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COMMERCIAL SPACEPORT DEVELOPMENT: THE ROLE OF DOMESTIC AND INTERNATIONAL SPACE LAW AND REGULATIONS

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ABSTRACT

Competition for commercial space launch business has continued to increase over the last decade. In expanding its services, the commercial launch industry is now preparing to accommodate tourists as they explore low earth orbit. Given the launch business growth, traditional government controlled spaceports are increasingly unable to offer timely and cost-effective launch services prompting private and municipal alliances to develop private spaceports. Domestic and international space law and regulations play a significant role in controlling growth through each nation's licensing powers.

We are now witnessing the early stages of commercial spaceport development in the United States and in other nations. The purpose of this paper is to summarize the recent development of commercial spaceports, the reasons for their creation and the manner in which they are being formed. Space law pertinent to their development and growth, including national licensing regimes, will be outlined. As local and international spaceports continue to evolve, creative solutions will have to be developed to regulate launch traffic between spaceports, to low earth orbit stations, communications satellites, solar energy platforms and the nearby planets. International space laws can and should play an important role. However, it is argued the extant international and domestic space and aerospace laws and regulations are inadequate. A general convention must be convened to address the predictable legal liability, space traffic, launch trajectory and recovery issues that will develop as nations create spaceports and launches proliferate.

INTRODUCTION
SPACEPORTS - BACKGROUND

The term "spaceport" brings to mind a futuristic facility at which spacecraft are launched, sheltered, and maintained for travel to distant cities on planet Earth and to planets and celestial bodies in our solar system. The term came into prominence during the 1950s in various movies and science fiction books. Although functionally distinct, one also thinks of the modern airports as a companion facility. Indeed, we will see that the operations of modern international airports as well as the legal and regulatory regimes that govern them have set the international tenor for future development of the spaceport.

The FAA in its February 2005 report, entitled, *Suborbital Reusable Launch Vehicles and Emerging Markets*, page i, advises: "Suborbital launch activity has long been overlooked by the commercial market which for many years focused exclusively on launching satellites. Recently, however, there has been a resurgence of interest in commercial suborbital spaceflight, stimulated by the emergence of new markets, notably space tourism and new vehicles developed by entrepreneurs. With the successful claiming of the Ansari X-Prize [won in October 2004 by Mojave Aerospace Ventures – a $10 million dollar award offered to the builders of the first privately-developed reusable suborbital vehicle capable of carrying three people to 100 kilometers (62 miles) altitude twice within two weeks], high public interest in space travel, and new vehicles under construction, entrepreneurial ventures are pushing a new industry forward at a rapid pace." As suborbital launch vehicles are developed to travel to 100 kilometers, they will serve more than tourists. They will serve the commercial, civil and military or remote sensing markets as well. Additionally, suborbital vehicles can also serve as the first stage of an orbital launch system, carrying an expendable upper stage that could carry small spacecraft into orbit at potentially lower costs than existing expendable launch vehicles.[1] The FAA report notes that: "Should some or all of these initial suborbital markets prove viable, the impetus will be present to develop more capable reusable suborbital vehicles that can fly higher, longer distances downrange, including high speed critical cargo/packages and eventually, high speed passenger transportation."[2]

"Spaceport" is not yet a recognized term by the United States Federal Aviation Administration (FAA) despite its use in numerous reports; instead, the term "launch site operator" is used in its regulations. Furthermore, the term "spaceport" does not appear in any of the international space law treaties and conventions; instead, some of the treaties and conventions use the term "station." Therefore, one may surmise that when the Outer Space Treaty of 1967, Article XII, makes reference to "All stations, installations, equipment and space vehicles..." it relates to the future spaceports that will be constructed on the Moon, Mars and other planets. Now, with the advent of commercial space transportation, "spaceport" has come into prominence especially in relation to the private, commercial launching of spacecraft to service the International Space Station (ISS) and for taking

[1] *Id.* at 1
[2] *Id.* at 2

tourists into suborbital and orbital space. Considering that the United States Department of Transportation issued its first commercial launch operator's license in 1987 and the first commercial launch occurred in 1989, the term "spaceport" has a short history.

Launch facilities throughout the world are overwhelmingly government owned, operated and controlled for use by the military and non-governmental commercial interests. Worldwide, there now exist 26 launch facilities, both government and commercial.[3] Some of the existing launch sites will become the future spaceports upon which businesses and travelers rely to transport goods and personnel to remote destinations. The newest launch facilities are currently located within the United States and are being established to serve commercial interests only. We will hereafter call them – "commercial spaceports." Given the global interest in establishing new spaceports, international coordination and regulation of future space vehicle launches will prove a challenge.

Spaceports vary with respect to the types of commercial space operations that can be supported. The types of vehicle operations that can be accommodated at a given spaceport are determined by such factors as:

a. Destination/mission objectives (e.g. launching into low earth orbit, medium earth orbit or geosynchronous earth orbit and the preferred trajectory).
b. Ability of the spaceport to accommodate the vehicle operational, performance and support requirements.
c. Spaceport scheduling assurance and range turn-around time (e.g. time needed to process successive operations).
d. Environmental constraints (e.g. noise abatement, hazard concerns).
e. Economics (e.g. launch costs)
f. Weather trends (i.e. the probability that weather patterns/trends will present a risk to the launch window).
g. Traffic Flow Patterns (i.e. the constraints that must be dealt with in use of the National Aerospace System such as conflicting use flight paths)[4]

SCOPE OF PAPER

The commercial spaceports of primary concern in this paper are non-military launch facilities funded with state grants, controlled by a governmental authority that may be jointly operated with one or more private companies for the primary purpose of launching commercial payloads and tourists. Such spaceports are currently located primarily in the United States. However, other nations are now planning to develop their own commercial spaceports.

COMMERCIAL SPACEPORTS IN THE UNITED STATES

As private, commercial space interests evolve, launch facility operators do not want to compete with the military for use of the government-operated facilities with their expensive personnel and facilities infrastructure; instead, they

[3] FAA/AST Launch Information, Vehicles &Sites: Launch Sites, http://ast.faa.gov/linfo_vsite/maps/as.cfm

[4] FAA website, *Commercial Space Transportation Concept of Operations In the National Airspace System*, FAA, Version 2.0, May 11, 2001, page 4, www.faa.gov

want flexible flight schedules and minimum range fees. Presently, there are eleven licensed and operational federal and commercial spaceports in the United States. There exist as of September 22, 2006, merely six commercial spaceports licensed by the FAA to conduct launch activities. To handle the increasing number of commercial launches in the 1990s, commercial spaceports were organized in the United States: (1) the California Spaceport is co-located at Vandenberg Air Force Base (licensed in1996); (2) the Florida Spaceport is co-located at Cape Canaveral Air Force Station (licensed in 1997); and (3) the Virginia Spaceport Center is co-located at Wallops Flight Facility on Wallops Island (licensed in 1997). More recently, spaceports have been established and licensed at: (4) the Kodiak Launch Complex on Kodiak Island, Alaska (licensed in 1998); (5) the East Kern Airport District – for the Mojave Airport, in California (licensed in 2004); and (6) the Oklahoma Space Industry Development Authority spaceport at the Clinton-Sherman Industrial Airpark located in Burns Flat, Oklahoma (licensed in 2006).

Other states within the United States have proposed spaceports that are now in the various stages of development. New Mexico , Cecil Field near Jacksonville, Florida and Texas – Gulf Coast Regional Spaceport at Brazoria County are currently in pre-application consultation with the FAA and have begun the NEPA process; none have yet submitted a launch license application to the FAA. Legislation has recently been passed in Wisconsin for construction of a spaceport in Sheboygan, Wisconsin. The state of Alabama wants to construct a spaceport on the Gulf of Mexico. Texas currently has three proposed sites for spaceports; the sites are in Brazos, Pecos and Willacy Counties. Montana enacted legislation creating a spaceport authority to create a spaceport in Great Falls, Montana, but has not pursued its development or licensing. Utah, Nevada, South Dakota, Washington and New Jersey are each engaged in development activity that may eventually lead to the creation of spaceports.

Outside of the United States, commercial spaceports have been proposed for the United Arab Emirates, outside Dubai; Singapore and Scotland. Other nations that have emerged as major providers of suborbital launch services include, Australia, Norway, Japan, Brazil and India.[5] The future will undoubtedly see other nations develop commercial spaceports in anticipation of future international air and orbital travel as well as to serve commercial customers. When a lunar colony is established later in the 21st century, additional travel needs will be serviced through the multitude of both governmental-controlled and commercial spaceports.

CREATING THE COMMERCIAL SPACEPORT

Within the United States, certain states that enacted legislation to establish state spaceport authorities have created their definition of a "spaceport." Although similar, the definitions are different in each of the states. For example, Chapter 13 of the Utah Spaceport Authority Act defines a spaceport as follows:

[5] FAA website, *Suborbital Reusable Launch Vehicles and Emerging Markets*, February 2005, page 9, www.faa.gov

"Spaceport means an area of land or water which is used, or is made available for, the landing and takeoff of spacecraft, including any appurtenant areas which are used, or intended for use, for spaceport buildings, other spaceport facilities or rights-of-way, together with all spaceport buildings and facilities located thereon, ... including, parking, dining, recreational, and hotel facilities."[6] A recent definition from the state of New Mexico defines spaceport to mean "...an installation and related facilities used for the launching, landing, recovery, servicing and monitoring of vehicles capable of entering or returning from space."[7] One of the early commercial spaceports in the United States, the California Spaceport, co-located on Vandenberg Air Force Base in California, defines spaceport to mean: an entity designated by the California Spaceport Authority for the operation of launch sites or reentry sites such as a city, county, special district ...whose application requires a written notice of intent to apply for a federal launch site operator's license, a copy of the "perfected application" submitted to the Department of Transportation and written notice of acceptance of the license.[8]

Given the desirability of having a spaceport located within its state, the listed state governments have enacted legislation creating spaceport authorities that will receive funds from the state to construct and operate the facility. Some of the more recent spaceport authorities, such as the New Mexico and Mojave spaceports, have secured the active involvement of certain commercial space flight companies that are involved in the development of suborbital and orbital space vehicles for commercial and tourist uses. To insure future launch business, the newest spaceports, both in the United States and internationally, will seek the involvement and monetary support - in a business alliance - of commercial launch companies and supporting service companies to participate in the continued growth of the spaceport. The spaceport authorities must construct support facilities for the launch vehicles, supporting personnel, cargo storage areas and accommodations for future passengers. One recognizes similarities in the commercial development of international airport properties and the surrounding areas and the future commercial spaceports. The lessons learned in the growth of airports over the last fifty years will, in some instances, apply to the future development of the spaceport. However, given the hazards of launching space vehicles and having them reenter the spaceport from distant locations, spaceports will continue to be located in geographically remote areas with climates appropriate for continuous use throughout the year. We may find that the commercial airports of today will provide continuous passenger services to the spaceports where passengers will be accommodated until their launch departure date.

SPACEPORT LICENSING REGIME IN THE UNITED STATES

The FAA Office of the Associate Administrator for Commercial Space Transportation (FAA/AST) licenses and

[6] Utah Spaceport Authority Act, Section 3. Section 72-13-102(2)
[7] New Mexico Statutes Annotated 1978, 9-15-43 F.
[8] California Space Enterprise Development Act, Chapter 627 of the 2003 Statutes, Section 13999.1 (p) and Section 13999.3(a)-(c)

regulates United States commercial space launch and reentry activity, as well as non-federal launch and reentry sites, as authorized by Executive Order 12465 and Title 49, United States Code, Subtitle IX, Sections 70101-70119. The FAA/AST is directed to encourage, facilitate, and promote commercial space launches and reentries.[9]

AST issues launch licenses for commercial launches or orbital and suborbital rockets, and licenses the operations of non-federal launch sites or "spaceports."

AST issues two types of launch and reentry licenses: (a) a launch or reentry specific license – issued for one or more launches or reentries having the same operational parameters; and (b) a launch or reentry operator license – issued to a launch site operator that conducts launches and reentries from one site within a range of operating parameters. A spaceport operator seeks the second of the two licenses permitting multiple launches from the site. The operator's license remains in effect for two to five years from the issuance date.[10]

The key components of the licensing process for a spaceport operator are the following:

a. Pre-application Consultation: Consultation with the FAA precedes the filing of an application;

b. Policy Review and Approval: The license application is received by FAA and reviewed to determine whether there are any issues affecting United States national security or foreign policy interests or international obligations of the United States;

c. Safety Review and Approval: The purpose of the safety review is to determine whether the spaceport can safely conduct its proposed operation;

d. Environmental Review: It ensures that the proposed spaceport activities pose no unacceptable danger to the natural environment; and

e. Compliance Monitoring: Making certain that the spaceport is operating within the regulations and terms of its license.[11]

Commercial spaceport personnel such as launch safety specialists and commercial space transportation vehicle personnel, including mission planning, mechanics, and vehicle operators (on-board pilots), receive FAA approved training, authorization and medical qualification similar to aircraft pilots.[12] Spaceport security and passenger safety will also be a significant and continuing concerns of the international spaceport community and the FAA, not unlike those currently experienced by air travelers in the year 2006.

Given the decreased commercial satellite launches over the last few years, the FAA expends considerable time with state governments and their economic

[9] FAA website, http://ast.faa.gov/aboutast/

[10] FAA website, http://ast.faa.gov/Irra/about_Irra.htm, page 1 of 4

[11] FAA website, *Id.* at page 2 of 4, and page 3 of 4

[12] FAA website, *Commercial Space Transportation Concept of Operations In The National Airspace System*, Version 2.0, May 11, 2001, page 8, www.faa.gov

development bodies in the pre-application consultation stage. No state wishes to expend taxpayer funds on a spaceport that cannot attract imminent launch business. Until we see a substantial upturn in launch business, many of the states that have expressed an interest in establishing a commercial spaceport (listed above) will likely not pursue the license past the first stage.

SPACEPORTS – SPACE AND AIR TRAFFIC MANAGEMENT

The growth of commercial spaceports will demand a newer, more sophisticated and integrated planet-wide space and air traffic management system. Such a system does not now exist. International space law has not yet considered space traffic management.

In the United States, the FAA recognizes the critical need to develop a space and air traffic management system. "Changes in the magnitude and complexity of space operations will place new demands on the NAS [National Airspace System] as vehicles in route to and from earth orbit and beyond transition through airspace that is currently the near exclusive domain of aviation traffic."[13] It is expected that the increased frequency of commercial launches and reentries, from a broad range of locations, in the United States will contribute substantially to competition for airspace amongst NAS users.[14] Space and aviation operations must be seamlessly integrated in order to continue to provide efficient service to all NAS users.

[13] *Id.* at 1
[14] *Id.* at 1

The FAA proposes to phase in the new, integrated traffic management system; the system serves traffic transitioning to and from space by providing reserved and released airspace (calling them "Flexible Spaceways") that allows space vehicles to transition through the NAS.[15] The FAA plan deals with the vertical assent to orbit and horizontal transition through the NAS to an airborne point where a vertical, high-acceleration assent is initiated. For flights operating above the NAS, the mission profile includes: (1) the vehicle's target point for insertion into space and (2) its reentry point into international airspace.[16]

Establishing an international regulatory body to provide for a safe, reliable, and efficient space and air traffic management system is the coming challenge. Some noted legal scholars recommend that we examine the institutional model established by the 1944 Chicago Convention and the charter of the International Civil Aviation Organization (ICAO).[17] "There are many reasons for the success of the ICAO system. One of them has been the ability to delimitate the matters falling under its competence and the matters belonging to the domestic jurisdiction of each State. It surely will be one of the most arduous issues to cope with in shaping the Space Traffic Management System."[18] Closely related

[15] *Id.*at 4
[16] *Id.* at 8, 16
[17] Convention on International Civil Aviation, December 7, 1944, 15UNTS 295; ICAO Doc. 7300/6 and Filho, J., "Space Traffic Management: Comparative Institutional Aspects," *Proceedings of the Forty-Fifth Colloquium on the Law of Outer Space*, 491 (2002)
[18] Filho, J., *id.* at 492

to the ICAO is another international regulatory body, the International Telecommunications Union (ITU) which deals with orbital satellite telecommunications regulation. The two bodies are considered already to engage in some forms of space traffic management.[19]

The literature dealing with proposed space traffic management systems are concerned with three phases of space traffic: (1) the launch phase – deals with expendable and reusable launch vehicles from government and commercial spaceports. Space debris mitigation is a significant concern, especially for expendable launch systems; keeping track of debris and providing sufficient warning to orbiting or transitioning space vehicles will prove critical to the safety of the vehicle and its passengers. Pre-launch notification must also be one of the many concerns to be addressed by concerned nations. (2) The in-orbit phase – requires the creation of a comprehensive collision-warning system. On-time status information regarding the movements of multiple space vehicles in a variety of orbits will be critical to a safe and reliable traffic management system just as it is for the current international air traffic system. (3) The reentry phase – notification of reentry will be required. It concerns primarily reusable space vehicles but will also include deorbiting space debris, satellites and other space objects.[20]

[19] Contant, C., Lala, P., Schrogl, K-U, "Status of the IAA Study Group on "Traffic Management Rules for Space Operations," *Proceedings of the Forty-Sixth Colloquium on the Law of Outer Space*, 300 (2003)

[20] *Id.* at 300-301; See, Perek, L., "Early Concepts for Space Traffic," *Proceedings of the Forty-Fifth Colloquium on the Law of Outer Space*, 496-503 (2002)

An integrated space and air traffic management system must deal not only with the concerns of the National Airspace System over the United States but also the air space over all other nations on Earth, including, satellites in orbit, space debris, and the increasing number of spacefaring nations utilizing commercial spaceports.

CONCLUSION

There exists an urgent need for the spacefaring nations to convene a general convention, similar to the 1944 Chicago Convention, to address and plan a future integrated space and air traffic management system. Given the time it takes to convene such a convention and successfully complete its business, commercial spaceports will continue to evolve worldwide as well as new and improved space vehicles to transport cargo and passengers within the current airspace system. Without the benefit of an international regulatory body to control air and space traffic, spacefaring nations may regulate the airspace above their respective nations in an uncoordinated manner. The detriment to future launch providers and their customers will become apparent within twenty years unless action is taken now. Some legal scholars have recommended that the United Nations, through its Committee on the Peaceful Uses of Outer Space (COPUOS), assume the burden of forging an international space traffic management system considering the difficulty in calling a general convention; work has begun to have the Committee study the project. With many nations now engaging in launch activity, it is imperative that coordinated action be taken. Commercial space

launches into suborbital and orbital space will continue to increase over the coming years. With no national or international body capable of taking on the task of coordinating and controlling integrated space and air traffic, problems will undoubtedly occur in disrupting the regular flow of aviation traffic between airports and spaceports. Such unsafe conditions will not long be tolerated by commercial aviation and space launch providers. We have the luxury of time to prepare for the future; let us not ponder the matter too long.