, *supra*, note 185 at 406.

[232] Notifications of frequency assignments to the Master International Frequency Register (MIFR) should be done in accordance with article 11 of the Radio Regulations. *Radio Regulations* adopted by the International Telecommunication Union (2004) at Article 11.

IMO is responsible for the regulation of maritime safety and universal uniform standards and practices for maritime transportation. Since GNSS is currently used for maritime transportation, IMO has an interest in the legal issues pertaining to GNSS services.[233] "GNSS search and rescue functions are also particularly important to maritime activities. In 1997 IMO established a maritime policy for all future GNSS systems, and since 2000, it has required GNSS receivers to be carried on all ships engaged in international carriage."[234]

INMARSAT also has an interest in GNSS services; and although it has been privatized, it still supports safety services for GNSS maritime operations and also for the EGNOS augmentation system.[235]

Since 2005, Unidroit has been studying a proposal to create an international convention on the third party liability of GNSS resulting from its malfunctioning. It was concluded that the convention is necessary to balance the economic sustainability of GNSS operators with fair and adequate compensations for victims. Although it recognized the importance of ICAO's work and legal studies concerning the matter, this convention should not be focused on aviation as it should incorporate all liability that may arise from different GNSS applications. The present international legal regime was found to be inadequate because the Liability Convention was not considered to apply to the failure of the GNSS signal and Chicago Convention treats only apply to air navigation matters. Besides, sovereign immunity may represent a barrier for recovery in some jurisdictions while national laws may give conflicting solutions to the issue. It was concluded that the international agreement should cover the following aspects: certification of GNSS providers, identifying the liability with these providers; strict liability with caps to limit the amount of compensation that should be established according to a global limitation per year, per incident or pro capita, but not the same to different type of services; a special regime should be created to open services: it should distinguish the type of open service, such as whether they offer commercial services or not; immunities may be determined to some regulated public services, like defence and security. However, there

[233] *Lyall & Larsen*, *supra*, note 185 at 406.
[234] *Ibid*.
[235] *Ibid* at 405.

is opposition regarding the matter: ICAO's attempt is used as an example to show the difficulty in reaching an agreement. Besides, there is only one commercial GNSS operator in the near future, GALILEO, and it seems a difficult challenge to have this convention before its operation begins as it is unique to have an international convention concerning only one operational entity (GALILEO). European Commission has also been studying the creation of a third party liability regulation.[236] Therefore, in spite of the fact that this convention is desirable and seems necessary, it has not reached an agreement yet.[237]

Considering the various aspects of GNSS services and the fact that the OST determines that all activities in outer space should be carried on taking into consideration the principles of international law, other international law provisions could help to fill the gap that seems to exist on the question of the liability involved in GNSS signal failure.

There are many other aspects that could be included in a study of this magnitude. However, this research does not aim at finding the answer to this problem. In the belief that there is no uniform international answer to the liability problem of GNSS application to air navigation, it will analyze the Brazilian case to see how its domestic law might at present respond to the issue or whether the creation of a new and specific instrument should be proposed. Even if, or when, such an international convention on GNSS liability is created, national law will still play an important role as subsidiary substantive law since such an international treaty will not be able to address all the legal aspects that could at some point emerge.[238] The international convention will always be a source of necessary principles and standards; but because the law is a living and growing institution, the domestic systems will probably be able more rapidly to update and complement

[236] "Third-Party Liability for Global Navigation Satellite System (GNSS) Services: The Proposed UNIDROIT Project", online: International Institute for the Unification of Private Law <http://www.unidroit.org/english/workprogramme/study079/main.htm>.
[237] This thesis does not investigate the matter of whether or not an international convention should be in place regarding the liability of the GNSS. Based on the fact that there is no international agreement, it studies the Brazilian liability regime in order to assess if Brazil is able to respond to specific claims concerning the liability of the GNSS used for air navigation. Although the author understands it may be desirable to have an agreement that creates a liability regime with a broader scope that covers all liability that may arise from GNSS applications, this research is limited to the liability that arises specifically from the provision of air navigation services in Brazil.
[238] *Carboni & Maestri*, *supra*, note 229 at 35-55.

international agreements in ways that will make them more suitable to the constant challenges introduced by new technologies and new relationships.

CHAPTER TWO

2.1 The Brazilian Air Navigation Framework

Brazil is in charge of the airspace over its territory (8,511,965 km2) and the airspace overlying its oceanic area, which extends to Meridian 10 W. Therefore, it is responsible for a total area of 22 million km2.[239]

The Brazilian Constitution, article 22, I establishes the exclusive power of the Union to legislate concerning Aeronautics Law.[240] Article 21, XII, c) states: "The Union shall have the power to operate directly, or through authorization, concession or permission, air and aerospace navigation and airport infrastructure."[241]

The Brazilian Aeronautical Code, article 25, clarifies that the aeronautical infrastructure is formed by a number of organs, installations and ground structures to support air navigation and to promote its safety, regularity and efficiency.[242] Article 47 determines that the Flight Protection System aims at the regularity, safety and efficiency of air traffic flow, and that it includes the following activities: I- air traffic control, II- aeronautical telecommunications and air navigation aids, III- aeronautical meteorology, IV- aeronautical cartography and information, V- search and rescue, VI- in-flight inspection, VII- coordination and inspection of specific technical training, VIII- supervision of manufacturing, repair, maintenance and distribution of terrestrial equipment for air navigation aids.[243]

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[239] *Sistema de Controle do Espaço Aéreo Brasileiro: Funcionalidades* (Rio de Janeiro: DECEA, 2010) at 9 [*Funcionalidades*].
[240] *Constitution of the Federative Republic of Brazil* 1988, (3d edition, 2010) s I, article 22, online: <http://www.stf.jus.br/repositorio/cms/portalStfInternacional/portalStfSobreCorte_en_us/anexo/constituicao_ingles_3ed2010.pdf> [*Brazilian Constitution*].
[241] *Ibid* at Article 21, XII, (c).
[242] *Código Brasileiro de Aeronáutica* 1986 (Lei N. 7.565 de 19 de dezembro de 1986) s article 25 [*Código Brasileiro de Aeronáutica*].
[243] *Ibid* at Article 47.

2.1.1 The Brazilian Airspace Control System (SISCEAB)

According to Portaria nº 913/GC3/09, SISCEAB, the Brazilian Airspace Control System, is mandated to develop the following activities: general air navigation and military air operations; airspace surveillance, aeronautical telecommunications and air navigation aids; air traffic management, aeronautical meteorology, aeronautical cartography, aeronautical information; search and rescue; flight inspection; coordination and oversight of technical training; supervision of the manufacturing, repair, maintenance and distribution of equipment used in airspace control.[244] The air navigation activities are empowered according to a specific law.[245] DECEA is the main institution of SISCEAB.

2.1.2 Brazilian Department of Airspace Control (DECEA)

"DECEA is an organization of the Brazilian State, subordinate to the Ministry of Defense and to the Brazilian Air Force, and responsible for the strategic control of the country's airspace, both in the civil and military areas."[246] According to its General-Director, Marco Aurélio Gonçalves Mendes, "all services that require a high degree of technology, manpower and research related to the management of the Brazilian airspace are provided by DECEA."[247] It was created in 2001 in Rio de Janeiro by Decree n. 3954/2001 with the following objectives: to plan, implement, integrate, regulate, coordinate and oversee the activities related to Brazilian airspace control and aeronautic telecommunications and informatics.[248] As the main institution of the Airspace Control System in Brazil (SISCEAB), it is responsible for the necessary means to promote the management and control of airspace and for air navigation services in accordance with the national and

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[244] *Portaria nº913/GC3,* Comando da Aeronáutica, 2009, (de 21 de setembro de 2009) s art. 2, online: <http://servicos.decea.gov.br/tarifas/arquivos/legislacao/3E064FC4-422F-491F-B715BFEDFDD47476.pdf> [*Portaria nº913/GC3*].
[245] *Ibid* at Article 2, sole paragraph.
[246] "Brazil Block Upgrades: Providing a Common Baseline for Global, Regional and National Planning" (May 2012) 67:5 The ICAO Journal at 6, online: <http://www.icao.int/publications/journalsreports/2012/6705_en.pdf> [*ICAO 67:5*].
[247] *Ibid*.
[248] *Decreto n. 3954* Presidência da República 2001, (5 October 2001), s article 2, online: <http://www.planalto.gov.br/ccivil_03/decreto/2001/D3954.htm>.

international laws to which Brazil is party.[249] DECEA is in charge of the regulation, coordination, supervision and oversight of all the SISCEAB activities, except those related to military operations.[250] The regulation, coordination and supervision of the airspace military operations are the responsibility of the Brazilian Airspace Defense Command – COMDABRA, the central institution of the Brazilian Airspace Defense System – SISDABRA.[251]

As the central institution of the SICEAB, DECEA is responsible for: I- planning and directing the implementation of the system; II- regulation direction, operational and technical supervision, coordination and control of the system's activities; III- overseeing the performance of the executive members linked to the system; IV- regulating and supervising the logistics that make possible the management of air space and the air navigation services; V- regulating and overseeing specific kinds of professional training; VI- analyzing the costs involved in air navigation activities in order to define its tariffs in accordance with the relevant legislation; VII- charging the set tariffs, with exception of activities related to military airspace performance; VIII- investigating and applying administrative sanctions resulting from infractions of legislation related to airspace control.[252]

In 2008, the National ATM Operational Concept was approved by DECEA through Document n. DCA-351-2, which gives all the directions for the implementation of CNS/ATM in Brazil (SIRIUS).[253] In the same year, the ACC-AO – Atlantic Area Control Center, CINDACTA III, in Recife, initiated RVSM – Reduced Vertical Separation Minimum operations. CINDACTA III also started ADS-C (Automatic Dependence Surveillance Contract) and CPDLC (Controller Pilot Data Link) in the following year, 2009.[254]

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[249] "O DECEA: Missão", online: DECEA <http://www.decea.gov.br/o-decea/missao/> *see also Portaria nº913/GC3*, *supra* note 243, article 3.
[250] Portaria nº 913/GC3, *supra*, note 244, Article 4.
[251] *Ibid* at Article 5.
[252] *Ibid* at Article 6.
[253] "O DECEA: Histórico", online: DECEA <http://www.decea.gov.br/o-decea/historico/> [*DECEA Histórico*].
[254] *Ibid*.

2010 was an important year for DECEA. The Air Traffic Information Management Advanced System and the Operation Interest Report – SAGITARIO was implemented in CINDACTA III, and the implementation of the PBN – Performance Based Navigation in the Brasília and Recife area control centers was begun. DECEA also affiliated with the Civil Air Navigation Services Organization (CANSO). In 2011, SAGITARIO became operational in CINDACTA II, and the JJAer – Junta de Julgamento da Aeronáutica (Aeronautical Trial Commission) was created.[255]

The airspace under Brazilian jurisdiction is divided into FIRs – Flight Information Regions. To each FIR corresponds one ACC – Area Control Center, with its own norms established by SISCEAB's central institution, DECEA.[256]

DECEA has a complex structure in order to facilitate its operations. It is divided into three supervisory sub-departments: SDAD – Administration sub-department, SDOP – Operations sub-department and SDTE – Technical sub-department; four Air Defense and Air Traffic Control Integrated Centers – CINDACTAs; one Flight Protection Regional Service – SRPV; five Area Control Centers (ACC); 47 Approaches Controls (APP); 59 Aerodrome Control Towers (TWR); 79 Airspace Control Detachments; in addition to 90 Aeronautical Telecommunications Stations and several support divisions throughout the country.[257]

DECEA has 12 subordinate units that divide its functions, and they contribute directly to the implementation and maintenance of the system and resources that are used to fulfill the main objective of the central institution.[258] The first is CGNA (Air Navigation Management Center). It was created in 2005 through Portaria nº 1003/GC3, and it is responsible for the management of the balance between demand and capacity in the Brazilian airspace. It works in coordination with the Brazilian Civil Aviation Regulatory Agency (ANAC) and the Brazilian airport infrastructure organization (INFRAERO).[259] Through the analysis of the demands of air traffic present and future, and the factors that

[255] *Ibid.*
[256] *Portaria nº 913/GC3*, *supra*, note 244 at Article 10, parágrafo único.
[257] "O DECEA: Estrutura", online: DECEA <http://www.decea.gov.br/o-decea/estrutura/>.
[258] "O DECEA: Unidades", online: DECEA <http://www.decea.gov.br/unidades/>.
[259] "O DECEA: Unidades – Centro de Gerenciamento da Navegação Aérea (CGNA)", online: DECEA <http://www.decea.gov.br/unidades/cgna/>.

may affect the capacity of the infrastructure in place, CGNA can plan the management of the airspace in such a way as to optimize its capacity and to adjust it to the needs and problems that appear daily. Therefore, CGNA strategically plans regular flights with routes and schedules; it takes into consideration probable fluctuations in capacity and demand that may be due to several factors, including weather, airport renovation or maintenance, or seasonal events. It also decides the number of controllers necessary for each period of the day; it establishes the structure for an efficient use of airspace by defining the procedures and warning pilots, controllers and airlines of probable dangers. It determines the operational needs that will define the type of equipment, the kind of air navigation aids and the personnel used.[260] Air Traffic Management is divided into three functions: airspace management, which aims at the flexible use of the airspace in order to increase the capacity and efficiency of aeronautical operations; air traffic flux management, which is implemented as a way to find specific solutions when capacity is larger than the infrastructure in place; air traffic services, which see to the provision of communications between air traffic control centers and between controllers and pilots to promote safety and to assist pilots in their mission.[261]

There are four Integrated Centers for Air Traffic Control and Air Defense – CINDACTAs I, II, III and IV. CINDACTA I, with headquarters in Brasília, is in charge of 45% of the air traffic in the country. Besides air traffic control, information, meteorology, telecommunications and search and rescue, it supplies national defense services since it maintains a permanent link between the Brazilian Airspace Control System (SISCEAB) and the Brazilian Airspace Defense Command (COMDABRA).[262] CINDACTA III is situated in Recife and is responsible for the Atlantic corridor beside the Brazilian oceanic areas. It has already started using the Automatic Dependent Surveillance – Contract (ADS-C) system, which allows the Control Center 'to see' the airplanes logged into the system through GPS signals.[263]

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[260] *Funcionalidades*, *supra*, note 239 at 9-10. .
[261] *Ibid* at 10-16.
[262] "O DECEA: Unidades – 1 Centro Integrado de Defesa Aérea e Controle de Tráfego Aéreo (Cindacta I)", online: DECEA <http://www.decea.gov.br/unidades/cindacta-i/> [*DECEA Cindacta I*].
[263] *Ibid; see also* "O DECEA Unidades – 3 Centro Integrado de Defesa Aérea e Controle de Tráfego Aéreo (Cindacta III)", online: DECEA <http://www.decea.gov.br/unidades/cindacta-iii/>.

The Airspace Control System Implementation Commission (CISCEA) is responsible for updating the Brazilian Airspace Control System (SISCEAB), taking into account new technologies and the growth of Brazilian air traffic.[264] The First Group of Communication and Control (1st GCC) provides mobile communication means, control and air alarms to areas without them or with fixed services that are insufficient to respond to the operational needs in the area.[265]

GEIV – Special Group for In-flight Inspection is in charge of inspecting the air navigation aids equipment and assuring safety and regular operations. It does the same kind of checking in other South American countries through contracts. GEIV certifies any new equipment to guarantee it is functioning properly before it starts being used. It is also responsible for monitoring aeronautical radio frequencies in order to protect them from harmful interference.[266] In an attempt to collaborate and acquire experience on the implementation of air navigation services based on the use of satellites, DECEA has been developing studies to validate satellite signals received in the Southern hemisphere. There are provisory ground stations to monitor the GPS system and also flights being done to evaluate the performance of this system.[267] This monitoring of the GPS signals seems very important in order to determine where and when a signal failure has occurred. Having the ability to identify if the failure is coming from space (the satellite itself) or if it is happening in any ground station may be an important criterion for determining liability in case of an accident caused by the failure of a signal.

The Aeronautic Cartography Institute (ICA) executes all the activities related to aeronautic cartography, such as the creation of maps, aeronautic charts and manuals printed or digitalized, according to the international norms and standards. It is also

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[264] "O DECEA: Unidades – Comissão de Implantação do Sistema de Controle do Espaço Aéreo (Ciscea)", online: DECEA <http://www.decea.gov.br/unidades/ciscea/>.
[265] "O DECEA: Unidades – 1 Gupo de Comunicações e Controle (GCC)", online: DECEA <http://www.decea.gov.br/unidades/gcc/>.
[266] "O DECEA: Unidades – Grupo Especial de Inspeção em Vôo (GEIV)", online: DECEA <http://www.decea.gov.br/unidades/geiv/>.
[267] "Com o intuito de colaborar e de adquirir experiência na implantação da navegação por satélites, o DECEA tem desenvolvido estudos para validar os sinais satelitais recebidos no Hemisfério Sul. Existem estações terrenas instaladas, provisoriamente, para monitora-mento dos sinais do 'Global Positioning System' (GPS). Alguns vôos estão sendo realizados, também, com a finalidade de avaliar o desempenho desse sistema." Author's free translation. "Inspeção em Vôo: Monitoramento de Sinais GPS", online: DECEA <http://www.decea.gov.br/espaco-aereo/inspencao-em-voo/>.

responsible for giving technical support to the Aeronautics Command regarding, among other things, topography and cartography matters.[268] The Airspace Control Institute (ICEA) is responsible for teaching and researching on a broad range of activities in order to capacitate human resources in different areas of airspace control, for example, air traffic, aeronautics information, air navigation, in-flight inspection, search and rescue, meteorology, aeronautical climatology, informatics, telecommunications and electronics. It utilizes a methodology adopted by ICAO, the TRAINAIR, which is part of the implementation training programs of the CNS/ATM concept.[269]

The Electronics Material Park of Rio de Janeiro (PAME-RJ) acts as a logistical and maintenance source to support Brazilian Airspace Control. It is also in charge of technical publications and is considered as a reference center on these matters.[270] The Regional Service for Flight Protection in São Paulo (SRPV-SP) provides airspace control service for the greater flight density areas in Brazilian airspace: the Rio de Janeiro-São Paulo region. It was created in 2004 through Decree nº 5.196 to control an important area where there are significantly large numbers of commercial flights in the country. It is responsible for six of the more flight-dense airports in Brazil: Congonhas, Guarulhos, Tom Jobim, Santos Dumont, Marte and Jacarepaguá.[271]

DECEA has been using satellite technology, digital communications and strategic management of air navigation in the implementation of CNS/ATM in Brazil. It has been redesigning its routes in order to make them more direct and to create parallel airways that will reduce greenhouse gas emissions and optimize flight paths and aircraft autonomy. The Recife and Brasilia terminals have already initiated some of these advantages since 2010.[272] "The implementation of PBN (Performance Based

[268] "O DECEA: Unidades – Instituto de Cartografia Aeronáutica", online: DECEA <http://www.decea.gov.br/unidades/ica/>.
[269] "O DECEA: Unidades – Instituto de Controle do Espaço Aéreo (ICEA)", online: DECEA <http://www.decea.gov.br/unidades/icea/>.
[270] "O DECEA: Unidades – Parque de Material de Eletrônica da Aeronáutica do Rio de Janeiro (PAME)", online: DECEA <http://www.decea.gov.br/unidades/pame/>.
[271] "O DECEA: Unidades – Serviço Regional de Proteção ao Vôo de São Paulo (SRPV-SP)", online: DECEA <http://www.decea.gov.br/unidades/srpv-sp/>.
[272] "DECEA redraws routes in Brazil" (Quarter 1, 2012), Airspace: Journal of the Civil Air Navigation Service Organization (CANSO) 16 at 24 [*Airspace*].

Navigation)[273] in the country's main air terminals has led to an optimized structure of airways supported by satellite based navigation and advanced flight management systems."[274] DECEA's changes in air navigation implemented by PBN "will promote, according to the organization's estimates, an increase of capacity around 47% in Brasilia-FIR and 39% in Curitiba-FIR.…"[275] For other regions that have also implemented PBN, "…studies developed by DECEA suggest a reduction of about 10 minutes in flights connecting São Paulo to Belo Horizonte, Salvador, Recife, Fortaleza or Natal. Since these airways carry out more than 35,000 flights per year, 10 minutes may aggregate savings of about 12 million kg of fuel and prevent the emission of about 38 million kg of CO2 into the atmosphere each year."[276]

2.1.3 The Civil Air Navigation Secretariat

The Civil Air Navigation Secretariat was created in 2011 through Decree n. 7476. It is part of the Civil Aviation Secretariat of the Republic's Presidency (SAC-PR), and it is in charge of coordination between DECEA and INFRAERO, which are responsible for management, regulation, inspection of the civil aeronautical infrastructure; elaboration of policies concerning development, federal investments and technologies to improve capacity and efficiency of the civil aeronautical infrastructure; and policy proposals to the aerodromes areas regarding the mitigation of noise and the problem of avifauna near aerodromes.[277] According to article 15, I of Decree n. 7476, the Air Navigation Secretary must advise the Minister of State, Chief of the SAC on coordination and supervision of the organs and entities responsible for the management, regulation and inspection of the aeronautical infrastructure. According to article 15, IV, the Secretary together with the Airports Secretary should also harmonize infrastructure planning and should propose policies and directives aimed at civil air navigation safety and security, taking into consideration any necessary coordination with the Defense Ministry on some matters.

[273] "PBN is a concept which, among other benefits, reduces and optimizes the routes – is a crucial step towards the consolidation of future air transportation." *Airspace*, *supra*, note 272 at 24.
[274] *Ibid*.
[275] *Ibid* at 25.
[276] *Ibid*.
[277] "Secretaria de Navegação Aérea Civil", online: Secretaria da Aviação Civil da Presidência da República <http://www.aviacaocivil.gov.br/secretaria-de-navegacao-aerea-civil>.

This Secretary has also to be aware of the Civil Aviation National Policy – PNAC in order to propose the necessary changes to keep the civil aeronautical infrastructure updated and to advise the Civil Aviation National Council on matters of civil aeronautical infrastructure, according to article 15, IX and X.[278]

2.1.4 The National Civil Aviation Authority (ANAC)

The National Civil Aviation Authority in Brazil (ANAC) was created in 2005 by the Law n. 11.182, regulated by Decree n. 5731/2006. It replaced the former DAC – Civil Aviation Department and other organizations of the Aeronautical Command.[279] "It is important to note that with the creation of ANAC, the Civil Aviation Authority was also established through article 3 of Law 11.182/2005, thus incorporating part of the attributions of the Aeronautical Authority, without extinction of the later."[280] ANAC has administrative autonomy; however, it must observe and implement the directions and policies created by the Civil Aviation National Council (CONAC).[281] ANAC has no competence over matters regarding the Brazilian Air Space Control System (SISCEAB) or the Aeronautical Accidents Prevention and Investigation System (SIPAER). Therefore, investigation of accidents and control over air space have been retained by SIPAER and SISCEAB, respectively, which must respect the international agreements to which Brazil is party.[282] Although the Civil Aviation Authority (ANAC) works in close collaboration

[278] *Decreto 7476*, 2011, (10 May 2011), s article 15, online: <http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2011/Decreto/D7476.htm>.
[279] *Lei de Criação da Agência Nacional de Aviação Civil - Lei 11.182*, 2005, (27 September, 2005), online: <http://www.jusbrasil.com.br/legislacao/96389/lei-de-criacao-da-agencia-nacional-de-aviacao-civil-lei-11182-05>.
[280] "Importante fazer constar que, com o advento da ANAC, foi também criada a Autoridade de Aviação Civil (art. 3º da Lei 11.182/2005), que passou a incorporar uma parcela das atribuições da Autoridade Aeronáutica, sem que essa última fosse extinta." Free author translater in Marcelo Honorato, "A crise da legalidade no Sistema de Prevenção de Acidentes Aeronáuticos", (16 January 2012) 952: 1 Boletim Jurídico, online: <http://www.boletimjuridico.com.br/doutrina/texto.asp?id=2461>
[281] José da Silva Pacheco, *Comentários ao Código Brasileiro de Aeronáutica* 4th edition revised, in accordance with laws numbers 7565/86 and 11.182/05 (Sao Paulo: Forense, 2006) at XLIV. [*Pacheco*]
[282] *Ibid* at XLV.

with the Civil Aviation Secretary (SAC),[283] since it has no competence over air navigation matters, this research will not go into further details about it.

2.1.5 The Civil Aviation Council

The Civil Aviation Council (CONAC) is an advisory organ to the President of the Republic regarding the formulation of civil aviation policy.[284] It has power I- to establish the guidelines for the representation of Brazil in conventions, agreements, treaties and acts concerning international air transport with other countries or international organizations of civil aviation; II- to propose a concessionary model for aerodrome infrastructure to be submitted to the President; III- to approve guidelines for the investment of resources on airlines and airports of strategic, economic or touristic interest; IV- to promote coordination between activities relating to flight protection and air regulation; V- to approve the general plan of commissioning of airlines; VI- to establish guidelines for the application of the institution of concessions or permissions in the commercial activity of airlines.[285]

2.1.6 INFRAERO

INFRAERO is a national public company established in 1972 by Law nº 5.862. It is responsible for implementing, managing, operating and exploring the industrial and commercial aspects of airport infrastructure in Brazil, as conferred by the Civil Aviation Secretariat of the Presidency of the Republic.[286] It works in collaboration with the Civil Aviation Secretariat (SAC). It is meant to guarantee the safety and efficiency of airports and air navigation infrastructure services.[287] "Its mission is to provide aerodrome and air

[283] *Decreto 7406*, Presidência da República, 2010 (27 December 2010), online: <http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2010/Decreto/D7406.htm>.
[284] Decreto 3564, Presidência da República, 2000, (17 August 2000), article 1, online: <http://www.planalto.gov.br/ccivil_03/decreto/D3564compilado.htm> [*Decreto 3564*].
[285] *Ibid* at Article 2.
[286] *Lei 5.862*, Presidência da República, 1972, (12 December, 1972), s article 2, altered by Lei n. 12.462/11, online: <http://www.planalto.gov.br/ccivil_03/leis/1970-1979/L5862.htm> [*Lei 5862*].
[287] "A Infraero e o desafio do novo Brasil", online: INFRAERO <http://www.infraero.gov.br/index.php/br/institucional/a-infraero.htm> [*INFRAERO*].

navigation infrastructure and services, contributing to the national integration and sustainable development of the country."[288]According to its Social Statute, article 4, INFRAERO has the objective to implement, administrate, operate and explore industrially and commercially the aerodrome and air navigation support infrastructure, to give consultation and advice in its areas of expertise and regarding airport construction. It can also assume any activity the SAC–PR may give it.[289] The liability of the provision of air navigation services done by INFRAERO will be discussed under a specific subtopic.

2.2 The Brazilian Aeronautical Code

2.2.1 Introduction

The first commercial flights in Brazil began in 1927. The first Brazilian Code of Air followed civil aviation activities in the country and was created in 1938 through the Law decree n. 483[290]. This Code was modified to be adapted to commercial aviation needs until 1967. Then, another Brazilian Air Code was established by Law decree (n. 32 of November 18, 1966),[291] which was subsequently changed by another Law decree (234 of January28, 1967).[292] The latest Brazilian Aeronautical Code is from December19, 1986 (Law n. 7565/86).[293]

Brazil has had seven different Constitutions: 1824, 1891, 1934, 1937, 1946, 1967 and 1988.[294] The Brazilian Air and Aeronautical Codes have been created and modified through more than one constitutional regime. It is curious that the current Brazilian

[288] "Prover infraestrutura e serviços aeroportuários e de navegação aérea, contribuindo para a integração nacional e o desenvolvimento sustentável do país." Author's free translation, *Ibid*.
[289] *Estatuto Social da INFRAEO* (INFRAERO Social Statute), Assembléia Geral Extraordinária, 2012 (5 July 2012) article 4, online: <http://www.infraero.gov.br/images/stories/Infraero/Estatuto/2012_ESTATUTO_DA_INFRAERO_AGE_05-06-2012.pdf>.
[290] *Código Brasileiro do Ar, Decreto-Lei 483* (First Brazilian Code of Air), Presidência da República, 1938 (8 June 1938) online: <http://www.planalto.gov.br/ccivil_03/decreto-lei/1937-1946/Del0483.htm> [*Código Brasileiro do Ar*].
[291] *Código Brasileiro do Ar, Decreto-Lei 32* (Second Brazilian Code of Air), 1966 (18 November 1966) online: <http://br.vlex.com/vid/novembro-institui-codigo-brasileiro-34163846>.
[292] Eurico Paulo Valle, *Comentários ao Novo Código Brasileiro do Ar*, (Rio de Janeiro: Forense 1973) at 9-11 [*Valle*].
[293] *Código Brasileiro de Aeronáutica*, *supra*, note 242.
[294] See all Brazilian Constitutions at <http://pdba.georgetown.edu/constitutions/brazil/brazil.html>.

Aeronautical Code, Law n. 7565/86, was established two years before the incumbent Brazilian Federal Constitution of 1988.[295]

The nomenclature of "Air Law" or "Aeronautical Law" has been a source of disagreement in Brazil since the creation of the first Brazilian Code of the Air.[296] This discussion has taken place in other countries, as well, like France and Italy. The matter was discussed in 1943 at the National Juridical Conference. The majority approved the term Air Law, which had already been in use for years.[297]

According to Eurico Paulo Valle, Air Law has a wider meaning than Aeronautical Law as it can include telecommunications, while Aeronautical Law rules apply only to air navigation. He justifies his understanding to be in accordance with the 1967 Federal Constitution which distinguished the right of the Union to legislate on Aeronautical Law, space and telecommunications.[298] However, this is not the way in which Aeronautical Law is understood in Brazil at the present time: it is considered to include the juridical norms about aeronautics, air navigation, air traffic, aeronautic and airport infrastructure and acts and services directly or indirectly related to aircraft flight.[299]

"Guided by military purposes, the aeronautical infrastructure was developed … by public and private initiatives, with a characteristic that, for many years, only Brazilian aviation had: the sharing of infrastructure by civil and military aviation which was consolidated in the 1970s with the entrance into operation of the Integrated System of Aerial Defense and Control of Aerial Traffic–SISDACTA."[300]

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[295] *Brazilian Constitution*, *supra*, note 240.
[296] *Código Brasileiro do Ar*, *supra*, note 290.
[297] *Valle*, *supra*, note 292 at 15-16.
[298] *Ibid* at 16.
[299] *Pacheco*, *supra,* note 281.
[300] Rodrigues, Rodrigo Augusto. "The Airline Market and Airport Infrastructure in Brazil: From a Regulated to a Deregulated system" (1998) Instituto Cultural Minerva/ Institute of Brazilian Issues/The George Washington University, online: <(http://www.gwu.edu/~ibi/minerva/Fall1998/Rodrigo.Rodrigues.html)>.

2.2.2 Important Provisions

According to the Brazilian Federal Constitution of 1988, article 22, I, the Union has the exclusive power to legislate concerning aeronautical law.[301] The Brazilian Aeronautical Code, article1, complements it by stating Aeronautical Law is regulated by the Code itself together with the treaties, conventions and international acts that Brazil is party to and complementary legislation.[302] The Code is applicable for nationals and foreigners inside national territory.[303] Article 21, XII, c) of the Brazilian Constitution states that it is in the Union's power to operate directly, or through authorization, concession or permission, air and aerospace navigation.[304]

Article 12 of the Aeronautical Code determines that in other cases not specifically fixed by Law, air navigation, air traffic, the aeronautical infrastructure, aircraft and personnel are governed by the norms, orientation, coordination, control and oversight of the Aeronautical Ministry.[305] The complementary legislation mentioned in article 1 is therefore the regulations present in the Code plus any special laws, decrees and norms relating to aeronautics.[306]

The Brazilian Aeronautical Code, article 25, clarifies that the aeronautical infrastructure is formed by a number of organs, installations and ground structures to support air navigation and to promote its safety, regularity and efficiency. Article 47 determines the Flight Protection System's goals of regularity, safety and efficiency of air traffic flow; and it includes the following activities: i) air traffic control, ii) aeronautical telecommunication and air navigation aids, iii) aeronautical meteorology, iv) aeronautical cartography and information, v) search and rescue, vi) in-flight inspection, vii) coordination and inspection of specific technical training, viii) supervision of

[301] *Brazilian Constitution*, *supra*, note 240.
[302] *Código Brasileiro de Aernoáutica*, *supra*, note 242 at Article 1.
[303] *Ibid* at Article 2.
[304] *Brazilian Constitution*, *supra*, note 240, Article 21, XII, (c).
[305] *Código Brasileiro de Aeronáutica*, *supra*, note 241 at Article 12.
[306] *Ibid* at Article 3.

manufacturing, repairing, maintenance and distribution of terrestrial equipment of air navigation aids.[307]

Section VIII of the Code deals with the rules of Civil Liability in articles 246 to 287. Contractual liability is defined in Chapter 1, and the liability of the transporter is defined in articles 246-248.[308] For example, Article 268 determines the liability of the transporter to damages to third parties on the ground caused directly by an aircraft in flight or maneuvering, or even by people or objects that have fallen or been thrown from it.[309] Regarding air traffic services, article 280, II establishes the rules of civil liability of the entity in charge of air traffic control. According to it, three principles necessarily characterize it: the first is the fault of the operator, the second is damages to passengers or goods and the third is the causal link between the fault of the operator in an accident and the consequent damages.[310]

Article 280 also clarifies the limits of the Civil Liability of Brazilian aeronautical manufacturers and aeronautical infrastructure entities. The article imposes liability in accordance with the fault in both cases – manufacturers and infrastructure providers. The manufacturer answers for faults for damages caused by defects in manufacture, while airport administrations and public administration are responsible for faults of their operators in accidents that cause damage to passengers or goods. The limits imposed are presented in articles 257, 260, 262, 269 and 277.[311]

Article 257 limits the responsibility of the transporter for each passenger or personnel member for injury or death to 3,500 OTN (National Treasure Obligation)[312] and to 150 OTN for delays. The limit may be extended by agreement between passengers and transporters.[313] Article 260 limits the liability for damages to baggage, 262 limits it for damages to freight, 269 limits the liability to the transporter and 277 specifies the liability

[307] *Ibid* at Article 1.
[308] *Ibid*.
[309] *Ibid*, at Article 268.
[310] *Pacheco*, *supra,* note 281 at 427.
[311] *Código Brasileiro de Aeronáutica*, *supra*, note 242 at Article 280.
[312] OTN was created by Law-decree 2284/86, but it was extinguished by Law 7730/89: *Decreto-Lei 2284,* Presidência da República, 1986 (10 March 1986), online: <http://www.presidencia.gov.br/ccivil_03/decreto-lei/Del2284.htm>; and *Lei 7730*, Presidência da República, 1989 (31 January 1989), online: <http://www.presidencia.gov.br/ccivil_03/Leis/L7730.htm>..
[313] *Código Brasileiro de Aeronáutica*, *supra*, note 242 at Article 257.

limitation in cases of collision.[314] Therefore, the idea of the legislation was to impose a cap for compensation provided by manufacturers, airport administrators and public administration (air traffic control operators are in this category) in case of damage to passengers, baggage, freight or other aircraft during a collision, as was established for transporters.

According to Pacheco, however, article 280, II, which deals with the limits of civil liability for airport administration and public administration, was revoked partially by art. 37, paragraph 6, of the Brazilian Constitution of 1988.[315] It is important to remember that the Brazilian Aeronautical Code of 1986 was elaborated before the current Brazilian Constitution of 1988. Article 37, paragraph 6, states: "public legal entities and private legal entities rendering public services shall be liable for damages that any of their agents, acting as such, cause to third parties, ensuring the right of recourse against the liable agent in cases of malice or fault."[316] The new Constitution expresses the alteration regarding the present understanding of civil liability, which imposes compensation on public and private legal persons. The new article 37, paragraph 6, demonstrates the evolution of civil liability for damages caused directly by the execution of a public service, independent of the legal person of the entity in charge of the service: either public law entities (Union, States, Federal District, municipalities or autarchies) or private law entities (public enterprise, joint stock company or others). Therefore, the rule seems simple: any harm to someone else's legal assets should be compensated by the person causing the damage.[317] ANAC through Resolution n. 37 of August7, 2008 updated the compensation limits presented in Section VIII of the Brazilian Aeronautical Code. It established the unitary value of OTN as R11.70 (Brazilian Reais), and it determined the IPCA – Ample Consumer Price National Index as the criterion for monetary updating of the OTN value.[318]

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[314] *Ibid* at Articles 257, 260, 262, 269 and 277.
[315] *Pacheco*, *supra*, note 281 at 436.
[316] *Brazilian Constitution*, *supra*, note 240 at Article 21, XII, (c).
[317] *Pacheco*, *supra*, note 281 at 436.
[318] Resolução 37 (ANAC Resolution), Agência Nacional de Aviação Civil, 2008 (7 August 2008), Articles 1 and 2, online: <http://www2.anac.gov.br/biblioteca/resolucao/RA2008_0037.pdf>.

Article 287 clarifies that civil liability for international air transport is restricted by the international conventions Brazil is party to, and the amount will be converted to the relevant national currency in accordance with regulation by the executive power.[319]

2.2.3 Complementary Legislation

Several other pieces of legislation complement the Aeronautical Code: laws and decrees as complementary legislation and *portarias* and *resoluções* as complementary norms. Worth mentioning, for example, is Decree n. 21.713 of August27, 1946, which promulgated the Chicago Convention. Article 28 of the Chicago Convention, which states that "each contracting State undertakes, so far as it may find practicable, to provide, in its territory, airports, radio services, meteorological services and other air navigation facilities to facilitate international air navigation, in accordance with the standards and practices recommended or established from time to time, pursuant to this Convention,"[320] is translated in article 28 of Decree 21.713.

Law n. 11.182/2005 created the ANAC, the new National Civil Aviation Agency, which began operations only in 2006 after being regulated by Decree n. 5.731 of March 20, 2006. It introduced several changes to the civil aviation rules, as has been mentioned previously.[321] ANAC is an entity of indirect public administration.[322] As an associate governmental agency, it can only be created or dissolved by law.[323] It is important to note that matters related to the Brazilian Airspace Control System – SISCEAB and the Aeronautical Accidents Prevention and Investigation System – SIPAER are excluded from the competency of ANAC.[324] The ANAC decree clearly states in article 4, paragraph 2, that ANAC should observe the specific authority of the Aeronautic Command regarding the norms and proceedings for airspace control. Paragraph 7 of the same article stipulates that the Brazilian Air Space Control System – SISCEAB will be

[319] *Código Brasileiro de Aeronáutica*, *supra*, note 242 at Article 287.
[320] *Chicago Convention*, *supra*, note 41 at Article28.
[321] Please refer to the subtopic on the Brazilian Air Navigation Framework.
[322] *Pacheco*, *supra*, note 281 at XLIV.
[323] *Brazilian Constitution*, *supra*, note 240 at Article 37, XIX.
[324] *Pacheco*, *supra*, note 280 at XLV.

controlled directly by the Union through the Aeronautic Command or by any entity to which this power has been delegated.[325]

DECEA is the central entity of the Brazilian SISCEAB (Airspace Control System) as it is in charge of the normative orientation of SISCEAB.[326] Therefore, it regulates and creates information and technical standards necessary to the promotion of safe air navigation services and all acts and services related thereto, through different mechanisms. The following are a few examples of its activities: the Aeronautical Information Circulars – AIC-A and AIC-N, the Aeronautical Command Instruction – ICA and the Air Traffic Division Normative Circular – CIRTRAF.[327] Regarding air traffic control, ICA-100-12 establishes the rules of the air and air traffic services in accordance with the international standards and recommended practices – SARPS created by ICAO.[328] As the entity in charge of the regulation and oversight of the SISCEAB activities,[329] it may also face liability in case of negligence of its competencies, either as a regulatory body or as a supervisory institution.

The Brazilian Civil Code of 2002, Law 10.406 can also be considered as complementary legislation. It cites a general rule regarding transport contracts in stipulating that special laws, treaties and international conventions are applicable to these contracts if they do not contradict the rules of the Civil Code itself.[330] Having a specific chapter on transportation is considered an innovation in the present Code since the previous Civil Code of 1916[331] did not have one. In addition, the Civil Code gives the general civil law rules for civil liability, which can always serve as a formal source, depending upon the case.[332]

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[325] *Decreto 5731*, Presidência da República, 2006 (20 march 2006) Article 4, paragraphs 2 and 7, online: <http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Decreto/D5731.htm>.
[326] *Portaria 913/CG/903*, *supra*, note 244 at Articles 3, 4, and 6.
[327] There are many others. *See, e.g.,* "Publicações DECEA", online: DECEA <http://publicacoes.decea.gov.br/index.cfm?i=filtro&cat=tipo&f=3>.
[328] *Regras do Ar e Serviço de Tráfego Aéreo, ICA 100-12*, Ministério da Defesa/Comando da Aeronáutica 2006, online: <http://www.fab.mil.br/portal/legislacoes/ica_100-012_160206.pdf> [*ICA 100-12*].
[329] *Portaria 913/CG/903*, *supra*, note 244 at Article 4.
[330] *Código Civil. Lei 10.046*, Presidência da República, 2002 (10 January 2002), online: <http://www.planalto.gov.br/ccivil_03/leis/2002/L10406.htm> [*Código Civil*].
[331] *Código Civil dos Estados Unidos do Brasil, Lei n. 3071*, Presidência da República, 1916 (1 January 1916), online: <http://www.planalto.gov.br/ccivil_03/leis/L3071.htm>.
[332] *Código Civil*, *supra*, note 330 at Articles 927, 186, and 187.

Although the responsibility of airlines is not a matter of study in this project, it is worth mentioning that the Consumer Code plays an important role in Brazil as a subsidiary source of the Brazilian Aeronautical Code for the protection of passengers' rights. There is no consensus[333] on this matter in the Brazilian jurisprudence since Brazil is party to both the Warsaw and Montreal Conventions, both of which preclude the right of use of any other legal provisions to solve their conflicts.

There is a Draft Law n. 6716/2009 that has been analyzed by the legislative power in Brazil to modify the Brazilian Aeronautical Code of 1986. The main change proposed seems to be the increase in the amount of foreign capital allowed to Brazilian airlines. The limit is 20% in the present Code, but the project wants to make it 49%.[334] It is believed by some that this would represent a modernization of the industry; however, it would also represent a challenge to the civil authority to promote oversight of the matter.[335]

2.3 Government Liability according to the Brazilian Doctrine

Before analyzing Government Liability pursuant to the Brazilian doctrine, it is worth mentioning that international law establishes a conceptual difference between state responsibility and state liability, although it is not considered an easy task. Linguistic difficulties in determining the difference between liability and responsibility in non-English languages may contribute to confusion regarding both terms. According to Sompong Sucharitkul,

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[333] On this matter, two opposite decisions can be mentioned. The first accepts the Brazilian Consumer Code instead of the Warsaw Convention, and it was proffered by the Justice Superior Tribunal in Recurso Especial 235.678 – São Paulo (19990096670-8) (2000) (STJ) Ruy Rosado de Aguiar, online: <https://ww2.stj.jus.br/processo/jsp/ita/abreDocumento.jsp?num_registro=199900966708&dt_publicacao=14-02-2000&cod_tipo_documento=3> [*Res 235.678*].
On the second, the Federal Supreme Tribunal applies the Warsaw Convention's statute of limitations instead of the Consumer Code's. *See* Recurso Extraordinário 297901/RN (2006) (STF) Ellen Grace, online: <http://www.stf.jus.br/portal/jurisprudencia/listarJurisprudencia.asp?s1=%28RE%24%2ESCLA%2E+E+297901%2ENUME%2E%29+OU+%28RE%2EACMS%2E+ADJ2+297901%2EACMS%2E%29&base=baseAcordaos&url=http://tinyurl.com/begld5r> [*RE 297901*].

[334] *See Projeto de Lei 6716*, *PL 6716/2009*, (Draft of Law), Câmara dos Deputados 2009, online: <http://www.camara.gov.br/proposicoesWeb/fichadetramitacao?idProposicao=465324.

[335] *See* Sulaiman Miguel Neto, "Função dos Códigos no Ordenamento Jurídico Brasileiro e Justificativa do CBA" (2010) 93 Rev Bra Direito Aeronáutico e Espacial at 58-59.

> " 'State responsibility' refers to a State's responsibility under international law in general, whereas 'international liability' denotes a State's 'civil responsibility', or obligation to pay compensation or make reparations for injuries that non-nationals suffer outside its national boundaries as a result of activities within its territory or under its control. A State's international liability is engaged not only under international law, but also within the national dimension of municipal legal systems in circumstances involving transnational relations."[336]

2.3.1 How to Define It

The Brazilian federation is divided among the Federal government, the State governments and the Municipal governments. The Brazilian Constitution, article 21, XII, c) specifies that it is the Federal government's responsibility to provide air navigation services either directly or indirectly through authorization, concession or permission.[337] "In Latin languages, the terms 'liability' and 'responsibility' are closely connected. The word '*responsabilité*' (or equivalent) covers both."[338] In Portuguese and according to Brazilian Law, the legal term for civil liability is '*Responsabilidade Civil*'.

State liability can originate from the three different functions of the State: Judicial, Legislative or Administrative. The liability of the Legislative and Judicial branches is exceptional, whereas the liability that comes from the Administrative function is much more common.[339] However, the State is a legal person that can respond in cases of liability. Therefore, according to this line of thought, it is mistaken to refer to 'liability of the Public Administration' as though the Public Administration has no legal capacity. The legal capacity remains with the State and those public and private legal entities that may

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[336] Sompong Sucharitkul, "State Responsibility and International Liability under International Law" (1996) 18 Loy. L.A. Int'l& Comp. L. Rev. 821 at 822, online: <http://digitalcommons.lmu.edu/ilr/vol18/iss4/6>

[337] *Brazilian Constitution*, *supra*, note 240 at Article 21, XII, (c).

[338] John Bell, *Introduction to Tort Liability of Public Authorities in Comparative Perspective*, Duncan Fairgrieve, Mads Andenas, and John Bell, eds. (London: The British Institute of International and Comparative Law, 2002) at xv [*Bell*].

[339] Maria Sylvia Zanella di Pietro, *Direito Administrativo*, 25th ed (São Paulo: Atlas, 2012) at 697 [*Di Pietro*]. This thesis will deal only with the state liability originating from the administrative function.

represent the State in some of its activities. State responsibility is always civil, and it is exercised through the possibility of pecuniary compensation for damages.[340] On the contrary, Meirelles defends the use of the expression 'Civil liability of the Public Administration' instead, justifying his view by explaining that this responsibility arises from administrative acts and not from acts of the State as a political entity.[341] It should be mentioned here that there are some activities that are the responsibility of the State even if the State delegates them to another entity to act on its behalf. "There are four major areas in which liability is invoked: the protection of rights, the exercise of discretion, the regulation of the activities of others, and the implementation of policy."[342] "Many of the more complex cases involve discretion. As has been said, there is a widespread concern not to interfere with the legitimate sphere of discretion of the administration."[343]The same concern is present in Brazilian Administrative Law.

It is important to differentiate the type of government liability the public administration activity may create. It can be non-contractual or contractual when it is governed by an administrative contract and its specific rules. According to Maria Sylvia Zanella di Pietro, the non-contractual civil liability of the State can be defined as the obligation the State has to compensate for damages caused to third parties and attributable to its public agents through act or omission, and which may be material or juridical, legal or illegal.[344] According to Brazilian private law, there is liability only in case of an illicit act[345]; however, administrative law allows liability resulting from legal acts that may cause damages that represent a heavier burden than that imposed on a regular basis on other members of society.[346] Mello explains that State liability from licit acts may occur in case

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[340] *Ibid* at 697.
[341] Hely Lopes Meirelles, *Direito Administrativo Brasileiro,* 27th ed, updated by Eurico de Andrade Azevedo, Délcio Balestero Aleixo and José Emmanuel Burle Filho (São Paulo: Malheiros Editores, 2002) at 617 [*Meirelles*].
[342] *Bell*, *supra*, note 338 at xxii.
[343] *Ibid* at xv.
[344] "Pode-se portanto, dizer que a responsabilidade extracontratual do Estado corresponde à obrigação de reparar danos causados a terceiros em decorrência de comportamentos comissivos ou omissivos, materiais ou jurídicos, lícitos ou ilícitos, imputáveias ao agentes públicos."Author's free translation of *Di Pietro*, *supra*, note 339 at 698.
[345] The term "illicit" here signifies a behavior contrary to the law. This thesis, however, will analyze that which is illicit only in terms of civil wrongs, ***not*** criminal.
[346] *Di Pietro*, *supra*, note 339 at 697.

the damage was caused indirectly as a consequence of a State's valid and legitimate act.[347]

2.3.2 Theories Regarding Government Liability through Time

Some theories concerning government liability have been elaborated over time. The classification may differ from author to author. According to di Pietro, these theories can be divided into three main areas. The first is the non-responsibility theory, also known as sovereign immunity. The second comprises the civil law theories and the third the public law theories. However, there are many different definitions and theoretical approaches to the subject, depending on the country, the legal systems and the language. This creates difficulties in studying and determining the basic concepts. Besides, these theories have not been treated entirely uniformly inside any juridical system.[348]

2.3.2.1 State Irresponsibility or Sovereign Immunity

The sovereign immunity theory was adopted by most absolutist regimes, its main idea being justified by the sovereignty power. The State had incontestable authority over the vassals. The principles 'The king can do no wrong'[349] and '*quod principi placuit habet legis vigorem*'[350] were the justification for the impossibility of claiming any damages against the king as this would place the king on the same level as the vassal.[351]According

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[347] Celso Antônio Bandeira de Mello, *Curso de Direito Administrativo*, 29th ed. (São Paulo: Malheiros, 2012) at 1011-1012 [*Mello*]. Mello says that there are cases in which the State is authorized by law to act in a certain way the objective of which is not to sacrifice someone else's rights. However, by exercising this power the State may affect someone else's rights, thus violating them in consequence or as a simple result of a legitimate action. (Author's free translation) ("…há casos em que o estado é autorizado pelo Direito à prática de certos atos que não têm por conteúdo próprio sacrificar direito de outrem. Sem embargo, o exercício deste atos pode vir a atingir direitos alheios, violando-os, como mero subproduto, como simples resultado ou sequela de uma ação legítima.") *Op. cit.* at 1012.

[348] *Di Pietro*, *supra*, note 339 at 698.

[349] Street believes "this tortious immunity is … a judge-made rule. It does not establish that law is inapplicable to the King, but that different laws may govern him from those controlling the activities of private individuals … the judges by formal legalistic reasoning have made it the basis for the royal immunity in tort. The judicial approach is perhaps best illustrated in the judgment of Cockburn C.J. in *Feather v. Reg.*" H. Street, *Governmental Liability: A Comparative Study* (London: Cambridge University Press, 1953) at 2.

[350] What pleases the king has the strength of law.

[351] *Di Pietro*, *supra*, note 339 at 699.

to Mello, however, these principles did not represent a complete lack of protection of individuals, who could have possible recourse to action in some cases; he mentions the examples of state responsibility originating from specific laws and private domain management of the State.[352]This theory has been criticized for the injustice it perpetuates. If a State must defend and promote the law and individual rights, then it should compensate for any damages it may cause to third parties.[353]

The recognition of the State's responsibility according to principles of Public Law was marked by the milestone *'Aresto Blanco'* from the '*Tribunal de Conflitos'* in 1873, even if it established it as neither a general nor an absolute liability. This is worth mentioning since it recognized the existence of state liability as a principle, regardless of the fact that there was no positive law expressing it.[354]

The State's responsibility has been admitted since the second half of the nineteenth century, and there has been a trend to expand it more and more. It has evolved from a subjective liability, based on fault, to an objective liability, with its foundation on the simple relation of cause and effect between administrative behavior and damaging event.[355]

2.3.2.2 Subjective Responsibility

Subjective liability is the obligation to compensate resulting from a behavior contrary to the law. This act might be based on fault or intent, but it directly causes damage to a third party or indirectly when it does not avoid it if it is supposed to avoid it.[356]

According to Carvalho Filho, the subjective doctrine relies on the civil doctrine of fault. However, at the beginning, not all State acts were treated equally regarding its responsibility. Some acts, considered to be a direct consequence of the sovereign power

[352] *Mello*, *supra*, note 347 at 1017-1018.
[353] *Di Pietro*, *supra*, note 337at 699.
[354] *Mello*, *supra*, note 347 at 1018.
[355] ("Admitida a responsabilidade do Estado já na segunda metade do século XIX, sua tendência foi expandir-se cada vez mais, de tal sorte que evolui de uma responsabilidade subjetiva, isto é, baseada na culpa, para uma responsabilidade objetiva, vale dizer, ancorada na simples relação de causa e efeito entre o comportamento administrativo e o evento danoso.") Author's free translation. *Mello*, *supra,* note 347 at 1018-1019.
[356] *Ibid*.

were not supposed to be liable. Only others, considered to be more similar to private law acts, could result in compensation. Since it was very difficult for the victims to prove the kind of act the State was involved in when the damage occurred, this view evolved into the recognition of administrative fault. In this instance, it was not necessary to identify the agent that caused the damage. Therefore, it was called anonymous fault or service fault (*faute de service*).[357]

According to Mello, public law principles liberate the need to determine the individual fault of the public agent in order to seek compensation from the State. This liability is based on the French idea of '*faute de service*', which means there is fault when the service does not function, or when it works badly or even when it is performed too late. In summary, '*faute de service'* is due to the malfunction of a service, including its belatedness; and it is sufficient to configure the State's responsibility for damages caused in consequence of it.[358]

It is relevant to mention here that confusion has occurred when the Brazilian doctrine has analyzed fault based on state responsibility. Some have wrongly expressed the view that it is an objective liability doctrine instead of a subjective one. The way the word '*faute*' was translated into Portuguese – as '*falta'*, which means lack, absence and not fault itself as a juridical concept – is probably one of the reasons for this problem. Besides, due to the difficulty the regular citizen would face in proving the government's fault (based on negligence, incompetence or imprudence), there are several cases in which fault has to be dealt with as a simple assumption.[359] This is done in order to guarantee the kind of protection the common people need to defend their rights. According to the accepted principle of fault assumption, the victim does not have to prove it. It does not affect the subjective character of the doctrine; for on the opposite argument, if the government can demonstrate it has acted with due diligence, competence and prudence, the antitheses of fault, it has no obligation to compensate for the damage.[360]

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[357] José dos Santos Carvalho Filho, *Manual de Direito Administrativo*, 25th ed. rev., atualizada e ampliada (São Paulo: Atlas, 2012) at 545 [*Carvalho Filho*].
[358] *Mello*, *supra*, note 347 at 1019
[359] *Ibid* at 1020.
[360] *Ibid* at 1020-1021.

There is subjective responsibility when it is necessary to demonstrate that the conduct causing damage has expressed either intent or fault. In both cases (intent and fault), there is a transgression of law. Therefore, it is always liability for illicit behavior, when the State, which should act according to certain templates, does not act, or it acts insufficiently to avoid the damage.[361]

2.3.2.3 Objective Responsibility

On the other hand, there is objective responsibility when it is enough to characterize it as the simple causal relation between a fact and its produced effect.[362] The obligation to compensate arises for someone out of a licit or an illicit act. It can be defined as the obligation to compensate due to a legal or illegal proceeding that caused damage to a juridical sphere of protection pertaining to a third party. It is enough to characterize the simple causal relationship between the behavior and the damage.[363]

According to di Pietro, the objective responsibility doctrine replaces the fault present in the subjective doctrine with the causal nexus between the functioning of the State and the damage suffered by the individual, independent of any malfunction of the service itself. She determines the elements that establish the responsibility: a licit or an illicit act of a public agent, specific and abnormal damage and the causal nexus. It is called the objective theory because it does not take into consideration any fault and/or intent that are subjective elements. It is also known as the risk theory, in reference to the risk that is involved in the State's activity.[364]

Meirelles observes that the theory of the risk comprises two categories: administrative risk and integral risk. Administrative risk admits exceptions to the responsibility of the

[361] *Ibid* at 1021.
[362] "Há responsabilidade objetiva quando basta para caracterizá-la a simples relação causal entre um acontecimento e o efeito que produz." Author's free translation . *Ibid*..
[363] "...é a obrigação de indenizar que incumbe a alguém em razão de um procedimento lícito ou ilícito que produziu uma lesão na esfera juridicamente protegida de outrem. Para configurá-la, basta, pois, a mera relação causal entre o comportamento e o dano." Author's free translation. *Ibid* at 788.
[364] *Di Pietro*, *supra*, note 339 at 701.

State in the cases of the victim's fault, a third party's fault or an 'Act of God' (*force majeure*), while integral risk has no exceptions.[365]

The Brazilian Constitution has adopted the objective theory, but accepts administrative risk instead of integral risk.[366] The later has never been introduced into the Brazilian legal system, although there was some discussion about it during the drafting of the Republic's Constitution.[367]

According to Carvalho Filho, the foundation of the objective responsibility of the State is administrative risk. He believes that since the state is much more powerful than the individual citizen, it should be liable for the risks of its activities. With a great amount of power comes a great amount of responsibility to justify it. However, it is important to differentiate administrative risk from integral risk: administrative risk admits limits. Therefore, if the victim has contributed to the event, the State may have its level of compensation diminished; or it may even be exempt in case of the victim's exclusive fault. On the other hand, integral risk does not need the causal link to be configured, and it exists even if the fault is exclusively the victim's.[368]

Mello says that to determine the foundation of State responsibility it is necessary to distinguish the cause of the damage. If it is an illicit act, the foundation is the Legality Principle.[369] Therefore, if the law is broken by the State, the consequence should be that it compensate for the damage caused. If it is a licit act, the foundation is the equal distribution of the burden that can originate from some acts. The idea is to protect some individuals from supporting the onus of the collective interest by themselves. This burden must be equally divided among the members of the community.[370] Aragão, however, suggests that it is difficult to understand all the nuances of the events that can lead to

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[365] *Meirelles*, *supra*, note 341 at 620.
[366] It is important to mention some specific exceptions. According to Di Pietro, damages caused by nuclear accidents are ruled by Constitution Article 21, XXIII, (d), and damages caused by terrorists, war or correlative acts against aircraft that belong to Brazilian air carriers are ruled by Law n. 10309, of 22/11/2001 and 09/10/2003; both are integral risk cases. *Di Pietro*, *supra*, note 339 at 702-703.
[367] *Meirelles*, *supra*, note 341 at 620.
[368] *Carvalho Filho*, *supra*, note 357 at 546.
[369] The Legality Principle is present in the Brazilian Constitution, Article, 5, II: "No one shall be obliged to do or refrain from doing something except by virtue of law." *Brazilian Constitution*, *supra*, note 240.
[370] *Mello*, *supra*, note 347 at 1023.

State Responsibility at the present time under the sole foundational principle of equality.[371]

It is further affirmed that "State liability also recognizes the juridical inequality which exists in the relationship between the individual and the Administration, due to the inherent prerogatives of public law, which, as a general rule, protects the public interest as taking precedence over individual interests."[372] According to this understanding, State liability would appear to be a juridical compensation to balance the relationship between the Administration and individuals when damages occur.

2.3.3 Brazilian Federal Constitution 1988 –Article 37, Paragraph 6

The Brazilian Constitution determines the objective responsibility of the Administration according to the modality of administrative risk in article 37, paragraph 6: "Public entities and private entities rendering public services are liable for the damages caused to third parties, by their agents, in such capacity, ensuring the right of recourse against the liable agent in cases of intent or fault."[373] The Supreme Federal Court has expressed the following view: The administrative risk theory has been adopted in successive Brazilian constitutional documents since 1946. It gives a doctrinal foundation for the objective civil responsibility of the public power for damages that its agents may cause.[374]

The criteria to establish objective responsibility present in this article differ. For private entities, the essential element is the social objective of the entity, namely, whether or not

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[371] "...ser difícil compreender todas as nuances dos eventos ensejadores da responsabilidade do Estado sob o único fundamento da igualdade." Author's free translation of Alexandre Santos de Aragão, "Os Fundamentos da Responsabilidade Civil do Estado," (2011) 27 REDE (ISSN 1981-187X) at 7, online: <http://www.direitodoestado.com/revista/REDE-27-SETEMBRO-2011-ALEXANDRE-ARAGAO.pdf>

[372] "...responsabilidade objectiva reconhece a desigualdade jurídica existente entre o particular e o Estado, decorrente das prerrogtivas de direito público a este inerentes, prerrogativas estas que, por visarem à tutela do interesse da coletividade, sempre assegurarão a prevalência jurídica desses interesses ante os do particular." Author's free translation of Marcelo Alexandrino & Vicenti Paulo, *Direito Administrativo Descomplicado*, 16th ed rev. amp (São Paulo: Método, 2008) at 602-603 [*Alexandrino & Paulo*].

[373] *Brazilian Constitution*, *supra*, note 240.

[374] "A teoria do risco administrativo, consagrada em sucessivos documentos constitucionais brasileiros desde a Carta Política de 1946, confere fundamento doutrinário à responsabilidade civil objetiva do Poder Público pelos danos a que os agentes públicos houverem dado causa. ...") Author's free translation. Recurso Extraordinário 109.615-2/RJ, (1996) [*DJ 020896*]; (STF) Celso de Mello, [*RE 109.615-2*], online: <http://redir.stf.jus.br/paginadorpub/paginador.jsp?docTP=AC&docID=200815>.

it provides a public service. Therefore, only those entities that provide a public service are considered liable in accordance with the objective rules. Regarding public entities, the fundamental principle is the nature of the juridical personality: therefore, all public entities, independent of the kind of service they offer, are objectively liable for damages caused to third parties.

Public law entities are the Federation's members (the Union, States and Municipalities), autarchies and public foundations. Since there are several forms of delegation, different entities that may receive delegation and an imprecise concept of public service, it could be difficult to identify a private legal person that provides a public service that would be liable in accordance with article 37, paragraph 6. However, as a general rule, it can be affirmed that private legal persons that provide public services may all be private law juridical personalities of an indirect administration (public company, mixed-capital company or public private law foundation). The private legal persons to whom the public service has been delegated,[375] and which are not part of the public administration, are also included under the same liability regime.[376] It is important to observe that the responsibility of the state is subsidiary to the responsibility of the private legal persons that provide public services.[377] This means that if the entity does not have enough funds to pay compensation, the State will respond from its own funds. Di Pietro believes that the foundation of the subsidiary responsibility of the State resides in the same article 37, paragraph 6, since the State should answer objectively if private legal entities cannot, in order to protect individuals from damages caused by actions of the State, either direct or indirectly.[378] Mello argues that all public legal persons that help the State and any private legal persons that provide a public service either through concession or permission or other forms of delegation of public services are included in the subsidiary responsibility of the State. The reasoning behind this view relies on the fact that the damaging activity

[375] According to Carvalho Filho, public service can only be delegated through concession and permission, in accordance with article 175 of the Constitution. However, the possibility of authorization of public services in accordance with article 121 of the Constitution will be discussed in a separate subtopic. *Carvalho Filho*, *supra*, note 357.
[376] *Ibid* at 550
[377] *Ibid* at 564.
[378] *Di Pietro*, *supra*, note 339 at 516-517.

is only possible because the State has given these entities through delegation the exercise of a public activity.[379]

The Constitution has chosen the right name for a public servant in article 37– a public agent: this generic nomenclature includes everyone permanently or temporarily in charge of a public service. The kind of legal relationship the public agent has with the administration should be a matter of indifference to the victim of damages. It matters if the agent is in the service of the public power: however, the agent's activities may exceed its administrative competence or jurisdictional area.[380] Di Pietro defends the idea that the public agent may be a political agent, an administrative agent or individuals collaborating with the public administration. However, the agent must be acting in the exercise of its official functions.[381] Mello argues that not only the damage that occurs as a consequence of the public agent's exercise of the public activity itself, but also any damage that could only be produced because the agent overextended his public agent capacity should be taken into account.[382] Article 37, paragraph 6 gives the public administration the right of recourse against its public agent. However, the agent is only liable for intent or fault.[383] The Supreme Federal Court (STF) maintains that the same article promotes a double warranty theory: the first is given to the victim, who is guaranteed the possibility of suing any public or private law entity that provides public service for damages caused. The second warranty is offered to the public agent who can only respond civilly and administratively to the legal person to which he belongs.[384] According to this theory, the public agent may not be civilly liable directly to the victim. Although this is the STF's jurisprudence, it is important to mention there is controversy regarding this matter, and

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[379] *Mello*, *supra*, note 347 at 1025.
[380] *Merirelles*, *supra*, note 341 at 623.
[381] *Di Pietro*, *supra*, note 339 at 705.
[382] "…não só os danos produzidos no prórpio exercício da atividade pública, mas também aqueles que só puderam ser produzidos graças ao fato de o agente prevalecer-se da condição de agente público." Author's free translation of *Mello*, *supra*, note 345 at 1026.
[383] *Alexandrino & Paulo*, *supra*, note 372 at 621-622.
[384] Informativo 436, (2006) at Responsabilidade Civil do Estado e Agente Público 1 e 2 (STF), online: <http://www.stf.jus.br//arquivo/informativo/documento/informativo436.htm#Responsabilidade Civil do Estado e Agente Público – 1> [*Informativo 436*]l and:Informativo 519, (2008) at Responsabilidade Civil do Estado e Ato decorrente do exercício de função, (STF), online: <http://www.stf.jus.br//arquivo/informativo/documento/informativo519.htm#Responsabilidade Civil do Estado e Ato Decorrente do Exercício da Função> [*Informativo 519*].

that this is not a majority position according to the Brazilian doctrine.[385]The Supreme Federal Court in Brazil, the STF, has presented the view that the civil liability of private legal persons that provide public services is objective. However, this Court used to hold the view that private legal persons that provide public services are only liable for damages caused to users of those services. It was believed that the liability of a private company that provides a public service does not extend to third parties who are not consumers of its service.[386] This view was changed by a later decision of the Supreme Federal Court Plenary with Minister Ricardo Lewandowski as *Relator* (Commentator)(RE 591/874/MS). The Court expressly stated that the responsibility of a private legal person that provides a public service is objective, and that it extends to non-users of the service as a consequence of the causal link between the damage to the third person and the administrative act. The commentator justified his vote on the principle of isonomy,[387] since he believed that art. 37, paragraph 6 of the Brazilian Constitution does not differentiate or give any margin for differentiation between users and non-users of the service. He said that everyone in one way or another may be affected by the public service, which can be provided directly or indirectly.[388]

There exists some criticism about the principle the STF used to justify the objective liability of public services' delegated entities. According to the STF, the foundation for this liability is article 37, paragraph 6 as it applies to both users and non-users of the services. However, article 37 expressly defines liability as applying to third parties. The user of the public services has a contractual relation with the delegated entity; and therefore, these services should be ruled by this contract and also by Concessions Law 8987, which determines objective liability in its article 25[389]. Although the consequence is

[385] Minister Carmem Lúcia had reservations about this principle. See *Informativo 436*, *Ibid*.
[386] Recurso Extraordinário 262.651/SP (2004) (STF) Carlos Veloso, online: <http://www.jusbrasil.com.br/filedown/dev0/files/JUS2/STF/IT/RE_262651_SP%20_16.11.2005.pdf> [*RE 262.651*].
[387] Article 5, Brazilian Federal Constitution determines the isonomy principle as the rule that "all persons are equal before the law, without any distinction whatsoever, Brazilians and foreigners residing in the country being ensured of inviolability of the right to life, to liberty, to equality, to security and to property.…" *Brazilian Constitution*, *supra*, note 240.
[388] Recurso Extraordinário 591.874/MS (2009) (STF) Ricardo Lewandowski, online: http://www.jusbrasil.com.br/filedown/dev3/files/JUS2/STF/IT/RE_591874_MS_1278900231279.pdf> [*RE 591.874*].
[389] *Lei 8987*, Presidência da República, 1995, s article 25, online: <http://www.planalto.gov.br/ccivil_03/leis/L8987cons.htm>.

the same if either the STF principle or Law 8987 is applied, since both are cases of objective liability, the foundational principle is different.[390] This is important since there might be situations that would need to be analyzed in accordance with specific contractual provisions. Specific laws are also created for a reason, to facilitate the application of a specific legal regime with its details. Furthermore, if the constitutional power has created a provision to protect third parties, this should be the focus of its application.

2.3.4 Omissions of the Public Administration

Regarding omissions on the part of the public administration, there has been discussion in relation to the Brazilian doctrine about whether the liability that arises from this inaction by the government is objective or subjective. According to Meirelles, the liability is objective; and it is based on administrative risk, even in case of omissions. Therefore, he believes that article 37, paragraph 6 of the Constitution does not differentiate between the act or the omission of the public agent. He mentions that there is objective liability if the State is in charge of protecting the physical integrity of the individual and fails to do so. This would be the case for students in a public school, prisoners in a prison or anyone interned in a hospital under the State's care. The public administration could only avoid compensation if an exception[391] to the State's responsibility were present.[392]

On the other hand, Mello argues the opposite case. State responsibility in case of omission is subjective, since article 37, paragraph 6 mentions only action. He believes that if the State does not act, or if it acts inefficiently or late, it is guilty of omission and therefore is responsible on the basis of its fault. He also says that if the State does not act, it cannot be the author of the damage and cannot be held responsible for it unless it was obliged by law to avoid the damage. Therefore, he defends the idea that the government can only be liable for omission in case of an illicit act, that is, one against the law. Fault and intent are the subjective criteria that should be taken into account in this case. He

[390] *See* Rafael Oliveira, *Responsabilidade Civil do Estado*, Notes (Curso Forum: 2012) [*Oliveira*].
[391] Exceptions are treated in a separate subtopic.
[392] *Meirelles*, *supra*, note 341 at 623-624.

goes further in promoting this idea by explaining that if the State were to respond objectively to acts and omissions without distinction, this would lead to an irrational and intolerable consequence for society: the State would become a universal guarantor of the collectivity; and the government would be liable for every single assault or natural disaster, independently of whether it acted with fault or intent; and this would not be acceptable.[393]

Carvalho Filho calls attention to an important point. He defends the responsibility of the State on the basis of fault in the case of omission. However, he does not accept the idea that the generic omission of the State may result in integral liability in cases of inaction. He agrees that the State fails to provide several generic obligations, such as public education, public health and public safety, in many different societies. Nevertheless, the State should not be responsible in every single case of general omission, but only when a direct causal nexus that links the State's omission to the damage can be established.[394] Although the author does not mention any specific omission, this concept could be seen as a logical consequence of his understanding of generic omissions. A specific omission could be defined as the specific obligation the State has to an individual based on a juridical relation that exists between them; this, for example, is the case of the prisoner. Consequent to this specific obligation and juridical relation, the State possesses the attributes of predictability and evitability. These are two important elements in determining the State's liability in cases of omission.[395]

Di Pietro mentions another point that should be taken into account: namely, if there had been a reasonable possibility of the State's acting in a case of omission. It must be possible and demandable from the State to act, and this condition can only be examined in every single case. It is the use of the reasonability principle that determines whether only what is reasonable to avoid the damage should only be asked of the State. Di Pietro also believes that the government's omission can be determined only in the case of an illicit act.[396]There is no consensus in the Federal Supreme Court (STF) on the type of liability

[393] *Mello*, *supra*, note 347 at 1029-31.
[394] *Carvalho Filho*, *supra*, note 357 at 560-63.
[395] *See Oliveira*, *supra*, note 390.
[396] *Di Pietro*, *supra*, note 339 at 710.

of the public administration in cases of omission. Opposite decisions can be cited: RE-109.615-2-RJ (Minister José Celso de Mello)[397] and RE 170-014-9-SP (Minister Ilmar Galvão)[398] defend the objective responsibility, while RE 180.602-8-SP (Minister Marco Aurélio)[399] and RE 179-147-1SP (Minister Carlos Velloso)[400] promote subjective responsibility for omissions of the State.[401]

The Brazilian Federal Supreme Court decided to hold the State liable for compensation for moral damages to the mother of a convicted prisoner killed by another prisoner inside a public institution, in e RE 179.147 with Minister Carlos Velloso as the Relator (Commentator) of the case. The view was expressed that liability for omission on the part of the Administration is subjective; therefore, intent or fault necessarily, in one of its three modalities: negligence, imprudence or incompetence, follows. It is not necessary to identify the fault individually, as the Brazilian doctrine accepts the French idea of '*faute de service'*.[402] On the opposite side, the Supreme Court has argued in the same case that civil liability for acts of the public administration, either directly through its public legal person or indirectly through a private legal person that provides a public service, is objective and based on administrative risk. There are several requirements: the damage, the administrative action and the causal nexus between the two – damage and public action. However, it is possible for the administration to legally use the victim's fault as a defense in order to diminish or avoid compensation.[403]

The Supreme Court has been adopting the theory of direct and immediate damage in relation to omissions by the government. This theory justifies compensation only if the damage is a direct and immediate cause of the State's inaction. In other words, the State is

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[397] *RE 109.615-2*, *supra*, note 374.
[398] Recurso extraordinário 170.014-9-SP (1997) (STF) Ilmar Galvão, online: <http://redir.stf.jus.br/paginadorpub/paginador.jsp?docTP=AC&docID=218334> [*RE 170.014-9*].
[399] Recurso Extraordinário 180.602-8-SP (1999) (DJ 160499) (STF) Marco Aurélio, online: <http://redir.stf.jus.br/paginadorpub/paginador.jsp?docTP=AC&docID=225416> [*RE 180.602-8*].
[400] Recurso extraordinário 179.147-1-SP (1997) (DJ 270298) (STF) Carlos Velloso, online: <http://redir.stf.jus.br/paginadorpub/paginador.jsp?docTP=AC&docID=224285> [*RE 179.147-1*].
[401] *Di Pietro*, *supra*, note 339 at 711.
[402] "III – Tratando-se de ato omissivo do poder público, a responsabilidade civil por tal ato é subjetiva, pelo que exige dolo ou culpa, numa de suas três vertentes, negligência, imperícia ou imprudência, não sendo, entretanto, necessário individualizá-la, dado que por ser atribuída ao serviço público, de forma genérica, a faute de service dos franceses." Author's free translation. *RE179.147-1*, *supra*, note 400.
[403] *Ibid.*

liable if the causal nexus directly links the damage to the state. If there is any other cause in between, the liability would not exist[404] Such would be the case of the victim of a fugitive prisoner who could only receive compensation if the fugitive had just escaped. If months had elapsed since the escape, the Court would not find the State responsible.[405]This position seems to be altered by RE 409.203.[406] Minister Joaquim Barbosa accepted the State's responsibility for omission in the case of a penitentiary fugitive who raped a victim. The judge understood the State as being responsible for not applying the Penal Execution Law, which determines the conditions under which a criminal's regime is changed from an opened to a closed one. The fugitive in this case should not have been maintained in an open regime that gave him the opportunity to commit another crime.

2.3.5 Exceptions to State Responsibility

There are three exceptions to State responsibility that will be discussed: exclusively the victim's fault, a third party's fault and unpredictable events, such as *force majeure* or (depending on the definition) unforeseeable circumstances. Mello defends the position that in objective responsibility situations, the State can only avoid liability if the causal nexus between the State's act and the damage has been broken. This is the case when the State does not produce the damage or when its act was not enough to bring about a risk situation that would cause damage.[407] Mello thinks that in the case of the victim's fault, there is no exception, but the causal nexus is simply broken. Therefore, he argues, the importance of the victim's fault is not the fault itself, but the fact that the government did

[404] *Di Pietro*, *supra*, note 339 at 711-12.
[405] Informativo 329 (2003) atRE 369820-RS (STF) Carlos Veloso, online: <http://www.stf.jus.br/arquivo/informativo/documento/informativo329.htm#Responsabilidade Civil e Ato Omissivo – 1> [*Informativo 329*]; and Recurso Extraordinário 573595 AgR /RS (2008) (STF) Eros Grau, online: <http://www.stf.jus.br/portal/jurisprudencia/listarJurisprudencia.asp?s1=%28573595%2ENUME%2E+OU+573595%2EACMS%2E%29&base=baseAcordaos&url=http://tinyurl.com/arendzz> [*RE 573595*].
[405] Recurso Extraordinário 136861 AgR / SP (409203) (2011) (STF) Joaquim Barbosa, online: <http://www.stf.jus.br/portal/jurisprudencia/listarJurisprudencia.asp?s1=%28RE+409203%29&base=baseAcordaos&url=http://tinyurl.com/chkrgp8> [*RE 136861*].
[406] Recurso Extraordinário 136861 AgR / SP (409203) (2011) (STF) Joaquim Barbosa, online: <http://www.stf.jus.br/portal/jurisprudencia/listarJurisprudencia.asp?s1=%28RE+409203%29&base=baseAcordaos&url=http://tinyurl.com/chkrgp8> [*RE 136861*].
[407] *Mello*, *supra*, note 347 at 1040-41.

not produce the damage. He defines *force majeure* as an irresistible natural event that, as such, also breaks the link between the State's action and the damage. However, if the State contributes to the damage, even in the case of *force majeure*, it is responsible. On the other hand, unforeseeable circumstances are normally no exception to the government's liability, as in the case of a technical accident that causes the damage. Although the latter is accidental and therefore unforeseeable, this does not change the fact that the service provided had a defect.[408]

The victim's fault exception rule may lead to some discussion. Although it is generally accepted that when the victim exclusively causes the damage, the government should not be liable, it is relevant to mention those cases in which the State has custody of a person or appears as a guarantor of a service. The State, for example, should guarantee the physical integrity of a prisoner.[409] Therefore, in the case of a suicide inside a prison, the State may be held liable, even if it was the victim who caused the damage. The Superior Justice Tribunal (STJ) has already accepted the responsibility of the public administration in the case of suicide inside a prison. It is believed that although it is the victim who produces the damage, the state may have contributed to it by omission, especially if it is held to guarantee the integrity of an individual.[410]

Di Pietro observes that State responsibility does not exist when its foundation, the causal nexus, does not exist. This happens when the public service is not the cause of the damage. She points out three exceptions to State liability: *force majeure*, the victim's exclusive fault or a third party's fault. When the victim contributes to the fault, but not exclusively, this is not an exception, but an attenuation of the responsibility. The author recognizes there is a controversy under the Brazilian doctrine about the definition of *force majeure* and unforeseeable circumstances. According to her, *force majeure* is an unpredictable and inevitable fact that does not represent the willing of the parties involved, like a storm and an earthquake. Since there is no causal nexus that links the

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[408] *Ibid* at 1041-42.

[409] *Brazilian Constitution*, *supra*, note 240, Article 5, XLIX, provides that "prisoners are ensured of respect to their physical and moral integrity."

[410] Agravo Regimental no Recurso Especial 1.258.753 - GO (2011/0052963-0), (2011) (STJ) Cesar Asfora Rocha, online: <http://www.jusbrasil.com.br/jurisprudencia/21812211/agravo-regimental-no-recurso-especial-agrg-no-resp-1258753-go-2011-0052963-0-stj/relatorio-e-voto> [*AgRg no RESP 1258753*].

public administration with this event, and therefore to the damage, the State cannot be liable for it, unless there is an omission by the public administration in addition to the *force majeure*. An example would be a flood following a strong storm, whereby damages occurred because the government did not clean the streets properly. The liability is subjective in this case of omission since the service malfunctioned. The theory of '*faute du service'* applies, and the fault is anonymous because it is not individualized in a single agent. The same rule applies if the event is caused by a third party; the State, again, is only liable if it did not act when it should have acted (omission). An example is the damages caused by a crowd; if the State does not act to prevent them it when it should have done so, then it is liable. On the opposing side, di Pietro defines an unforeseeable circumstance as an incident caused either by a human act or by an administrative failure. In this case, the State may be liable. Di Pietro also analyzes third-party fault as an exception to state liability. However, she mentions the case when a law specifically determines that a third party's fault does not avoid government liability. According to the Civil Code, article 735,[411] the contractual responsibility of a carrier for an accident involving a passenger is not undermined by the third party's fault, against whom there is recourse.[412]

Carvalho Filho defines both *force majeure* and unforeseeable circumstances as unpredictable facts. He does not differentiate them, and he believes the effects are the same since they are both situations that anyone can be prepared for or in which anyone can avoid the damages. Since he believes there is no fact that can be imputable to the State, neither is there an act committed by a public agent; therefore, there is no causal nexus to link the damage to any act of the State According to him, these are both legitimate exceptions to government liability.[413]

It is important to mention the difference between an external unforeseeable circumstance and an internal unforeseeable circumstance. The internal one is considered the inherent risk of the State's own activity, whereas the external one breaks the causal nexus and

[411] *Código Civil*, *supra*, note 330, article 735.
[412] *Di Pietro*, *supra*, note 339.
[413] *Carvalho Filho*, *supra*, note 357 at 557-558.

therefore avoids liability. The Justice Tribunal of Rio de Janeiro (TJ/RJ) has jurisprudence on this matter. If the unforeseeable circumstance is internal, the third-party fact does not exclude the duty to compensate.[414]

Regarding *force majeure* and unforeseeable events, the Supreme Court itself through Minister Celso de Mello has already treated both terms as equally exceptions to objective liability. In AI 455.846/RJ, the Relator (Commentator) says it is certain that the principle of objective responsibility is not absolute, since there are exceptional situations that can liberate the State from liability, for example, *force majeure*, unforeseeable circumstances and also the exclusive fault of the victim.[415] However, it is important to mention here that there is no agreement among the authors, the doctrines and the courts regarding this matter. It is treated differently depending on the facts in individual cases.[416] As a living institution Administrative Law will keep evolving; therefore, it is essential to maintain updated interpretations of these concepts in order to respond to problems that may arise.

Based on all that has been said about the exceptions to government liability, it can be assumed there are some elements that can usefully eliminate doubts about the attribution of liability: namely, the causal nexus, predictability and avoidability. If the responsibility is objective, the causal nexus should be the foundation, since the Brazilian doctrine does not accept the integral risk theory, but rather the administrative risk theory. On the other hand, if the responsibility is subjective, analyzing whether the State could have had any means of prediction, and whether it was reasonably able to avoid the damage are important tools to determine if there is fault and if the government should be held responsible. Under Brazilian Law it is possible for the public agent to accumulate

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[414] "Cuidando-se de fortuito interno, o fato de terceiro não exclui o dever do fornecedor de indenizar." (Author's free translation) Súmula 94, (2005) (TJ/RJ), online: <http://webfarm.tjrj.jus.br/biblioteca/asp/textos_main.asp?codigo=150637&desc=ti&servidor=1&iIdioma=0> [*Súmula 94*].

[415] "É certo, no entanto, que o princípio da responsabilidade objetiva não se reveste de caráter absoluto, eis que admite o abrandamento e, até mesmo, a exclusão da própria responsabilidade civil do Estado, nas hipóteses excepcionais configuradoras de situações liberatórias - como o caso fortuito e a força maior ou evidenciadoras de ocorrência de culpa atribuível à própria vítima." Author's free translation of Agravo de Instrumento 455.846/RJ (2004) (STF) Celso de Mello, online: <http://www.jusbrasil.com.br/jurisprudencia/14795332/agravo-de-instrumento-ai-455846-rj-stf> [*AI 455.846*]. In the same way, the Minister mentions other cases:
(RDA 137/233 - RTJ 55/50 - RTJ 163/1107-1109, v.g.) and (RTJ 163/1107-1109).

[416] *Alexandrino & Paulo*, *supra*, note 372 at 612.

administrative, civil and criminal penalties.[417] However, this thesis deals only with the civil liability of the State.

As a conclusion, in spite of all the controversy regarding the civil liability of the public administration and the theoretical approaches to it in Brazil, it is correct to affirm that the general rule is objective liability with administrative risk for all administrative actions, according to the Constitution's article 37, paragraph 6. For administrative omissions, the regime may be different, but every case should be analyzed in order to define if there is State responsibility and if the liability will be subjective based on fault (imprudence, negligence and incompetence) and its civil law principles. Even for objective liability it is allowed to the State to defend itself in cases of victim's fault, third-party fault and *force majeure,* since Brazil has never incorporated the integral risk theory. *Force majeure* and unforeseeable circumstances may be exceptions to State liability, depending on the concept accepted.

The liability of air navigation providers and of the GNSS signals used in air navigation may be influenced by these administrative law doctrines of State liability under Brazilian Law; for according to the Brazilian Constitution, it is the responsibility of the federal government to provide air navigation services either directly or indirectly. Therefore, the liability of the federal government will mostly rule the liability of air navigation services. However, as will be demonstrated in another section, there are air navigation services performed through authorization in Brazil. This particular case has to be addressed and studied since the kind of liability may be specific. Besides, the Constitution does not give details on how this liability may be claimed. Therefore, it is essential to look into all the special legislation regarding the subject to discover if there is any provision that can deal specifically with this situation.

[417] *Lei 8112*, Presidência da República 1990 (11 December 1990) s article 25, online: <http://www.planalto.gov.br/ccivil_03/leis/l8112cons.htm> [*Law 8.112/90*].

2.4 Authorization of Public Service

2.4.1 The Brazilian Aeronautics Code and the Constitution's Provisions Regarding the Matter

Article 48, single paragraph, of the CBA rules that the aeronautical telecommunication service may be operated directly by the Aeronautics Ministry, through authorization[418] of a specialized entity of the indirect administration linked to that Ministry, or by any legal entity or individual dedicated to aerial activities in relation to private stations of aeronautic telecommunications.[419] According to Pacheco, the aeronautical telecommunication services[420] are operated in Brazil by the Aeronautics Ministry and by INFRAERO, a public company in charge of airport administration that has replaced the Telecomunicações Aeronáuticas S.A. (Aeronautic Telecommunications). Regarding individuals and other legal entities dedicated to aeronautic activity, an example is the private conglomerate Camargo Correa,[421] which has both its own private aircraft fleet and its own private airports and can have private telecommunications stations as well.[422] It is relevant that private telecommunications stations present in private aerodromes have a preponderantly private interest at stake; and, therefore, the liability of an air navigation service provider may be different from that relating to services provided by a governmental entity.[423]The Federal Constitution's article 21, XII, c)[424] states that it is in the power of the Union to provide air navigation services either directly or through authorization, concession[425] or permission.[426] However, the Constitution has another

[418] The provision of air navigation services through authorization will be individually analysed.
[419] *Código Brasileiro de Aeronáutica*, *supra*, note 242 at Article 48.
[420] The Aeronautical Telecommunications Service will be analysed together with ICA-6310 and Portaria Interministerial n. 24/MD/SAC, which, since 2012, have established the condition for air navigation and telecommunication stations (EPTA) to be created through authorization.
[421] Camargo Correa is one of the largest private business groups in Brazil, with interests in areas such as construction, infrastructure, and management. "Perfil Grupo Camargo Correia", online: Camargo Correia <http://www.camargocorrea.com.br/>.
[422] *Pacheco*, *supra*, note 281.
[423] The analyses of the liability of different service providers will be done under a separate heading.
[424] *Brazilian Constitution*, *supra*, note 239 at Article 21, XII, (c).
[425] Concession of public service is the exercise of a public service granted by the State to someone else who performs it in its own name and at its own risk according to rules established by the public power, but with a contractual guarantee of financial balancing. The service is remunerated by users through a tariff. *Mello*, *supra*, note 347 at 717/18.
[426] Permission is a unilateral and provisional act through which the public power delegates the exercise of a public service to a private entity that charges tariffs to its users. *Ibid* at 775.

article, 175, which determines that public services have to be provided by the government either directly or by concession or permission.[427] According to article 175, it could be assumed that a public service can only be delegated through concession and permission, since the article does not mention authorization as an option. Air navigation is considered a public service in Brazil because it is established in article 21, XII, c, as part of the public entity's competence, at least when it aims to satisfy the collective interest in general.[428] Therefore, at first sight, two contradictory principles may appear to exist in the Federal Constitution: article 21, XII, c) includes authorization as a possibility for the provision of air navigation services in Brazil, while article 175 seems to express the view that public services may only be delegated through concession or permission. The liability of the service provider could be affected, depending on how public service and authorization are defined. The objective liability rule present in article 37, paragraph 6 of the Federal Constitution only affects the delegated entities when they provide public services. Therefore, if for any reason, air navigation services are not considered public services, the liability regime could change if they are provided by delegated private legal entities. On the other hand, if it is the public administration without delegation that offers the services, the liability regime will always be the objective rule of article 37, paragraph 6. However, the Brazilian doctrine has not specified a single approach to the matter, and there can be more than one position. Thus, it is relevant to define authorization and public service according to the Brazilian legal regime.

2.4.2 Definition of Authorization and Public Service under the Brazilian Doctrine

Aragão believes that authorization is only the exercise of the administration's police power,[429] and that it cannot be a delegation of public service, although he shows that both

[427] *Brazilian Constitution*, *supra*, note 240 at Article 175.
[428] *Mello*, *supra*, note 347 at 702.
[429] Police Power is the governmental activity that imposes conditions on the freedom and property of individuals in order to adjust them to the collective interest. Author's free translation of *Mello*, *supra*, note 347 at 838. ("A atividade estatal de condicionar a liberdade e a propriedade ajustando-as aos interesses coletivos designa-se 'poder de polícia'").

positions exist in the Brazilian legal doctrine.[430] He defines it as a discretionary act of administrative police that allows the individual to promote a specific activity or to practice a determined act under public control (e.g., to be able to carry a gun, you need authorization). Private activities are controlled through authorization (there is no delegation).[431]

In regard to public services, Aragão does not think that the foundational principle of a public activity (the promotion of the collectivity's needs) should be taken into consideration to define them, because in one way or another all public activities promote the common interest. The juridical regime should be used to determine whether or not a service is public.[432] A public service is considered an activity that could by its nature be either public or private, but the constitutional or the legislative powers have decided to classify it as public at a determined historical moment so the State could promote the protection of the social interest existent at that time.[433] The problem is that the Brazilian Constitution does not use the expression 'public service' with a precise, single meaning. It is used to express either an economic activity provided by the State (article 175), the Public Administration itself (article 37), or health services provided by the State (article 198). Sometimes it refers only to 'services' (article 21) or 'public relevant services' (article 121).[434]

Hely Lopes Meirelles defines public services as all the services provided by the Administration or its delegates, under State rules and control, to satisfy the essential or

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[430] Alexandre Santos de Aragão, "Delegações de Serviços Públicos" (2009) 16 REDAE (ISSN 1981 1861) at 22, online: <http://www.direitodoestado.com/revista/REDAE-16-NOVEMBRO-2008-ALEXANDRE%20ARAGAO.pdf> [*Aragão*].

[431] "Ato discricionário de Polícia que faculta ao particular o desempenho material de determinada atividade ou a prática de determinado ato sujeito a controle público (ex: porte de arma, produção de material bélico etc)... Através da autorização de polícia controla-se (não se delega) a prestação de atividades privadas." Author's free translation of *Aragão*, *supra*, at 22.

[432] Alexandre dos Santos Aragão, "O conceito de serviços públicos no Direito Constitucional brasileiro," (2009) 17 REDAE (ISSN 1981-1861) at 9, online: <http://www.direitodoestado.com/revista/REDAE-17-FEVEREIRO-2009-ALEXANDRE%20ARAGAO.pdf> [*Aragão I*].

[433] *Ibid* at 9.

[434] *Ibid* at 20.

secondary needs of the collectivity or simply to promote the convenience of the State.[435] This definition may not include the new private-public partnerships that have added more complexity to the matter of identifying public services and the public interest. Meirelles defines authorization as a discretionary and provisional administrative act that allows individuals, in their own interest, to act or to use special public or private assets that otherwise they would have no access to.[436]

Couto e Silva simplifies the question of public services and their liability regime by defending the position that even if they are offered in a private environment where there is competition, though in a market constantly controlled by the State, the services delegated to individuals through concession, permission or authorization still remain, on any hypothesis, public services and should be considered public in their all effects, including the extra contractual liability regime of article 37, paragraph 6 of the Federal Constitution.[437]

Carvalho Filho does not accept the possibility of authorization of a public service. He understands that authorization is a discretionary and provisional act of the public administration that gives permission to individuals to act in their own interest. Therefore, the service cannot be considered a public service. According to him, public service can only be delegated through concession and permission. He explains that article 21, XII, c) of the Federal Constitution provides for the possibility of authorization if some public services are offered solely in the private interest, in which case they lose their public characteristic. He gives some examples of services that might not always be typical public services: navigation, transport, radio, sound and images, among others.[438]

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[435] Author's free translation of "Serviço público é todo aquele prestado pela Administração ou por seus delegados, sob normas e controles estatais, para satisfazer necessidades essenciais ou secundárias da coletividade ou simples conveniências do Estado" *Meirelles*, *supra*, note 341 at 316.
[436] *Ibid* at 183.
[437] Author's free translation of "... ainda que prestados em ambiente privado, e situados em ambiente de competição e concorrência, mas num mercado constantemente vigiado pelo Estado, os serviços por este delegados a particulares mediante concessão, permissão e autorização, continuam sendo, em quaisquer hipóteses, serviços púlbicos, devendo ser assim considerados para todos os efeitos, inclusive, portanto, para o da responsabilidade extracontratual de que trata o parágrafo 6 do artigo 37, da Constituição Federal" in , Almiro do Couto e Silva, "Privatização no Brasil e o Novo Exercício de Funções Públicas por Particulares" (2009) 16 RERE at 32, online: <http://www.direitodoestado.com/revista/RERE-16-DEZEMBRO-2008-ALMIRO%20COUTO.pdf>.
[438] *Carvalho Filho*, *supra*, note 357 at 441-442.

On the other hand, Mello believes that the authorization presented in article 21, XII, c) of the Constitution has two different meanings. The first is the exercise of the administrative police power, when it authorizes a private conduct that needs this confirmation from the public authority to guarantee it does not harm the collectivity. He mentions telecommunications services, which are not public services when they are offered in the private interest (for example, amateur radio services). The second meaning is the authorization of the public service itself; however, this is done only in emergency situations that once solved should yield to the regular proceeding of public service delegation through concession and permission.[439] Mello identifies a service as public when it can be singularly enjoyed by individuals and is regulated by a specific public law regime.[440] Di Pietro contends that this is a very narrow view since the idea of a utility to be enjoyed directly and singularly by individuals is too specific, whereas other public services cannot be enjoyed singularly though they remain public in spite of that, such as diplomatic services and scientific research that can only benefit the community indirectly.[441]

Di Pietro defends the view that there are three meanings of authorization in the Brazilian context. The first is the exercise of administrative police, without which the individual would not be enabled to perform certain activities. The second is the authorization of an individual to use a public good; and the third is the possibility of authorization of public service as a proper delegation of service, but in a provisional way.[442] Therefore, she defines the last as a unilateral and discretionary administrative act in which the public power delegates the operation of a public service in a provisional way.[443] The author justifies her position by explaining that the delegation of a public service is done to fulfill collective interests and to provide services to third parties through concession or permission, but it can also be done through authorization when it is offered in the interest of the authorized entity. Even in this last situation, the service may still be considered in

[439] *Mello*, *supra*, note 347 at 707
[440] *Ibid* at 690.
[441] *Di Pietro*, *supra*, note 339 at 103.
[442] *Ibid* at 233. It is important to note the author changed her position; in the 17th edition of the book, when she did not accept authorization as a delegation of public service.
[443] Author's free translation of "autorização é o ato administrative unilateral e discricionário pelo qual o poder público delega ao particular a exploração de serviço público, a título precário" *Ibid* at 233.

the public interest.[444] She defines public service as the activity attributable to the State by law in order to satisfy collective needs; it may be exercised directly or indirectly through delegation and is regulated partially or completely by a public law regime.[445] Di Pietro makes an interesting distinction: all public services aim to satisfy the public interest; however, not all activities of public interest are public services, since it is necessary that the law fit this activity to the goals of the State.[446]

It is important to observe that if authorization is considered a discretionary administrative act, a convenience and opportunity evaluation is done by the public agent in order to grant the act. Although the decision must be legally justified, the convenience and opportunity that created the reasons and justified the authorization could change. Therefore the act is also provisional, as it can be revoked (this decision must also be justified). Thus, the entitlement of the public service remains with the State, according to article 21 of the Federal Constitution,[447] even when it delegates it.[448]

Independently of which public service concept is adopted, or whether it is considered possible to authorize the provision of public service through authorization, in regard to the civil liability of an air navigation service provider, the most important point is to determine which legal regime applies to the delegation of air navigation services. It is simpler to defend the position that the government's liability regime applies to air navigation provided by government entities. However, when the service is delegated to private law entities, the identification of the liability regime may become more complex. There is also the need to determine if there is any contractual relation established between the parties involved. Therefore, the topic of air navigation services' liability regime will be analyzed separately

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[444] *Ibid* at 233, 234.
[445] *Ibid* at 106.
[446] *Ibid* at 108.
[447] Article 21, XII, ©: "The Union shall have the power to operate directly or through authorization, concession or permission air and airspace navigation and airport infrastructure." *Brazilian Constitution*, *supra*, note 240.
[448] Marcos Juruena Villela Souto, *Direito Administrativo Regulatório*, 2nd ed (Rio de Janeiro: Lumen Juris, 2008) at 2.2.2.

2.4.3 Jurisprudence

The Brazilian Courts have no agreed understanding on this matter. Minister (Judge of the STF) Ayres Brito of the Supreme Federal Tribunal (STF), in ADF 1923/DF, expresses the view that there are public services that can be provided by non-public agents. He believes that if a service is offered by the public sector, either directly or indirectly (through concession or permission or by authorization) it will be *de facto* a public service. According to Minister Brito, even if the service is provided by private entities, it will still be considered public.[449] It is important to observe that according to this decision, a public service can be delegated through authorization.

2.4.4 Authorization of Air Traffic and Telecommunications Service Provider Stations (EPTA)

On the basis of the constitutional provision of article 21, XII, c), and in the aforementioned Brazilian Aeronautics Code, article 48, single paragraph, the Department of Airspace Control (DECEA) has approved a new version of ICA-63-10, which introduces, among other matters, the rules and proceedings for the implementation, certification and operation of the Air Navigation and Telecommunication Service Stations (EPTA[450]).[451] These stations (EPTAs) are in charge of their own costs as they are

[449] Informativo 622, (2011) at ADI 1923/DF, (STF) Ayres de Brito, online: <http://www.stf.jus.br/arquivo/informativo/documento/informativo622.htm> [*Informativo 622*].

[450] According to ICA-63-10/12: "EPTA são Estações de Telecomunicações, pertencentes a pessoas físicas ou jurídicas de direito público ou privado, dotadas de pessoal, instalações, equipamentos e materiais suficientes para: prestar, isolada ou cumulativamente, os Serviços de Controle de Tráfego Aéreo (APP e/ou TWR), os Serviços de Informação de Voo, de Informação de Voo de Aeródromo (FIS/AFIS) e de Alerta; apoiar a navegação aérea por meio de auxílios à navegação aérea; apoiar às operações de pouso e decolagem em plataformas marítimas, ou ainda, veicular mensagens de caráter geral entre as entidades autorizadas e suas respectivas aeronaves, em complemento à infraestrutura de navegação aérea existente." Author's free translation: EPTA are telecommunication stations that belong to individuals or legal entities of private or public law, and that have enough personnel, installations, equipment and materials to provide, singly or cumulatively, Air Traffic Control Services (APP and/or TWR), Flight Information Service, Aerodrome Flight Information (FIS/AFIS) and Alert; to support air navigation through air navigation aids; to support landing and take-off operations on maritime platforms; or even, to send/receive messages of a general character between the authorized entities and their respective aircraft, complementing the air navigation infrastructure in place." *Estações Prestadoras de Serviços de Telecomunicações e de Tráfego Aéreo (EPTA)/ICA 63-10* Ministério da Defesa/ Comando da Aeronáutica 2012 s 1.2.12, online: <https://docs.google.com/viewer?url=http://publicacoes.decea.gov.br/download.cfm?d%3D3761&chrome=true> [*ICA 63-10*].

intended to fulfill specific needs of the authorized entity.[452] To run an EPTA, the entity must be dedicated to the aerial activity and it must be authorized by DECEA.[453] To be considered as dedicated to the aerial activity, the entity must be included in one of the possibilities described in article 2.21: or be an operator of airplanes as defined in the Brazilian Aeronautical Code (CBA); or it must be a specialized entity of indirect federal administration that depends on aeronautical telecommunications to develop its activities; or it must be an aerodrome administrative entity or part of the Military Commands or the Municipal and State governments that want to operate the EPTA in their respective regional aerodromes; or, finally, it may be any other entity that wishes to pursue activities that need aeronautic telecommunications to support the airplanes in its service.[454] There is the possibility of subcontracting an EPTA's services through specialized service providers possessing any legal personality[455]; but they need to be certified by DECEA, which approves their technical and operational proceedings to implement, operate and do maintenance on an EPTA through a Certificate of Specialized Technical Operations (Certificado de Especialização Técnico-operacional – CET).[456] The specialized service providers are third parties contracted by the EPTA's entity and certified by DECEA. Therefore, both the EPTA and the specialized service providers are jointly responsible for obeying any regulations DECEA puts in place regarding Air Traffic Services and Aeronautic Telecommunications and Meteorology.[457] Any irregularity that may affect the safety of flight or the integrity of individuals can serve as a motivation to cancel the certification given by DECEA to a specialized service provider and can also result in the suspension or deactivation of the EPTA.[458] INFRAERO, the public company of the indirect administration that also provides air navigation services, has to adapt itself to its air navigation service provider's certification that should conform to the format of an EPTA.[459] EPTAs are divided among the different types of services they provide: Special category or CAT "ESP" are able to provide ATC services (APP

[451] *Ibid*.
[452] *Ibid* at 2.1.
[453] *Ibid* at 2.2.
[454] *Ibid* at 2.2.1.
[455] *Ibid* at 2.2.2 and 2.3.
[456] *Ibid* at 2.3.1.
[457] *Ibid* at 2.3.10.
[458] *Ibid* at 2.3.11.
[459] *Ibid* at 8.6.

and/or TWR) and Aeronautic Meteorology Service in accordance with DECEA's regulations.[460] CAT "A" are able to provide Flight Information Services (FIS), Aerodrome Flight Information Services (AFIS), Operation and Alert in Instrument Flight Rules (IFR), defined in ICA 100-12 and ICA 100-1, Aerodrome IFR Operation and Aeronautic Meteorology Service.[461] CAT "B" are used exclusively for messages about flight regularity and generally in the administrative interest of the entities and their airplanes.[462] CAT "C" means the service consists of light visual aids and/or air navigation aids not linked to AFIS or ATC organs with the aim to support air navigation. If they are linked to an ATC (EPTA CAT "ESP") or Radio (EPTA CAT "A"), they will be treated as part of an EPTA "ESP" or "A" and will no longer be considered a CAT "C".[463] If the EPTA CAT "C" does not belong to the same authorized entity, the EPTA CAT "ESP" or CAT "A" must guarantee the operability of that entity's air navigation aids, and it must answer in solidarity for any event that affects the quality of the air navigation services.[464] CAT "M" is created with the unique objective of supporting landing and take-off procedures on maritime platforms and providing meteorological information specific to the activity and other general messages between entities and their airplanes in their service.[465] It is important to observe that during their operating hours EPTA CAT "ESP", "A" and "C" have to offer their services to the users of SISCEAB and not only to the entities' users that have justified their implementation.[466] On the other hand, this provision creates the impression that CAT "B" and "M" may operate in the unique interest of the entity that has justified their implementation. This reasoning may affect the understanding of the kind of service these EPTAs may be performing, whether it is or is not a public service, and therefore whether the government liability regime will be applied. The liability aspects are studied under a separate subheading.

[460] *Ibid* at 2.4.1.
[461] *Ibid* at 2.4.2.
[462] *Ibid* at 2.4.3.
[463] *Ibid* at 2.4.4.
[464] *Ibid* at 2.4.4, nota 2.
[465] *Ibid* at 2.4.5.
[466] *Ibid* at 2.5.

Portaria Interministerial n. 24/MD/SAC[467] determines that air navigation services delegated to other entities apart from the Aeronautics Command must be performed using the EPTA model, independently of the service provider, whether it is INFRAERO or any other private entity.[468] The regulator gave a deadline of June 30, 2012 to all providers to adapt themselves to this demand.[469] It also rules that air navigation services will be remunerated by tariffs (the legal term for remuneration of public services in Brazil).[470] The Aeronautics Command (COMAER) and INFRAERO were required to submit a new redistribution plan of air navigation services before June 30, 2012, based on two goals: COMAER will be mainly in charge of the Area Control Center – ACC. Regarding the other services, such as the Approximation[471] Center Control, Aerodrome Control Tower and Aeronautic Telecommunications Stations, they will be the responsibility of COMAER in instances of military or strategic interest declared by the Ministry of State of Defense.[472] This decision to give to other entities apart from the Aeronautics Command the provision of air navigation services regarding aerodromes, approximation and aeronautics telecommunication stations is an important change made in the structure of the provision of this service in the country. The impact of this approach on the civil liability of the service provider has to be analyzed, as will be done in a separate subsection.

2.4.5 Decree 7871/12 Concerning the Delegation of Operations of Public (Civilian) Aerodromes through Authorization

The aforementioned article 21, XII, c) of the Federal Constitution determines that it is in the power of the Union to operate directly or through authorization, concession or permission air and airspace navigation and airport infrastructures. The operation of

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[467] *Portaria Normativa Interministerial n. 24/MD/SAC*, Ministério da Defesa/ Ministério da Secretaria da Aviação Civil da Presidência da Repúblicade 2012, online: <http://www.aviacaocivil.gov.br/arquivos/portarias/portariatantat> [*Portaria Interministerial 24*].
[468] *Ibid* at Article 4.
[469] *Ibid* at Article 4, Paragraph 6.
[470] *Ibid* at Article 3.
[471] In charge of the approaching flights.
[472] *Portaria Interministerial 24*, *supra*, note 467 at Article 7.

airports is in the same constitutional provision; therefore, they are under a similar juridical regime to the air navigation services.

It is worth mentioning Decree 7871/12 as an example in order to demonstrate once again the way the Brazilian doctrine has recently been dealing with the possibility of authorization of a public service. This decree is about the delegation conditions of the operation of public civilian aerodromes through authorization in Brazil.[473] Certain aspects should be considered when analyzing this decree: first, it clearly mentions 'delegation through authorization'; second, it governs only public aerodromes[474]; third, it is based on article 21, which gives permission for authorization of a public service; fourth, there are tariffs (*tarifa*) for the service, which can only be charged in the case of a public service; fifth, the interest is not solely private, since article 9 mentions that, as a general rule, public civilian aerodromes operated through authorization may be used by any airplane, independent of property or nationality.[475] The controversy on the matter of the possibility of authorization of a public service, in relation to this specific decree, does seem to be resolved, as it appears to be authorization of a public service according to the reasons explained above. The airports subject to this regulation are public and not private, and they can be used by any airplane without distinction. If we compare this to the EPTA regulation, there seems to be one important difference: although the authorized aerodromes are all public, not all EPTAs, specifically not CAT "B" and CAT "M", are open to all users of the Brazilian airspace control system. These two models may have been created solely in the private interest, and this may change the characteristics of the service provided since it may not be considered public. As this is a new piece of regulation, it is important to discuss in this thesis its impact on the liability regime.

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[473] *Decreto 7871*, Presidência da República 2012 (21 December 2012) s article 1, online: <http://www.jusbrasil.com.br/legislacao/1033653/decreto-7871-12> [*Decreto 7871*].

[474] Based on the Brazilian Aeronautical Code, an aerodrome can be public or private. Article 30, paragraph 2 says that a private aerodrome can only be used with the permission of its owner, and that it is prohibited from commercial operations. Article 36, IV specifies that a public aerodrome can be constructed, kept, and explored through concession or authorization. *Código Brasileiro de Aeronáutica*, *supra*, note 242 at Articles 30, Paragraph 2 and 36, IV.

[475] *Decreto 7871*, *supra*, note 473 at Article 9.

2.5 The Liability of the Air Navigation Services in Brazil

2.5.1 Important Aspects that Might Affect Liability

The air navigation services are divided into three categories: air traffic control, flight information service and alert service. Air traffic control is responsible for preventing collisions, organizing the aerial circulation of flights and helping them to land, taxi and take-off in aerodrome areas. The flight information service is responsible for providing necessary information pertaining to the safety, regularity and efficiency of air navigation. The alert service exists to inform the appropriate bodies about aircraft in difficulty to get them assistance.[476]

The air traffic control service gives binding information to the pilot that should be followed to avoid an accident. Therefore, this service has much more at stake in relation to liability. The flight information service, on the other hand, provides information that the pilots can use according to their discretion. Although the information given does not oblige the commanding pilot to act, in meteorologically adverse conditions the service may be charged if it does not alert a pilot about a dangerous situation. It may also be liable if it provides imprecise or incomplete information.[477] The alert service is used only after a problem is detected. The liability in this case can only be shared, since the service did not cause the aircraft to be in the alert situation in the first place. It may have to compensate only if it contributed to an accident after it was first informed about the difficulties and should have responded differently from the way in which it did.[478] Therefore, depending on the type of service that is performed by the air navigation provider, the service may have different kinds of responsibilities involved in whether it is done or not done. The exchange of information with pilots is essential for promoting the safety of air transportation.[479]

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[476] Francis Schubert, *La responsabilité des agencies du contrôle de la circulation aérienne* (Glattbrugg, Suisse: Lenticularis, 1994) at 10-11 [*Schubert V*].
[477] *Ibid* at 11, 61-63, 74-79.
[478] *See* Marco Fábio Morsello, *Responsabilidade Civil no Transporte Aéreo* (São Paulo: Atlas, 2007) at 146 [*Morsello*].
[479] *Schubert V*, *supra,* note 476 at 73-76.

Besides, air traffic control activity is complex and requires specific skills, such as spatial reasoning, emotional control and fast thinking, to deal with the challenges in today' crowded airspaces. Therefore, the controller is the key link in the chain that connects pilots and the airspace control system.[480] The relationship between pilots and controllers is a unique one. ICA-100-12[481] in item 4.2, which establishes rules to avoid collisions, clearly states under 4.1.2 that the rules prescribed in the document do not absolve the pilot in command from his responsibility to take better action to avoid a collision, including maneuverings based on warnings given by the Airborne Collision Avoidance System (ACAS). It goes further and explains that to prevent a collision it is paramount to exercise vigilance on board aircraft independently of the flight rules or airspace classification in which the aircraft is operating, including the aerodrome area.[482] The Brazilian Aeronautical Code, article 166 defines that the safe operation of the aircrafts the responsibility of the commanding officer.[483] The Chicago Convention, Annex 6 determines: "The pilot in command shall be responsible for the operation and safety of the aeroplane and for the safety of all persons on board, during flight time."[484]Article 90 of Decree n. 21.713/1946 (Chicago Convention in Brazil) clarifies the rules that should be followed to create the annexes and their binding effects. Therefore, there can be no question that the annexes are binding in Brazil too. Although the pilot in command is ultimately responsible for the decisions he makes to promote safety, this does not exclude the share in responsibility that ground personnel and air traffic controllers have. Air traffic controllers share the duty to provide safety for aircraft in flight.[485]

The type of airspace may also affect the rules and the sharing of responsibilities between controllers and pilots. Controlled airspace has the boundaries defined inside which the air traffic control service operates in accordance with the airspace classification.[486] Class A airspace has only Instrument Flight Rules (IFR) flights, and they are all separated from

[480] *See* Gustavo Borges Basilio, Maria Teresinha Pavan & Fernando de Oliveira Pontes, "Responsabilidade Civil do Controlador de Tráfego Aéreo" (2012) 3 Rev Conexão SIPAER [*Basílio, Pavan & Pontes*].
[481] It has been explained that ICA is an Aeronautical Command Information created by DECEA to regulate air navigation activity.
[482] ICA 100-12, *supra* note 327.
[483] *Código Brasileiro de Aeronáutica*, *supra*, note 240 at Article 166.
[484] ICAO, Annex 6 to the Convention On International Civil Aviation, Operation of Aircraft, International Standards And Recommended Practices adopted by International Civil Aviation Organization (9d ed. July 10).
[485] *Pacheco*, *supra*, note 281 at 428.
[486] *ICA 100-12*, *supra*, note 328, Definições: Espaço Aéreo Controlado.

each other by air traffic control.[487] Therefore, the controller has a clear responsibility to avoid collisions. On the other hand, Class B has both IFR and Visual Flight rules (VFR) flights, and they are separated from each other by air traffic control.[488] This is also reflected in ATS liability, since all flights are separated by control, even the visual ones. Although class C also has both IFR and VFR flights, IFR flights are separated among themselves and from VFR flights, while VFR are only separated from IFR flights and receive traffic information regarding other VFRs and warnings to avoid traffic when the pilot asks.[489] The last case gives more freedom and responsibility to the pilot of visual flights because he is separated only from IFR flights. It does not relieve the controller completely of responsibility, though, since these flights may receive information regarding other VFRs and warnings to avoid traffic when they request them. Advisory airspace has its defined boundaries or designated routes in which advisory air traffic service is offered.[490] The airspace of air traffic services also has its defined boundaries within which it can operate specific kinds of flights and where air traffic services are performed and the operational rules apply.[491] Therefore, depending on the rules that apply to a specific airspace and the responsibility that is given to controllers and to pilots in that given area of operation, the liability of the air navigation provider will be determined in every single case. It seems difficult to determine the share of responsibility of controllers and pilots without analyzing the types of airspace with their specific rules.

Another aspect is the type of flight, since it also affects the rules that must be followed: whether or not it is based on the "see and avoid" condition of visual flight rules (VFR) and when the instrument flight rules (IFR) are applicable. It is very difficult to blame the controller in VFR flights, since it is the responsibility of the pilot to verify the conditions and to avoid any obstacle.[492] On the other hand, IFR flights are done with the necessary interference of the controller since they can be performed in difficult meteorological conditions. IFR flights use navigational aids, like the Instrument Landing System (ILS), orientation by Global Navigation Satellite System (GNSS) and Traffic-collision

[487] *Ibid* at 7.4.
[488] *Ibid*.
[489] *Ibid*.
[490] *Ibid*, Definições: Espaço Aéreo de Assessoramento.
[491] *Ibid*, Definições: Espaço Aéreo ATS.
[492] *See Pacheco*, *supra*, note 281 at 429.

Avoidance System (TCAS), to help them operate in the absence of visibility.[493] When there is low or no visibility the autonomy of the commanding officer to make decisions is almost nil, a situation that does not occur in visual flights.[494] Regarding meteorological conditions, no criteria of minimal visibility have been adopted by ICAO. States are free to create their own rules. Some States have established minimal safety parameters beyond which flight is not allowed, not even in IFR conditions.[495] Potential victims may be passengers, third parties on the ground or air carriers using the air navigation services. Since passengers cannot be considered users of the air navigation services, they are considered third parties. Therefore, passengers and third parties on the ground fall under the same regime of liability concerning their relationship to ANS. However, although air carriers are users of the service, the flight plan does not establish a contractual relation with controllers. The liability is created by law and by the necessity to promote safety.[496] As users, air carriers may sue the ANS for delays or cancelations caused by controllers. The air carrier Lufthansa threatened to sue the German government, in charge of air traffic control, for successive flight delays caused by controllers in 1991 if the government did not act to prevent those delays.[497] Brazilian GOL airlines sued the Brazilian government, the Union, which was in charge of the air navigation services, for cancelations caused by striking controllers. On the basis of article 37, paragraph 6 of the Brazilian Constitution, it was decided that the responsibility was objective.[498]

2.5.2 Liability of Air Navigation Services in Brazil

Air navigation services in Brazil are provided either directly or indirectly by the Union. Article 21, XII of the Brazilian Constitution states: "The Union shall have the power to operate, directly or through authorization, concession or permission, the air and aerospace

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[493] *Schubert V*, *supra*, note 476 at 12-13.
[494] "…nos denominados vôos por instrumentos com visibilidade parca ou inexistente, a autonomia decisória do comandante é quase nula, o que incorre, e.g., nos denominados vôos visuais (a olho nu)." Author's free translation of *Morsello*, *supra*, note 478 at 141.
[495] *Ibid* at 138.
[496] *Schubert V*, *supra*, note 476 at 28-33.
[497] High Beam Research, News Release, "Deutsche Lufthansa threatens to sue over air traffic delays" (6 March 2000), online: <http://www.highbeam.com/doc/1G1-59779202.html>.
[498] Agravo de Instrumento 840144 (2011) (STF) (Origem:Turma Recursal do Juizado Especial da 2 Região), online: <http://www.stf.jus.br/portal/processo/verProcessoDetalhe.asp?incidente=4038499> [*AI 840144*].

navigation and airport infrastructure."[499] It does so directly through its de-concentrated public organ, DECEA, which is subordinate to the Ministry of Defense and to the Brazilian Aeronautics Command. The Ministry of Defense is a federal administrative organ of the Union directly connected to the Presidency of the Republic.[500]The Aeronautics Command is under the supreme authority of the President of the Republic; hence it is an agency of the Ministry of Defense. De-concentration is a tactic to divide competencies within the same juridical person.[501] The line of subordination and de-concentration is as follows: DECEA – Aeronautics Command – Ministry of Defense – Presidency of the Republic. Therefore, in this case, the Union is the responsible agent and DECEA is subordinate to it. DECEA is part of the direct administration, and it should consequently be ruled by the civil liability of the public administration stated in art. 37, paragraph 6, regarding third parties. The Chicago Convention in article 28 determines the responsibilities of States to provide air navigation services. Brazil is a party to this treaty and has introduced it into its legal system through Decree n. 21713/1946.[502] The Union can also delegate air navigation services through authorization, concession or permission, but it would still retain the duty of overseeing the activity. There is authorization of air navigation services in Brazil, and they will be specifically analyzed in this respect.

2.5.2.1 Services Provided Directly by the Government

If the service is performed by the government directly (DECEA) the liability regime is that presented in article 37, paragraph 6 of the Brazilian Constitution of 1988, which defines the situation as follows: "public legal entities and private legal entities rendering public services shall be liable for damages that any of their agents, acting as such, cause to third parties, ensuring the right of recourse against the liable agent in cases of malice or

[499] *Brazilian Constitution*, *supra*, note 240 at Article 21, XII.
[500] Thus, giving the example of the Ministry as an administrative federal organ of the Union, José dos Santos Carvalho Filho, "Personalidade Judiciária de Órgãos Públicos" (2007) 11 REDE at 6, <http://www.direitodoestado.com/revista/REDE-11-JULHO-2007-JOSE%20CARVALHO%20FILHO.pdf>.

[501] *See Alexandrino & Paulo*, *supra*, note 372 at 26.
[502] *Decreto 21.713*, Presidência da República 1946 (27 August 1946) (Establishing Chicago Convention in Brazil), online: <http://www.jusbrasil.com.br/legislacao/116621/decreto-21713-46>.

fault."[503] Therefore, the rule is one of objective liability, with the State having the right of recourse against the agent in case of fault or malice.[504]

It is also worth mentioning one accident which occurred in Brazil in 1979, when an aircraft operated by Lufthansa collided with the Macacos Hill while departing Galeão international airport in Rio de Janeiro. The airline and its insurers[505]sued the Brazilian government, the Union, in charge of the air traffic control services for damages based on the doctrine of objective responsibility, and the Court found in favour of the airline and its insurers, determining that the civil responsibility of the Union was objective, and, therefore, that the union was liable for the accident.[506].Because the accident happened in 1979, this decision was based on article 107 of the previous Brazilian Constitution of 1969, which provided that a public legal is liable for the damage that its agents cause to third parties. In the case, AC 204252/RJ Judge Antônio Cruz Netto held that the objective responsibility standard of article 107 was later promulgated in article 37, paragraph 6 of the incumbent constitution. Moreover, the latest constitution, passed in 1988, extended the objective responsibility rule even further whereby it now applies to private legal persons that provide a public service.[507]

It is also important to differentiate the government's liability in case of action or omission. Art 37, paragraph 6 rules objective liability in the case of a positive action. However, if there is an omission, the rule is not clear. There are advocates for both sides, with some defending objective liability and others subjective liability, as has already been demonstrated in the section on government liability according to the Brazilian doctrine. Therefore, it is important to explain the consequences of both cases.

The air navigation service provider may be liable for an omission, for example, if an air traffic controller did not perform an action when he should have done so and this

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[503] *Brazilian Constitution*, *supra*, note 240 at Article 37, Paragraph 6.
[504] Government liability has been extensively demonstrated in a specific subsection.
[505]*Ação Ordinária 0266263-66.1900.4.02.5101* (JF/RJ) (1981) Mauro Souza Marques da Costa Braga [*AC 0266263-66.1900.4.02.5101*].
[506] Apelação Civil 204252/RJ (2006) at Ementa, (TJ/RJ) Antônio Cruz Netto [*AC 204252*].
[507] *Emenda Constitucional n. 1 de 17 de Outubro de 1969 (Constituição de 1969)*, Article 107, online: <http://www.planalto.gov.br/ccivil_03/constituicao/emendas/emc_anterior1988/emc01-69.htm>

omission has contributed to the occurrence of an accident.[508] If the controller knows the aircraft is mistakenly entering an airway in the opposite direction with the Airborne Avoidance Collision System (ACAS) off, he should warn the pilot. If he does not and the airplane collides in the air with another airplane, his omission could be considered one of the causes of the accident. Since this is a case of omission, government liability may have different solutions, depending on the application of the objective or the subjective theory. If the objective doctrine is established, the fundamental principle would be the risk of the activity itself. Air navigation services are considered risky and whoever provides them is aware of the fact that any mistake can lead to or cause an accident. If such is the case, there can be no discussion concerning whether or not the omission was faulty; it will suffice to demonstrate the State agent's inaction (omission), the damage (the accident) and the causal nexus between the accident and the omission. On the contrary, if the subjective theory is adopted, it will be necessary to demonstrate fault. It is important to remember that fault is anonymous in government liability. Therefore, there is no need to individualize it in a single controller's omission. It will be enough to prove that the service malfunctioned. This means that the service was not performed, was performed late or was performed inappropriately. In this case, the service was not performed since there was an omission. There is no room to discuss whether it was reasonable to ask for the service to act because the example given is a clear situation that the inaction was a negligent act and the opposite would be expected from any kind of air navigation service. It is important to observe it is not argued whether the State is or is not responsible. The discussion rests on the need to identify fault. In some cases, this might seem clear, as in the example above; however, since there is normally more than one cause of an accident, it may be complicated for the plaintiff to prove there was fault. This also affects the length of the legal proceedings, since there will be many more discussions than in the case of objective liability. To relieve the plaintiff of this burden, some believe there can be a reversal of the burden of proof by making the State responsible for proving its omission was not faulty or that there was not any omission. This is an important matter to mention, especially in a country where legal proceedings are accumulating without

[508] This thesis does not intend to analyze the responsibility of the air traffic controller as an individual but rather the liability of the air navigation service provider; although the service is performed through the controller's actions or omissions, the focus is on the service.

solutions.[509] According to Morsello, the air navigation services liability is objective even if the service were not provided by the government because, he argues, air navigation services are a public function even when provided by private entities. Besides, in his view, the activity involves risk with the duty to impose safety.[510]

2.5.2.2 INFRAERO

INFRAERO is a public company of the indirect administration with the goal of providing airport infrastructure, including the air navigation services necessary to aerodrome areas,[511] such as airport tower control, being in charge of landing, taxiing and take-off procedures. Although it is a private legal person, it is considered to be providing a public service. Therefore, the liability regime that applies to its air navigation services should be the governmental one mentioned above. Article 37, paragraph 6 clearly includes any private legal entity that performs a public service in its objective liability rule.

2.5.2.3 Authorized Entities that Provide Services – EPTAs

According to the new regulations in place,[512] provision of air navigation service in Brazil not offered by the Aeronautics Command has to be done by using the Air Navigation and Telecommunications Service Provider Stations (EPTAs) model. DECEA is in charge of authorizing private or public legal entities dedicated to aerial activities, as has already been explained. It was observed while analyzing these two items of regulation that there are several types of EPTAs and most of them are open to all users of the Brazilian Airspace Control System (SISCEAB). This has also been explained in the discussion on the possibility of authorization of public service. If a public service can be authorized and if, as in the case of EPTAs, it is an authorization of the public service of air navigation,

[509] According to Cezar Peluso, former President of the Justice National Council (CNJ), in an interview given to VEJA in 2011, 70% of the cases in the federal courts and tribunals in 2010 have not yet been resolved. The situation seems to be worse on the states' and labor courts where the number rises to 72%, in Ricardo Setti, "70% dos Processos na Justiça Federal em 2010 não tiveram solução", *Veja* (29 August 2011), online: <http://veja.abril.com.br/blog/ricardo-setti/politica-cia/70-dos-processos-na-justica-federal-em-2010-nao-tiveram-solucao-presidente-do-cnj-admite-que-justica-esta-em-debito-com-a-sociedade/>.
[510] *Morsello*, *supra*, note 478 at 138-139.
[511] *Lei 5862*, *supra,* note 286 at Article 2.
[512] *ICA 63-10*, *supra*, note 450; *Portaria Interministerial 24*, *supra*, note 467.

the liability regime remains the objective one present in the Brazilian Constitution, article 37, paragraph 6 concerning third parties. This is the rationale because this article states that private legal entities when providing public services are ruled by objective liability. However, there are two types of EPTAs, CAT "B" and CAT "M" that do not need to offer their services to all users of the Brazilian airspace control system. They also seem to be created for the sole interest of the entity that implemented them. In this case, it is more difficult to characterize the service as public. However, the matter is not simple either, since air navigation services in Brazil are the responsibility of the Union, which must provide them directly or indirectly by means of authorization, concession or permission. Therefore, some consider them to be a public service even when they are provided by private entities. We respectfully disagree, since an activity may be of public interest, but not be a public service.[513] This appears to be the case with the EPTAs that exist for the unique interest of their private owners. The service is of public interest since it may interfere with a public service of national interest and also affect public safety and national security. Therefore, it needs to be regulated, controlled and often supervised. The liability regime in this specific case cannot be the same as that for private legal entities that provide a public service (Constitution). It would seem to be the liability regime of the Brazilian Civil Code. Since a risky activity that may endanger others is involved, the civil liability should be that presented in article 927, single paragraph: the objective one. It may be argued that the services CAT "B" and CAT "M" provide are too specific to offer any danger to other users of another EPTA. In this case, if it is agreed the services they provide are not risky, the liability would be subjective, as is stated in the heading of article 927 of the Civil Code. If the users of the air navigation service are considered consumers, the door is open to the application of the Brazilian Consumer Code. In this case the service would not be considered public; this interpretation is simpler and may often occur. On the other hand, there is a current discussion on the possibility of the application of the Consumer Code to public services.[514]

[513] *See Di Pietro*, *supra*, note 339 at 108.
[514] Alexandre Santos de Aragão, "Serviços Públicos e Direito do Consumidor: Possibilidades e Limites da Aplicação do CDC," (2008) 15 REDAE, online: <http://www.direitodoestado.com/revista/REDAE-15-AGOSTO-2008-ALEXANDRE%20ARAGAO.pdf>.

The State is subsidiarily responsible for EPTAs that provide a public service, since it has to respond in case the entity is financially unable to compensate victims. However, if the public administration is also negligent in acting and somehow contributes along with the delegated entity in causing the damage, it is responsible in solidarity for providing compensation.[515]

2.5.3 Civil Code

In regard to civil liability, the Brazilian Civil Code, law n.10.406 of January 10, 2002 contains some rules that might serve as a guide for the liability of the air navigation services as well. The Civil Code establishes two liability regimes: subjective when there is an illicit act, and objective when there is either a specific law that determines liability or when the nature of the activity implies risk to others. Article 927 of the Civil Code establishes subjective responsibility when it can be determined that someone who causes damage to someone else by an illicit act[516] is obliged to make reparations. The single paragraph in this article states the objective rule for reparations, even without fault, as applying in all cases specified by law or when the nature of the activity of the author of the damage would normally imply risk to the rights of others.[517] The exclusive fault of the victim or of a third party and *force majeure* events (acts of God) break the causal nexus and are therefore exceptions to the liability rule.[518] Articles 186 and 187 complement article 927 in defining an illicit act. Article 186 specifies that anyone who has violated a right and caused damage to someone else, even exclusively moral damage, by act or voluntary omission, negligence or imprudence, has committed an illicit act.[519] Article 187 states that the holder of a right who when exercising this right manifestly exceeds the limits imposed by a social or economic objective and by good faith and good custom also commits an illicit act.[520] Air navigation services could be considered a dangerous activity

[515] *See Carvalho Filho*, *supra*, note 357 at 563-564.
[516] According to Sílvio Venosa, the illicit act may be translated as a voluntary behaviour that transgress a duty. Free author translation ("o ato ilícito traduz-se em um comportamto voluntário q transgride um dever"), Sílvio Venosa. *Responsabilidade Civil*, 3 ed (São Paulo: Atlas, 2003) at 22.
[517] *Código Civil*, *supra*, note 330 at,Article 927.
[518] Carlos Roberto Gonçalves, *Responsabilidade Civil* 14 ed (São Paulo; Saraiva, 2012) at 8-9.
[519] *Código Civil*, *supra*, note 329 at Article 186.
[520] *Ibid* at Article 187.

that might cause risk to others. Although the service exists to promote safety, to avoid aircraft collisions and to coordinate several flights in the same airspace at the same time, it is risky since any mistake can threaten many lives. Morsello believes that it is a risk activity with the duty to impose safety.[521] Therefore, the liability regime is objective in accordance with civil law provisions of the Civil Code present in article 927, single paragraph.[522]

Regarding the limits of the amount of compensation, article 944 of the Civil Code states that the compensation should be established by taking into consideration the extent of the damage. The single paragraph of the same article specifies an exception: if there is an excessive disproportion between the damage and the severity of the fault, the judge may diminish the amount.[523] According to the Brazilian Justice Federal Council (CFJ), the interpretation of this provision must be restrictive, and it does not apply to the objective liability rule since it is an exception to the principle of integral compensation.[524]

2.5.3.1 The Concept of Fault

According to Cavalieri Filho, fault is the voluntary act contrary to the duty of care imposed by Law that produces an involuntary, but predictable damage. It is impossible to the legislation to predict all situations that the duty of care must be observed. Therefore, it is important to note this duty comes from the law and the contracts, but also from the generically juridical duty to not harm people and goods. It is possible to establish this

[521] *Morsello*, *supra*, note 478 at 138.
[522] It is important to observe that according to the Federal Justice Council (Conselho Federal de Justiça – CFJ) while studying the Civil Code: "There is Civil Liability based on the risk of the activity, stated in the single paragraph of article 927 of the Civil Code, when the activity developed by the author of the damage causes to a specific person a burden larger than that attributable to the other members of the collectivity." Free author translation of Enunciado 38 da I Jornada de Direito Civil (2002) (CJF), online: <http://www.jurisway.org.br/v2/dhall.asp?id_dh=69 > (Art. 927: "a responsabilidade fundada no risco da atividade, como prevista na segunda parte do parágrafo único do art. 927 do novo Código Civil, configura-se quando a atividade normalmente desenvolvida pelo autor do dano causar a pessoa determinada um ônus maior do que aos demais membros da coletividade.")
[523] *Código Civil*, *supra*, note 330 at Article 944.
[524] *See* Enunciado 46 da I Jornada de Direito Civil, (2002) (CJF), online: <http://www.jurisway.org.br/v2/dhall.asp?id_dh=69>.

duty in every single case if we compare the concrete behavior with the behavior a normal, common, capable and prudent man.[525]

The lack of care is expressed by three different behaviors: negligence, imprudence and incompetence. Negligence can be defined as lack of care through an omission. There is negligence if a vehicle's owner has not kept this vehicle in proper condition (i.e. the vehicle lacks breaks) and if a doctor forgets surgical material inside the patient. On the other hand, imprudence is the lack of the duty of care through a positive action. The driver that exceeds the speed limit and who does not respect the signs is imprudent. Another example would be the case of a controller who knows that he alone should not be overseeing many flights but, he still does so. He may thus cause an accident, although he truly believed it would not occur even with the risks involved in the practice. Incompetence is the lack of expertise for a technical activity[526]. A case in point would be someone who acted as a controller without possessing the proper training and knowledge necessary and required for the function.

2.5.3.2 Fault of the Organization – "The latent failure of the organization"

According to one view, in the specific case of air traffic controllers, negligence, imprudence and incompetence may not be the exclusive acts of one agent who fails and thus causes damage. It may be a common practice of a group that can be personified in a single agent in the case of a negligent act that causes an accident.[527] Imprudence and negligence can represent a latent failure of the organization as a cultural behavior inside a particular organization. The imprudent agent does something he should not have done, acting differently from the behaviors required by the established safety parameters. The negligent agent, on the other hand, does not act as he should, and he also acts contrary to the safety standards and rules in place. In both cases the agent may be simply repeating a cultural behavior or bad practice that exists within the organization. The incompetence of

[525] ("...Culpa é conduta voluntária contrária ao dever de cuidado imposto pelo Direito, com a produção de um evento danoso involuntário, porém previsto ou imprevisível") Author's free translation of Sérgio Cavalieri Filho, Programa de Responsabilidade Civil 10 ed rev e amp (São Paulo: Atlas, 2012) at 34-36.
[526] *Ibid* at 38.
[527] *See Basilio, Pavan & Pontes*, *supra*, note 480.

an air traffic controller is much more unlikely since he has to have specific training in order to become a controller in the first place. However, there could be a latent failure of the organization to properly train a controller on a newly implemented system, for example. According to the same line of reasoning, it would therefore not be appropriate to invoke the right of recourse of article 37, paragraph 6 of the Brazilian Constitution against this controller in the case of an accident caused by a failure of the air traffic control system or its operators. As a consequence of this idea, it is assumed that the accident happened because the State failed to properly train the agent for the service, or it failed to prevent the controller from acting without prudence and disrespecting explicit rules. To justify this understanding, it is necessary that the agent, the air traffic controller, acted in good faith.[528]

Although it is not the specific topic of this study, it is relevant to mention that the condemnation of controllers for honest mistakes made while exercising their function has a terrible impact on the prevention of accidents. There is a culture of reporting honest mistakes in order to avoid future accidents.[529] Thus, the investigation of accidents should be done with the unique objective of preventing future accidents, as is clearly expressed by ICAO in Annex 13.[530]

The theory explained above, which supports the notion of the latent failure of the entire organization if air traffic control is involved in the possible causes of an accident, posits it as the entity responsible for any liability that can arise from the air traffic services' activity since it is in charge of air traffic control. This theory is justified by arguing that it is against the promotion of safety and avoidance of future accidents to apportion blame in the controllers. It is believed that controllers, like pilots, should be exonerated when they have made honest mistakes and have not acted with intent to cause damage. Therefore, according to those who advocate this theory, the principle of the Civil Code that the person who causes damage to another should compensate for it does not prevail in this

[528] *Ibid*.
[529] *Ibid*.
[530] ICAO, *International Standards and Recommended Practices adopted by International Civil Aviation Organization, Annex 13 to the Chicago Convention, Aircraft Accident and Incident Investigation,* (as amended by the ICAO Council in 2001), online: < http://www.cad.gov.rs/docs/udesi/an13_cons.pdf>.

case, nor does the right of recourse in the case of fault as it should be considered the fault of the entire organization and not of a single controller.[531]

The Civil Code provisions mentioned above suggest in articles 927, 186, 187 and 944 how civil liability could be used as a guide to the liability of the air navigation service providers in Brazil. If there is doubt concerning whether or not air navigation is a public service or whether or not the victim is a third party, the Civil Code rules could answer which liability regime would apply. If the theory of risk activity is accepted, the liability would be objective; and for the contrary, it would be subjective. One thing is sure: it will be for the courts that decide which path to follow, and this could lead to uncertainty.

The liability regime exists; however, there are no specific rules to follow in case of damages caused by the air navigation service provider. This situation is of interest for both the victims and the State, which is directly personified through the activity of DECEA and indirectly through INFRAERO and any EPTA. The State should have a regime of compensation whose rules and limits are more clearly defined, for at present compensation could exceed reasonable limits in some cases. The victims, on the other hand, should also have clear norms and paths to follow for claims as it could become complicated to determine which liability regime ought to apply and the process could take several years.

2.5.4 The GOL Case

On September29, 2006, there was a collision between two aircraft in flight over Mato Grosso, Brazil: a Boeing 737 manufactured in the USA but registered in Brazil, PR-GTD of GOL Airlines, flight 1907, and an Embraer Legacy manufactured in Brazil but registered in the US, N600XL, which had been recently acquired by the American company ExcelAire Services. GOL flight 1907 was on a regular commercial flight from Manaus (AM) to Rio de Janeiro (RJ) with a technical stop in Brasilia International

[531] *Basilio, Pavan & Pontes*, *supra*, note 480. It is important to note here that the author disagrees with the view of these authors that the airline should be the party responsible as a result of the latent failure of the organization. The author has not added this idea since she does not believe that the airline should be compelled to answer first and have a right of recourse against the State.

Airport. The Legacy was on a 'ferry flight' from São José dos Campos to Fort Lauderdale with a technical stop in Manaus International Airport. The airplanes collided frontally touching their left wings at 19:56 UTC at UZ6 airway (corridor from Manaus to Brasilia), which is inside the Amazonia FIR (Flight Information Region), at flight level 370 (FL 370). N600XL suffered some damage and lost part of its left winglet; however, it was able to land safely through an emergency procedure at Campo de Provas Brigadeiro Velloso. The PR-GTD lost a third of its left wing and went out of control, falling into the jungle. There were no survivors among its 148 passengers and 6 crew members.[532] The pilots of the N600XL and its controllers were indicted. The first controller had approved the flight plan of the N600XL, but he was accused of omitting obligatory information when giving his authorization. Since ICA-100-12 determines if the authorization of flight level is for only part of the route, it is important that the ATC specify one point up to which the authorization applies. This was the case for the N600XL flight, but the authorization did not specify the point at which it should apply. Although the flight plan had authorized only flight level 370 up to a certain point in the flight, the N600XL pilots said they believed that they were cleared to fly on that level for the entire route by the air traffic control authorization which did not specify the point to change altitude. The region 5 controller changed the flight to region 7 before the flight reached 7, and he did not mention either to the new controller in charge or to the pilots the change in altitude that N600Xl should make at that point. Although he had the information on his screen for seven minutes about the planned change of flight level to 360, the region 7 controller did not alert N600XL to change altitude, nor did he direct the flight to change frequency of communication to 135.9, which was available in region 7. After seven minutes, the transponder[533] of N600XL stopped working; and, as a consequence, the TCAS went off without the pilots' being aware. At this moment, the pilots only noticed a NOTAM in flight, which limited the length of the runway in Manaus; and they were focusing on

[532] *See* Comando da Aeronáutica, Centro de Investigação e Prevenção de Acidentes Aeronáuticos (CENIPA), *Final Report A-022/CENIPA/2008* (November 2008), online: <https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxtdW5kb2F2aWFjYW9icmFzaWxibG9nfGd4OjQ1NjQ4MWYwYmNjMjEzMzA> [*CENIPA Report*].

[533] The transponder is the equipment that interacts with the secondary radars and other flights giving the position and altitude of a flight. The transponder interacts with other airplanes in flight and it gives information to the TCAS– Traffic Alert and Collision Avoidance System. It is obligatory at the altitude at which N600XL was flying. Therefore, TCAS will only work properly if the both aircraft have their transponders on.

trying to figure out the performance conditions of the airplane since this was a new aircraft they both were unfamiliar with (this can be heard in the recordings of the pilots' conversation during the flight).The region 7 controller did not notice the loss of the transponder (C Mode), and he did not take the corrective measures prescribed for this situation. Besides, when he passed the information to the new controller who was replacing him, he wrongly informed the new controller that the flight was on level 360 and not 370. The new controller tried to contact N600Xl 34 minutes after the last bilateral contact; however, N600Xl was using frequency 125.05 MHZ, which made the contact impossible as the airplane was already out of the reach in that frequency. 57 minutes after the last bilateral contact, the crew started to try to communicate. There were 19 communication attempts from N600XL and seven from the region 7 control in Brasília without any success for 32 minutes until the collision.[534] Two of the controllers were indicted. The first was the one who should have seen that the transponder had shut down and that N600XL was flying on a flight level different from the flight plan (360); both data items were on his screen at least for a time. He was charged on Brazilian Penal Code, art. 261[535] for an attempt against air transport safety. He was absolved by the first instance judge as he was considered someone who should have never been certified as a controller. The other controller was accused according to the same article 261 of the Penal Code of negligence for having not programmed his console with the auxiliary radio frequencies, which made the communication between control and N600Xl very difficult. He was condemned to 3 years and 4 months of detention. Since the condemnation was based on fault and not on intent, his sentence was replaced by two restricted rights sanctions: suspension from work for a period of time and community service. The other two controllers, although accused, were both summarily absolved, and there was another

[534] *CENIPA Report*, *supra*, note 532.
[535] The Brazilian Penal Code, Article 261 determines the punishment for the following acts, "to expose one's own or someone else's marine vessel or airplane to danger or to practice any act to obstruct or block maritime, river or air navigation: a penalty of 2 to 5 years' imprisonment". Free author's translation: Art. 261 – "Expor a perigo embarcação ou aeronave, própria ou alheia, ou praticar qualquer ato tendente a impedir ou dificultar navegação marítima, fluvial ou aérea: Sanção 2 a 5 anos de reclusão". *Código Penal Brasileiro, Decreto Lei 2848*, Presidência da República 1940 (7 December 1940), s article 261, online: <http://www.jusbrasil.com.br/legislacao/anotada/2325847/art-261-do-codigo-penal-decreto-lei-2848-40>.

who had never been part of the criminal prosecution. The second instance Tribunal confirmed the summary absolution of some of the controllers.[536]

2.5.4.1 The Impact of the Criminal Condemnation on Civil Liability

Civil liability was not addressed in this decision since it was a criminal proceeding. However, the case raises some issues that could be analyzed in regard to the civil liability of public agents in Brazil. Air navigation services are provided by the public administration, as has already been explained. According to Law n. 8.112/90, article 125, civil, penal and administrative sanctions can be accrued independently of each other.[537] It is important to note that according to Brazilian Law and rules for the responsibility of the public agents, it is possible to have administrative responsibility without having civil responsibility. In the same way, it is possible to have administrative and civil responsibilities without penal. However, the situation is rather more complicated if there is a penal condemnation. A criminal prosecution can end up in four different ways: 1) criminal condemnation of a public servant; b) dismissal of the case based on negative evidence pertaining to either the author or the fact; c) absolution based on lack of criminal culpability; d) absolution based on insufficient proof or for other reasons. The first option, criminal condemnation, implies the automatic recognition of the civil and administrative responsibility of the public servant. There is a presumption that criminal proceedings are always more careful to condemn anyone; and therefore when someone receives a criminal condemnation it is sufficient proof of his wrongdoing. For the same reason, in the case of someone who is absolved based on negative evidence of either author or fact, he is also automatically absolved in civil and administrative proceedings. If the criminal instance, which has to be more severe in its evidence proceedings, finds that the fact has not happened or the agent is not the author of the fact, the agent cannot be considered guilty in civil and administrative proceedings. On the opposite side, the criminal absolution based on the lack of proof, lack of penal culpability or for other reasons does not interfere with the civil and administrative responsibilities. The reasoning continues to be the same

[536] *Sentença no processo criminal 384-67.2011.4.01.3603* (19 May 2011) (sentence on the criminal proceeding on the case of GOL flight 1907) (JF/MT) Judge Murilo Mendes.
[537] *Law 8.112/90*, *supra*, note 417 at Article 125.

throughout: if there is not enough proof of the agent's criminal responsibility or culpability in the criminal proceeding (which is most rigorous), this does not necessarily mean that the proof cannot be obtained at the administrative or civil levels, which are both less stringent. Civil and administrative faults are based on fewer enumerated conditions than criminal faults.[538] This is the kind of connection between a criminal condemnation and the civil liability of a public agent that is worth mentioning when comparing the GOL criminal case and the civil liability of air navigation services. This case is considered the most important case that has dealt with the faults of air traffic controllers in one of the biggest aircraft accidents in Brazil's history.

2.6. Ground Based Augmentation System - GBAS

2.6.1 GBAS Introduction

The Ground Based Augmentation System (GBAS) can provide the accuracy needed for the GNSS to be used for aviation. Three types of augmentation systems have been developed to overcome the limitations of GPS and GLONAS: one based on the ground, the abovementioned GBAS; one in flight, the Airborne Based Augmentation System (ABAS); and another in space based on a satellite, the Satellite Based Augmentation System (SBAS).[539] GBAS is the focus of this study since Brazil has decided to use GBAS as its first augmentation system option. ICAO created SARPS to GNSS during the Global Navigation Satellite System Panel in 2001 and they became part of Annex 10.[540]

GNSS has some aspects that need to be considered before it can be implemented for aviation. The implementation of GNSS procedures can happen in different phases from one State to the other as each State takes advantage of already existing technology and infrastructure to balance cost with benefit. This will happen in accordance with each State's different levels of infrastructure that are already in place in aerodromes and air

[538] *Alexandrino & Paulo*, *supra*, note 372 at 624-626.
[539] *ICAO Doc 9849*, *supra*, note 156, 2.1.3 at 2-1.
[540] *Ibid* at Foreword at iii.

navigation services, the level of air traffic services supporting GNSS operations, the type of aircraft equipage flying and the existing regulations.[541]

The following series of quotations describes GBAS and its operations. "GBAS is a … safety system consisting of hardware and software that improve GPS and, potentially, any constellation in the future, providing improved service levels and supporting the CAT I approach in the system's coverage area. GBAS operates in the frequency range from 108 to 117.95 MHz, enabling an increase in accuracy...."[542] GBAS may guarantee Category I operations and the provision of GBAS positioning service in the terminal area as well as approach operations in Categories II and III.[543] "The GBAS ground facility monitors GPS and/or GLONASS signals at an aerodrome and broadcasts locally relevant integrity messages, … corrections and approach data via a VHF data broadcast (VDB) to aircraft within the nominal range of 37 km in the approach area (when supporting Category I operations).... When an SBAS service is available, GBAS can also provide corrections for the SBAS GEO ranging signal."[544] "A single GBAS ground installation may provide guidance for up to 49 precision approaches within its VDB coverage, serving several runways and possibly more than one aerodrome."[545] "In some cases, the data may be used for nearby airports and heliports as well. GBAS infrastructure includes electronic equipment, which can be installed in any suitable airport building, and antennas to broadcast data and receive the satellite signals."[546] "The complexity and redundancy of GBAS ground station installations depends on the service provided."[547]Although the runaways must meet the required infrastructure for GBAS, according to its cost and flexibility characteristics, since more runaways will be qualified for electronic precision approach guidance, there will be more efficiency of the aerodrome structure, increasing the level of safety.[548]

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[541] *Ibid* at 2.1.1 and 2.1.2, at 2-1.
[542] Secretariat, *Report of the Sixteenth Meeting of the CAR/SAM Regional Planning and Implementation Group,* ICAO GREPECAS/16, 16th Meeting, (2011) at 3.2 [*Report GREPECAS/16*].
[543] *ICAO Doc 9849*, *supra*, note 155, 3.3.4.2 at 3-6.
[544] *Ibid* at 3-6.
[545] *Ibid*.
[546] *Ibid* at 2-4.
[547] *Ibid*.
[548] *Ibid*.

2.6.2 Brazilian Decision for GBAS

If States want to use or implement any new air navigation aid, ICAO advises the evaluation of its accuracy, integrity, continuity and availability.[549] Brazilian and FAA specialists in GNSS augmentation system trials observed and reported in 2002 that the ionosphere's behavior in the Brazilian area is different from its behavior over the United States. Therefore the algorithm implemented in Rio de Janeiro's master station could not be used for CSTB.[550] Brazil realized SBAS flight trials from 2002 to 2004.[551] The results of these trials proved that the ionosphere's effect on the SBAS signal did not support Non-Precision Approaches (NPA) with vertical precision requirements (APV) in Brazilian airspace.[552] Due to these technical difficulties regarding the ionosphere's behavior over Brazil, the government decided to move towards the implementation of a GBAS system instead of an SBAS. It was understood that "the level of performance that can be achieved depends upon the infrastructure incorporated into SBAS and the ionosphere conditions in the corresponding geographical area."[553] The GBAS station installed in Brazil uses the SLS-4000 Smart Pass from Honeywell. "Brazil is the first South American country to install Honeywell's SmartPath® Ground Based Augmentation System (GBAS), which can increase airport capacity, decrease air traffic noise and reduce weather-related delays."[554] There are flight inspection procedures for the GBAS

[549] *Ibid* at 4-1.
[550] One study tried to analyze the different impact of an alternative ionospheric correction algorithm. *See* Attila Komjathy, Lawrence Sparks, Tony Mannucci & Xiaoqing Pi, "An Alternative Ionospheric Correction Algorithm for Satellite-Based Augmentation Systems in Low-Latitude Region," California Institute of Technology (Jet Propulsion Laboratory), online: <http://trs-new.jpl.nasa.gov/dspace/bitstream/2014/7181/1/03-0838.pdf>; and Coordination meeting on GNSS Augmentation Trials, *Report of the 2nd RLA/00/009 Project,* ICAO, (2002) at 3.7 [*ICAO RLA/00/009*].
[551] According to *ICAO RLA/00/009*, *supra*, note 550 at 2.7: "Pending verification trial flights will be carried out with Brazilian and Colombian flight trial aircraft. The aeronautical administration of Brazil has equipped a flight inspection aircraft with a trial WAAS console to carry out trials in the CSTB. 2.8 The next trials, in addition to collecting data to verify the scintillation effect of the ionosphere in the GPS signal, will also verify the precision, integrity, continuity, availability and coverage parameters for en route and NPA air operations over the GPS signal through SBAS augmentation."
[552] Ricardo Elias Cosendey & Alessander de Andrade Santoro, *Tests and studies results analysis for GNSS Implementation Impact of ionospheric effects on GBAS L1 operations,* GNSS Task Force (ICAO Regional Office, Lima 2006), 1.1.
[553] *Review of Global and CAR/SAM CNS/ATM Developments: Follow-up, Coordination and Co-operation regarding phase III of the RLA/03/902 – SACCSA Project linked to GNSS Regional Implementation,* GREPECAS, ICAO, 1st Meeting of the CNS/ATM Subgroup, Working Paper 40, 2.1.
[554] Honeywell, Press Release, "Honeywell Green Jet Fuel Powers Flights to Rio+20 United Nations Conference In Brazil" (19 June 2012), online: <http://honeywell.com/News/Pages/Honeywell-Green-Jet-Fuel-Powers-Flights-To-Rio-20-United-Nations-Conference-In-Brazil.aspx>.

implementations in Brazil that use EMB-110 and H-800XP aircraft with the necessary equipment to check the system.[555] They verify if there is any interference in the frequency and also certain elements, such as approach conditions and accuracy of the proceeding.[556] GREPECAS has decided that the initial use of the GBAS should be done in accordance with the Instrument Landing System's (ILS) "look alike" concept in order to facilitate the implementation to pilots and controllers who already are familiar and work with this concept.[557]

2.6.3 GBAS Liability

As was explained in the first chapter, there is no international agreement on GNSS liability. National laws are a possible option for any liability case. Since Brazil has decided to use GBAS as its augmentation solution to air navigation, any discussion about the liability of the GNSS used for air navigation in Brazil has to analyze the GBAS peculiarities regarding its liability.

GBAS involves software and hardware that provide the accuracy, integrity and continuity of the GNSS signal needed for air navigation. One observer noted while discussing the liability of automated systems in air traffic management that "the cast of characters involved in the development, implementation, and use of software makes the assignment of responsibility a problematic test, so it is often very difficult to pinpoint exactly what went wrong and who is responsible."[558] In consequence, "software developments, contracts and licences usually include strong liability limitations or even exemptions of the developers/providers for damage caused by their products. However, these limitations are not effective with respect to third parties."[559]

Another important question concerning automated devices used for air navigation is "what kind of priorities should be given to different signals and when humans may

[555] *Report GREPECAS/16*, *supra*, note 542, 3.4, Appendix A, 6.
[556] *Ibid* at 3.5, Appendix A at 6.
[557] *Ibid* at 3.3, Appendix A4 at 6.
[558] Giuseppe Contissa, "Addressing Liability of Automated Systems in Air Traffic Management" (2011) 30 EUI WP/ MWP at 4, online: <http://cadmus.eui.eu/bitstream/handle/1814/19014/MWP_Contissa_2011_30.pdf> [*Contissa*].
[559] *Ibid*.

override automated devices?"[560] In other words, when should controllers and pilots trust the cognitive system of an automated unit, and when should they be aware that there is something wrong? Is it possible always to determine the line that separates the responsibility of a product and the responsibility of its operator? And what happens when the product provides a service? All these questions need to be answered before any responsibility can be apportioned. If there is no specific law that gives a path to follow in these difficult cases, every single event will need to be extensively analyzed and dealt with under general rules of government or civil liability. Although this thesis deals only with the liability of the air navigation service provider, it is important to observe the connections with other possible responsible agents, especially when the separation of duties is not easily defined.

It can be affirmed that there are three lines of essential categories of satellite navigation functions: basic or primary signal provision, augmented or secondary signal provision and value-added service provision. The first is not considered a service provision since it provides only signals in space that carry basic data. Providers of Air Traffic Services and Air Traffic Controllers can be considered the value-added services in the aviation sector.[561] Therefore, when a GBAS signal is applied by controllers for precision approaches, this secondary signal provision becomes a value-added service provision.

Although the idea of the liability of the basic signal provider exists, there are advocates of the exemption of liability for the basic positioning signal, as was done with the Internet, so that the service provider is exempted from liability caused by the content it hosts. It is argued that the basic signal provider will not be likely to be the defendant in liability cases, and that this exemption would help to avoid too costly basic operations that could make the GNSS services business unattractive. The idea is to establish rules of liability depending on the type of value-added service that exists.[562] In fact, however, there is no international agreement on the matter.

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[560] *Ibid* at 4-5.
[561] Frans G. Von der Dunk, "Liability for Global Navigation Satellite Services: A Comparative Analysis of GPS and GALILEO" (2004) 30 J Space L 136 at 143 [*Dunk*].
[562] Souchirou Kozuka, "Third Party Liability arising from GNSS-Related Services" (Paper delivered at the 60th International Aeronautical Congress, 12-16 October 2009) [unpublished].

At the present time, GBAS is still in its implementation stage in Brazil. However, once the Brazilian government finishes implementing and certifying it, it will assume the obligation to oversee it, through its audits, maintenance and flight inspection programs. Therefore, unless a failure is due to a manufacturing problem, since GBAS is considered a ground based system used to improve service levels, the air navigation service provider in charge of it should be liable for compensation in case of an accident caused by a failure of this signal or a misuse of the system. GBAS does not generate the signal from space as an SBAS does. It is a ground-based navigation system that offers precision approaches. In accordance with articles 1 and 28 of the Chicago Convention, the State in whose territory the air navigation services are provided and whose services are required to ensure that the system and all navigation aids are functioning properly is also liable for any damages that said services may cause.[563] The liability of the air navigation provider has been dealt with in a particular subheading of this thesis.

However, if the signal which fails is from the core constellation in space that provides the GNSS, or its satellite-based augmentation, SBAS, the answer is more complicated; and it may differ, depending on which GNSS provider is offering the service. If it is GPS, for instance, as there is no charge to use it, "a claim before a U.S. court against the U.S. government for damage resulting from the usage of signals provided for free is not a very promising venue in terms of possible success."[564] Since there is no international rule establishing the liability of GNSS signal failure, the State responsible for compensation is the State in whose territory the air navigation service is provided. However, there may be a chain of service providers involved, and this adds more complexity to the issue. Therefore, it is important to determine "where" the failure happens, if it was at the core constellation or on the ground at the GBAS level, or somewhere else. This is possible through a monitoring system that can identify the performance of the service. The Brazilian GNSS Performance Monitoring System (GPMS) is able to analyze the critical information regarding the GNSS signals and to provide real time information on its navigation services, such as route, non-precise approach and terminal of a specific

[563] *Chicago Convention*, *supra* note 41, Articles 1 and 28.
[564] Dunk, *supra*, note 561 at 142.

region.[565] The system is able to collect in real time the satellite signals through remote stations in Rio de Janeiro, Porto Alegre, Belém and Boa Vista and to present the actual and future availability of the GNSS services in specific areas to different operators. It is also capable of preserving the GNSS performance data to create future reports in order to evaluate the system or investigate accidents.[566] This system is critical for identifying whether a failure occurred in space or on the ground. Therefore, it is essential to determine who is responsible for the damage.

Another aspect worth referring to is any contractual relationship. Whoever has a contract for a GNSS signal may have their liability ruled by the contract agreement. However, contractual provisions may not be clear on which rule to apply. Third parties can also be affected in case of an accident, and they have no contract to protect them. Therefore, they may face more difficulties in order to be compensated. For these reasons, it is important to study the national laws to determine if they can be properly used in case of an accident with victims and damages to compensate. The Brazilian Constitution establishes objective liability rules for third parties if the government provides the service directly or indirectly, and if the service is considered public.[567] There is also discussion regarding the government's liability in cases of omission under the Brazilian doctrine. In cases of action, the Brazilian doctrine agrees on the objective rule. However, if there is an omission, there are two possible solutions: objective or subjective liability.[568] The liability of the air navigation service provider for an action concerning GBAS could occur as a result of a wrongful action based on a misuse of the system or an action against the procedural rules in place; depending on the critical point of the flight, either could lead to an accident. Regarding omission, the possibilities are much more varied, since the government's liability could be argued for if the government fails to oversee and/or regulate the GBAS service. It could also be responsible if the controllers are not properly trained in the new automated service. Even if the GBAS system is privately owned and

[565] DECEA, *Relatório nº CGNA-DSO/2011 Situação Atual do Sistema GPMS do CGNA* (25 November 2011), (Report received via email) [*Relatório GPMS*].
[566] *Ibid*.
[567] Article 37, paragraph 6 of the *Brazilian Constitution*, *supra*, note 240. This discussion regarding third party liability, government liability and whether or not air navigation services can be considered public has been dealt with under specific subheadings.
[568] This matter has also been studied in other subsections of this thesis.

offered at a private airport, the liability that arises from any signal failure or lack of it should be regulated by government liability rules. Although there may exist Aeronautic Telecommunications and Air Traffic Service Provider Stations (EPTAs) that could justify themselves on the grounds of sole private interest (CAT "B" and "M"), this cannot happen with GBAS. This assumption is made through the interpretation of ICA 63-10, which states that anyone who wants to implement an Instrument Land System (ILS) can only do so if it also applies to implement an EPTA CAT "ESP", which is an Air Traffic Control unit.[569] Since GBAS, like ILS, offers precision approach services, it also needs an Air Traffic Control unit. EPTA "ESP" is open to all users of the Brazilian Airspace Control System (SISCEAB) during the time they operate.[570] For this reason, EPTA CAT "ESP" could only be considered a public service. As a public service, it is ruled by constitutional article 37, paragraph 6, which states objective liability for any public legal entity and for any private legal person that provides a public service.[571]

Any other use GNSS may have in air navigation services in Brazil that do not use augmentation systems is based on the direct basic signals emitted from space. Since there is no rule regarding the liability regime that applies in this specific situation, the State should be responsible for it, as mentioned above, in accordance with Articles 1 and 28 of the Chicago Convention. Contractual relations may also be observed, depending on the type of service that is offered.

The fact that Brazil has chosen GBAS as its GNSS augmentation solution for the moment does not obviate possible discussion on the failure of the GNSS signal at its core constellation. The signal, for example, may encounter interference that makes it unavailable to GBAS. Although the State must guarantee compensation for the liability in the case of failure of the signal coming from space, this discussion remains open and is important for every nation, independently of the augmentation system any country may choose.

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[569] *ICA 63-10*, *supra*, note 450, 2.4.4, nota 3.
[570] *Ibid* at 2.5.
[571] *Brazilian Constitution*, *supra*, note 240, Article 37, Paragraph 6. The discussion regarding the liability of EPTA is presented in the Air Navigation Services Liability and Authorization of Public Service section of this thesis.

CONCLUSIONS

3.1 A New Legislation Regarding the Liability of the GNSS Used in Air Navigation in Brazil

3.1.1 Justification of the Research

It was demonstrated in the first chapter of this thesis that there is neither an international convention regarding air navigation liability nor any international agreement on the liability of the GNSS. Therefore, national laws play an important role in responding to the lack of international provisions. However, domestic laws can make any liability claim complex, depending on the conditions and the countries involved in the accident. Besides, national laws can also give different solutions to the same matter if it is taken to jurisdictions of more than one country. Air navigation services are mostly considered a public function with national and sovereign interests. This can make it almost impossible for some plaintiffs who may face government immunities in some countries to overcome a barrier to recovery. GNSS is also a complex subject, since damages may occur from a failure of a signal that comes from space and that can affect several services in different countries, including air navigation. GNSS used for air navigation fluctuates between two juridical systems, Space Law and Air Law. However, Space Law treaties cannot solve liability questions about the failure of a GNSS signal, as was explained in the first chapter. The International Civil Aviation Organization has tried to establish an international convention on the liability of GNSS, but the matter was studied for many years without an agreement among countries being reached.

Brazil is already using GNSS for air navigation. It has chosen the Ground Based Augmentation System (GBAS) as its augmentation solution. Therefore, the lack of an international agreement noted in the first chapter justifies the subject matter studied in the second one: an investigation of the Brazilian doctrine concerning liability and the regulations in place that could affect the liability of the GNSS used for air navigation services in Brazil. If there is an accident caused by the lack or failure of a GNSS signal in Brazil, it is important to know whether the present national legislation may properly respond to liability claims. The focus in chapter two was the civil liability of the air

navigation service provider. The idea was to investigate if the general Brazilian legislation concerning liability would be able to solve the specific problem discussed above with its own peculiarities. As a starting point, the Brazilian air navigation framework was described in an attempt to explain the system in the country. Air navigation is mainly considered to be a public service in Brazil. Therefore, the first liability regime to be studied was the governmental one. Some specifics of the delegation of air navigation services to private legal entities were also analyzed. New regulations were studied in order to determine the possibilities for air navigation service provisions that exist at present in Brazil. Air navigation service liabilities were dealt with under a particular heading to demonstrate all the particularities that could affect the responsibility of service providers, including the type of airspace, flight rules and the relationship between pilots and controllers. GNSS liabilities were also given a specific section explaining the Brazilian decision to opt for the Ground Based Augmentation System (GBAS) as its augmentation solution to GNSS signals and its impact on the liability regime. The Brazilian Aeronautical Code was studied as well in order to identify any specific rules that could affect the matter. In addition, provisions of the Civil Code and the Consumer Code were noted.

3.2 Answering the Questions of the Thesis

3.2.1 Question – Are the Brazilian general legal provisions for liability able to respond to the specific claims of liability of the GNSS used for air navigation services in Brazil?

It was concluded that the main rule for the liability of the GNSS used for air navigation services in Brazil (GBAS) is the objective one present in Brazil's Federal Constitution, article 37, paragraph 6. This means that there is a need to prove only the damage, the public administration agent's act and the link between the damage and the act. Fault is not discussed. Although the rule concerns third parties, the Supreme Court has also been applying it indiscriminately to contractual relations. There has been some discussion about whether article 37 covers actions and omissions of the public administration. This is a much-debated point and there are advocates for both sides: some believe omissions should be governed by subjective liability, while others think omissions could also come

under objective liability. There have been no decisions concerning the specific subject of this thesis; however, in similar situations, the tendency seems to favor analyses of the predictability and certainty of the situation involved. If the government were able to foresee the circumstances and if it were fair to ask for its action, liability would be present. The State is not a universal guarantor. Therefore, it cannot be liable for any lack or malfunction of an existing public service. Air navigation services in Brazil are provided by the Federal Union, either directly or indirectly through authorization, concession and permission. There is delegation of air navigation services through authorization to private legal persons or even individuals using the EPTA model. Any entity apart from the Aeronautical Command that provides air navigation services in Brazil has been obliged to follow this model since 2012. In most cases, it does not change the liability regime, since private legal entities that provide a public service are also ruled by article 37, paragraph 6. However, in two specific EPTA types, it seems that no public service is involved. In these two specific cases, the liability regime should be the one present in the Civil Code, as demonstrated. If any consumer relation can be established, the Consumer Code also appears as a possibility. It is important to note that these two models of EPTA do not provide a public service and are not related to GBAS operation.

The GBAS system used for air navigation in Brazil may also be considered a public service, since it has to be linked to an Air Traffic Control unit in order to operate and all air traffic control organs in Brazil are public service providers. Therefore, the liability regime is the one present in the Brazilian Constitution, article 37, paragraph 6. The problem of actions or omissions related to possible damages resulting from the GBAS can be debated, however. The liability could then switch from objective to subjective, if it is understood that the omission should be ruled by different provisions. It is important to remember in regard to the doctrine of fault, that fault is anonymous and that there is no requirement to individualize it. Therefore, the idea of the “latent failure of the organization” may be a possible theory to rely on. The concern is to establish the type of liability; and if it is objective or subjective, to identify whether there is a need to discuss fault. There is no doubt that the government is responsible, though.

Concerning the first question of this thesis, if the general rules of liability in the Brazilian doctrine could properly respond to liability claims in cases of damages caused by the GNSS used for air navigation services in the country, on the basis of everything said in the second chapter, the answer is yes, the legal system in place is able to govern these claims. However, as was demonstrated, there does not seem to be a simple path to follow. There is much controversy regarding government liability in Brazil under the Brazilian doctrine. Nor do the courts agree on the matter. Besides, air navigation service liabilities have not often been addressed by the courts, and there is a lack of jurisprudence to predict any specific positions on the matter. Brazil is a civil law country; therefore, legal provisions are very important safeguards of rights. It is important to mention, though, that there is a constitutional rule determining objective liability for the public administration that protects third parties in Brazil. This can be considered an advance, since one of the main concerns regarding the lack of an international agreement on the liability of both GNSS and air navigation services is the rights of third parties not ruled by contractual provisions. This problem does not exist under the Brazilian doctrine. Still, there are no specific rules regulating the matter. The Constitution establishes only the principle of objective liability; it does not determine the particularities of the rule. The latter would have to be created by infra-constitutional law.

3.2.2 Proposing a New Legislation

There is nothing in the present general legislation concerning liability claims in Brazil that could create a barrier for recovery of damages caused by GBAS used for air navigation services. However, independently of whether the signal fails on the ground or at the core constellation, it may be difficult to establish the legal regime that applies, since there are no specific rules and discussions under the Brazilian doctrine regarding the government liability regime in case of omission and also on the possibility of a public service to be delegated through authorization[572]. It is a common understanding that the responsibility of States to provide air navigation services under the Chicago Convention also defines a State's liability in this case. Moreover, the national constitutional

[572] Although the author believes it is public service when GBAS is involved, there is no agreement on the matter in the Brazilian doctrine.

provisions which determine that air navigation services are a public service provided directly or indirectly by the Union also focus the liability on the State. However, there is the possibility of authorization for air navigation to be provided by private entities. Therefore, if these services are not considered public, the governmental liability rule of article 37, paragraph 6 will not apply. This means that if parts of the air navigation services offered through delegation (authorization) are considered private, they would have their liability regime ruled by either the Civil or the Consumer Code. This could create different solutions to similar service provisions.

Therefore, the choice to have a specific provision could help overcome some of the difficulties that victims and the government might face in cases of necessity. Victims could have problems in identifying the type of regime applicable and in having their compensations regulated by similar provisions and could wait too long for a settlement, while the government could face excessive amounts in compensation if there were no limits for compensatable amounts for damages. The goal should be to balance the opposite interests at stake. According to Helene Sasseville, "the choice of a system of liability must begin with a careful assessment of the goals and interests it is meant to safeguard. As in any other field of activity, the overall aim is the fair and rapid compensation of those who have suffered damages; this should be achieved, to the extent possible, without imposing an excessive financial burden on governments who provide ATC services."[573]It is necessary as well to establish clear rules when the Brazilian jurisdiction will apply for domestic and/or international air transportation, since there are no international regulations for either air navigation service liabilities or GNSS liabilities to specify the rules. The lack of international treaties leaves open the application of national laws, independently of whether the air transportation involved in the air navigation service is national or international.

The limitations on the amount of compensation are not an uncontested point under the Brazilian doctrine,[574] especially concerning moral damages, although the Brazilian

[573] Helene Sasseville, "Air Traffic Control Agencies: Fault liability vs. Strict Liability" (1985) X Ann Air&Sp. L. 243.

[574] The difficulties in establishing the amount for moral damages that the judges have been facing in Brazil can be illustrated by the number of proceedings waiting to be heard by the Superior Justice Tribunal: they were 11,369 cases in 2008. According to Minister Felipe Salomão, there are no objective legal criteria to

Aeronautical Code imposes limitations on the compensation to national air transportation. In article 280, it also limits the liability of the public administration for the provision of air navigation infrastructure. This provision relies on fault and is limited to accidents involving damages to passengers and goods. However, the Code was created before the present Federal Constitution.

Therefore, due to the limitations of this study in covering all the relevant issues, it is important to continue this investigation to identify all the values at stake in order to better propose the kind of provisions that should be present in a new legislation regarding the liability of the GNSS used for air navigation services. Other GNSS services, besides air navigation, should also be considered in order to establish these rules too. As was said, there is a new draft of an Aeronautical Code being analyzed by the Brazilian Congress. It could incorporate these rules. At this moment, the current CBA is outdated, nor is it clear and specific on the rules concerning the subject of this thesis. ICAO's suggestions based on LTEP recommendations on subjects that should also be considered before any law is created regarding GNSS liabilities are an additional important source. They defend fair, prompt and adequate compensation; address the types of damages that should be assured compensation, whether physical, economic loss and/or mental injury; discuss the issues of joint and several liability among parties involved; and deal with the recourse action mechanism, the two-tier concept, strict liability up to a limit to be defined, and fault liability above a ceiling without numerical limits, among others. ICAO's paramount principle of safety in relation to GNSS services should be promoted in any piece of legislation regarding the matter. Other relevant studies, like the one Unidroit has been performing, should also be considered when creating any law regarding the matter. The number of cases involving the civil liability of air navigation service providers in Brazil is very limited, however, when one accident happens there is normally more than one

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establish the amount of compensation for moral damages. The judge uses several elements to determine it. This creates different decisions inside the same tribunal concerning the same type of damage. Therefore, the STJ has decided to establish some values in order to facilitate the arbitration of the amount and to avoid juridical uncertainty. However, there is still disparity over the amounts of compensation among different tribunals in Brazil. JusBrasil Notícias, News Release, "STJ define valor de indenização por danos morais", (15 September 2009), online: <http://oab-rn.jusbrasil.com.br/noticias/1877205/stj-define-valor-de-indenizacoes-por-danos-morais>.

defendant involved. Lives are part of the damages. Hence, the subject should always be taken seriously for the sake of promoting safety in air transportation.

If further studies conclude that there is no practicality in elaborating a new legislation due to the type of provisions that would be needed, a contractual framework could also be established to fulfill the gap in specific provisions regarding this matter. This is also something that needs to be analyzed in further research, because national contract laws and doctrines have to be studied to elaborate this kind of domestic approach.

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