

**WRITTEN STATEMENT OF
AIR LINE PILOTS ASSOCIATION, INTERNATIONAL (ALPA)
BEFORE THE
SUBCOMMITTEE ON AVIATION
OF THE
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
U.S. HOUSE OF REPRESENTATIVES**

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**“COMMERCIAL SPACE TRANSPORTATION
REGULATORY REFORM: STAKEHOLDER PERSPECTIVES”**

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Mr. Chairman and members of the committee, thank you for giving me the opportunity to join you today, along with this panel of industry leaders. I would like to say right up-front that we are all here today as members of the same community, the aerospace industry. But before I share our thoughts on this important subset of the industry, please allow me to introduce my organization to you.

I'm the president of the Air Line Pilots Association, International (ALPA), which represents more than 60,000 professional airline pilots flying for 34 airlines in the United States and Canada. ALPA is the world's largest pilot union and the world's largest non-governmental aviation safety organization. We are the recognized voice of the airline piloting profession in North America, with a history of safety and security advocacy spanning more than 85 years. As the sole U.S. member of the International Federation of Airline Pilots Associations (IFALPA), ALPA has the unique ability to provide active airline pilot expertise to aviation safety issues worldwide, and to incorporate an international dimension to safety advocacy.

Setting the Stage

Commercial space operations are not new. In fact, it has been more than 30 years since Congress established a commercial space office in the Department of Transportation (DOT), which now resides at the Federal Aviation Administration (FAA). The industry is mature, and thanks to a series of events over the past decade, it is thriving. We'll dive into those events further in our testimony.

However, we must keep commercial aviation part of this discussion today. Future growth and success of U.S. commercial aviation depends upon continued safe, dependable and efficient access to shared public resources such as the National Airspace System (NAS), air traffic management, ground infrastructure and airport services.

It is clear that expanded markets and technology advances in space are enabling new commercial companies to access these limited resources, which has become a critical challenge for the aviation community. Air traffic management, airports and the NAS are regulated and managed according to strict operational and safety regulations, which will not sufficiently accommodate the projected growth and evolution of space transportation, without enhancements. Anytime there is significant growth in a segment of the airspace user community, there must be a means to safely integrate with existing aircraft operations and infrastructure without decreasing the level of safety or efficiency for existing operations.

Neither industry would be successful today without the other. Each sector generates \$100's of billions in annual economic returns for the U.S. and unmeasurable benefits to society. The FAA has coordinated the activities of both airplanes and rockets successfully for over sixty years. In many ways, there is a false distinction between the two sectors since several aircraft types travel into outer space and all space vehicles travel through the atmosphere.

As spaceflight becomes more diffuse and routine, both sectors must cooperate to create policies, regulations and procedures to manage shared national aerospace resources safely and efficiently.

Early Developments in U.S. Aviation and Space

In order to fully articulate the complementary nature of commercial space and commercial aviation, we have developed a white paper that documents the role of the government agencies and industry, both historically as well as today. That whitepaper can be found online at www.alpa.org/whitepapers.

Commercial Space Industry Growth

Over the past several years, commercial space operators have added new launch facilities, increased launch frequency and have begun returning rockets to land for reuse. Several companies sell space tourism flights, and plan to begin taking passengers to space as early as next year, which could accelerate this expansion and growth. Space companies are now testing new concepts of operations that include horizontal liftoff and/or landing, which is driving the development of commercial spaceports at or adjacent to existing airports. Today's regulatory environment has not kept pace with these developments and new solutions are now required.

Several aerospace companies have recently developed technologies that lower costs even more significantly. These reduced costs and increased frequency are driving new markets into space, such as space tourism, which could in-turn, drive growth

over the next few years. The charts below depict the breakdown of the types of orbital space launches in the last few years. It is notable that U.S. commercial launches increased significantly between 2013 (6) and 2017 (21):

U.S. Orbital Space Launches, 2013–2017				
Year	Civil	Military	Commercial	Total
2017	2	6	21	29
2016	4	7	11	22
2015	4	8	8	20
Noncommercial		Commercial		Total
2014	12		11	23
2013	13		6	19

In addition to frequency, launches take place from more locations and use different concepts of operations. U.S. space launches have historically operated out of a small number of coastal launch sites, managed by civilian and military government agencies. The chart below depicts the space launch sites in the USA.

U.S. Space Launch Sites						
Launch Site	Operator	License First Issued	Expires	2017 FAA AST-Licensed or Permitted Flights	State or Country	Type of Launch Site
California Spaceport	Harris Corporation	1996	9/18/2021	6	CA	Commercial
Cape Canaveral Air Force Station	U.S. Air Force				FL	Government
Cecil Field Spaceport	Jacksonville Airport Authority	2010	1/10/2020	0	FL	Commercial
Edwards Air Force Base	U.S. Air Force				CA	Government
Ellington Airport	Houston Airport System	2015	6/25/2020	0	TX	Commercial
Florida Spaceport	Space Florida	1999	6/30/2020	14	FL	Commercial
Kennedy Space Center	NASA				FL	Government
Mid-Atlantic Regional Spaceport	Virginia Commercial Space Flight Authority	1997	12/18/2022	1	VA	Commercial
Midland International Air and Space Port	Midland International Airport	2014	9/14/2019	0	TX	Commercial
Mojave Air and Space Port	East Kern Airport District	2004	6/16/2019	0	CA	Commercial
Oklahoma Spaceport	Oklahoma Space Industry Development Authority	2006	6/11/2021	0	OK	Commercial
Pacific Missile Range Facility	U.S. Navy				HI	Government
Pacific Spaceport Complex Alaska	Alaska Aerospace Corporation	1998	9/23/2018	0	AK	Commercial
Poker Flat Research Range	University of Alaska Fairbanks Geophysical Authority				AK	Nonprofit
Ronald Reagan Ballistic Missile Defense Test Site	U.S. Army				Republic of the Marshall Islands	Government
Spaceport America	New Mexico Spaceport Authority	2008	12/14/2018	0	NM	Commercial
Vandenberg Air Force Base	U.S. Air Force				CA	Government
Wallops Flight Facility	NASA				VA	Government
White Sands Missile Range	U.S. Army				NM	Government
Source:						

Note: In addition to the sites in the table above, there are three non-licensed sites where individual companies conduct launches using a licensed or permitted vehicle. Because the companies own and operate these sites using their own vehicles exclusively, a site license is not required. SpaceX conducts flight tests at its McGregor,

Texas site and Blue Origin conducts FAA-permitted flight tests from its site near Van Horn, Texas.

Existing Regulations and Requirements

Current launch licensing procedures and regulations were created at a time when there were significantly fewer launches, launch operators, types of operations, and launch facilities. Federal policy related to our shared national aerospace resources needs to reflect current growth projections and the potential for further acceleration.

The FAA provides aircraft and pilot certification, operational approval, air traffic control and safety oversight of commercial airline operations in the NAS. Each operator is responsible for ensuring their aircraft fleet is managed and operates according to FAA requirements. The FAA also provides the necessary permits and licenses for space operations, for the space vehicles used by space operators, and the licensing of space ports.

Operational Approval of Space Launches

Title 14 of the Code of Federal Regulations (CFR) Volume 4, Chapter III, Commercial Space Transportation, FAA, DOT, outlines requirements pertaining to commercial space operations. This section of the rules defines the policy and procedures in support of commercial space operations in the United States.

When NASA and other government agencies purchase a launch for their own spacecraft, no launch licenses are required. When launches are provided for commercial spacecraft, the FAA's Office of Commercial Space Transportation (AST) is responsible for licensing. AST was established in 1984 and has licensed 286 launches and 16 reentries to date.

Commercial Spaceports

Independent of issuing approvals for the commercial space operations (launch, recovery, etc.), the FAA AST also issues launch site operator licenses for airports or spaceports who desire to conduct commercial space operations. A graphic below describes the process.

Public input to the licensing process is currently limited to the environmental review portion of the process, as highlighted below. In some cases, airports are applying for spaceport licenses without a companion commercial space operator license application. Therefore, even if the spaceport license was issued, no commercial space operations would be allowed without additional FAA approval.

Because the FAA evaluates spaceport applications completely separate from commercial space operator applications, a spaceport could be established without a specific use in mind. For organizations like ALPA, this presents challenges when it comes to providing the FAA with comments during the only public comment period for spaceports. The comment period is for public review of the environmental

assessment. Currently there is not a comment period for stakeholders to submit with regards to the operations envisioned at the spaceport. This creates a challenging situation for stakeholders and the FAA to have comprehensive review of all aspects of the spaceport licensing criteria, including safety of the operations in proximity to other aviation operations.

Airspace and Air Traffic Control

The FAA AST appears to serve as the single focal point for space companies to coordinate operational approval and air traffic control procedures to segregate the volume of airspace required for the space operation from other NAS operations. The airspace and air traffic control management strategies continue to evolve with the new types of technologies used by commercial space operators. Also, the new types of commercial space activities that are being planned by a wide range of commercial space companies is requiring the FAA to conduct new risk assessments to ensure that their historic airspace management policies and plans are adequate for the envisioned operations.

To protect passengers and crews aboard commercial aircraft operating in the vicinity of space operations, airspace boundaries are established to sterilize the airspace needed by the space vehicle. These airspace areas are sized to provide an adequate safety margin should a catastrophic failure occur at any time from the launch until the space vehicle was well clear (above) aviation operations. These large airspace areas are designed to contain the operation and to segregate the space operation from

airline and other aeronautical operations. The FAA utilizes special activity airspace (SAA) to segregate space and aircraft operations.

Each SAA has defined dimensions based on the space vehicle's launch and reentry trajectories, which mitigate the risk in the event of a catastrophic failure and ensure that non-participating aircraft remain outside the SAA boundaries. These restrictions have led to extensive and expensive delays to commercial air traffic that are unsustainable. However, until policies, procedures, and airworthiness certification requirements are developed based on improved data, today's commercial aviation and space operations will continue to use this same methodology to manage and restrict the NAS. Integration of commercial space operations in the NAS would benefit from increased collaboration and coordination with other elements in the FAA, such as Flight Standards.

Aircraft design approvals.

The FAA serves as the safety and oversight regulator for aircraft design and certification. For traditional civil aircraft, Title 14 CFR Chapter I, Subchapter C, contains aircraft certification policy and standards required for aircraft airworthiness certification. These regulations are used by aircraft manufacturers in the development, maintenance, and periodic inspections of aircraft. Compliance with the airworthiness standards is mandatory before an aircraft can integrate/operate in the NAS without restrictions or without containment in segregated airspace. Aircraft

manufacturers may be granted an experimental airworthiness certification during the developmental phase of new aircraft.

By contrast, the FAA AST issues either a license or experimental permit for spacecraft operations. Compliance with 14 CFR Chapter I is not required. The license or experimental permit allows space operators to launch a space vehicle into orbit/sub-orbit and reenter the earth's atmosphere. Before AST grants a license/permit, the space operator must demonstrate compliance with the criteria in 14 CFR Chapter III that safeguards the public, including persons in non-participating aircraft.

As written originally, the FAA space licensing requirements did not envision the frequency of operations or spacecraft designs now being used, nor those anticipated in the future. As a result, the FAA is undertaking a review and a re-write of requirements in 14 CFR Chapter III to shift to a "performance based" set of design and operational requirements. In support of this activity, the FAA formed the Streamlined Launch and Reentry Licensing Requirements Aviation Rulemaking Advisory Committee (ARC). Launched in March 2018, the ARC is tasked with developing recommendations for a performance-based regulatory approach in which the regulations will state safety objectives to be achieved and leave design or operational solutions up to the applicant.

Passengers as Participants

More than 1,000 individuals have pre-paid space companies for suborbital spaceflights. The Commercial Space Launch Competitiveness Act of 2015 (P.L. 114-119) gives the FAA the specific responsibility of regulating commercial human space flight. The act prohibits the FAA from regulating crew and passenger safety except in response to high risk incidents, serious injuries or fatalities, or an event that poses a high risk of causing a serious or fatal injury. The act defines paying individuals as “participants”, rather than “passengers” to allow them to be transported with an experimental airworthiness certificate.

ALPA’s Safety Concerns

Any new technology introduced into the NAS requires a carefully crafted risk management, risk mitigation, and implementation strategy. While commercial space operations are not new, the increase in the frequency of launches and associated segregation of airspace, combined with the growing number of commercial spaceports, means that the elevated demand for access to airspace will likely place pressure on regulators and operators to reduce the size of the airspace protection zones, to minimize commercial space’s operational impact on commercial aviation. Without proper mitigations in place, the elevated levels of risk may not be acceptable.

In the longer term, there is discussion of the full integration of space vehicles into the national airspace, where the space vehicles operate within the existing framework of aircraft operations and infrastructure. Accomplishing this goal without decreasing

the level of safety of the existing operations will be a significant challenge. However, we are confident that it can be successfully achieved.

ALPA will continue to support the FAA, other government agencies and industry, and participate in the safety risk analysis activities as well as rulemaking processes to ensure safety risk is addressed for all phases of the operations.

Current and Emerging Operational Challenges

Managing more frequent and diverse space activities under current FAA policies and regulations has resulted in significant impacts to commercial aviation including flight delays, flight plan alterations, increased distance flown, longer flight times, flight cancellations, crew duty cycle, gate slot management and added fuel burn.

According to the Airlines for America¹, in 2017, the average cost of aircraft block (taxi plus airborne) time for U.S. passenger airlines was \$68.48 per minute. If 10 aircraft are delayed for 10 minutes each, the associated cost would be \$68,480. If the same delay were incurred each day of a year, the cost of the delays would be nearly \$25M. These costs do not include the passenger's value of time, the costs of lost opportunities, and the costs of missed meetings/vacations where expenses are incurred prior to completion of air travel.

¹ See: <http://airlines.org/dataset/per-minute-cost-of-delays-to-u-s-airlines/>

ALPA sought to understand the impacts of the Space-X Falcon Heavy launch on aviation operations. The launch was at the Kennedy Space Center on February 6, 2018. According to the FAA:

- 563 flights were delayed.
- 34,841 additional nautical miles flown.
- 62 additional nautical miles flown on average per flight.
- 4,645 total minutes delayed.
- 8-minute average delay per flight.
- 5,000 square nautical miles impacted.
- 62 departure and 59 arrival delays were experienced at the Orlando International Airport.

ALPA also noted that the FAA completed a report in 2014² where they evaluated impacts caused by space operations conducted at Cape Canaveral.

In this study, the FAA's Concept Analysis Branch studied a historical launch and reentry to quantify the current NAS impact of commercial space operations and to identify air traffic control (ATC) practices used to minimize this impact. On March 1, 2013, the SpaceX Falcon 9/Dragon capsule was launched from Cape Canaveral Air Force Station in Florida. Several Special Activity Airspaces (SAAs) were activated to protect air traffic from debris in the event of a vehicle explosion. After being docked to the International Space Station, the Dragon capsule reentered the atmosphere and

² See: https://acy.tc.faa.gov/data/uploaded/Publications/SVO_Impact_TechNote_Final_v4b.pdf

splashed down in the Pacific Ocean off the coast of California on March 26, 2013. This reentry also required a SAA to block air traffic from entering the potentially dangerous airspace.

Results showed that flights in the Jacksonville and Miami Air Route Traffic Control Centers (ARTCCs) during the launch were significantly impacted by the operation. The Falcon 9/Dragon launch caused impacted flights to fly between 25 and 84 nautical miles (NM) longer, burn between 275 and 2,387 pounds (lbs) more fuel, and fly between 1 and 23 minutes (min) longer as compared to similar days with no launch activity. However, the launch operation did not negatively impact the total hourly operations at key Florida airports. The reentry analysis showed that flights traveling to or from Hawaii and Australia would be impacted by the reentry operation, but domestic and other international flights would be minimally impacted. Flights to or from Hawaii and Australia flew between 15 and 27 NM more, burned between 458 and 576 lbs more fuel, and flew between 1.5 and 7 min longer to avoid the reentry airspace. The FAA's analysis of the impacts of launches at Cape Canaveral indicates that the continued use of segregated airspace on an increasingly frequent basis could become a prohibitively expensive method of supporting space operations.

Spaceport Challenges

Space launch facilities - now called spaceports - were historically located independent from airports and near the coastline. This geography allowed for

separate operations and access to NAS through SAA's without significant disruption to commercial aviation.

In anticipation of increased launch activity, new spaceports are being developed across the country and in some cases are co-locating with or using the airport facilities. The table previously presented above lists the 10 licensed spaceports currently in operation.

The FAA has publicly announced that Front Range airport, near Denver, Colorado has submitted an application for FAA spaceport licensing. However, no operator plans to utilize the spaceport, should it be approved by the FAA.

Space launch operations that are adjacent to airports or overfly land pose a safety risk to the public as well as to commercial aviation. Spaceports co-located with airports would need to overcome many operational issues such as hazardous fueling, noise abatement, traffic volume/capacity and controller workload. Sharing the NAS in this environment would add a level of complexity that we do not have the ability or resources to manage within the current system at this time. In order for launches to occur at many of these spaceports, significant safety and operational challenges must be addressed.

Key Stakeholders

Unlike the entrance of hundreds of thousands of drone/UAV operators, commercial spaceflight operators have existential incentives and a growing history of safe operations. Existing commercial players in the space transportation arena are well known, several operate in both sectors and the barriers to entry remain high. Since 1989 (nearly 30 years) there have been 290 launches by commercial space operators.

Finding Solutions

The increased frequency and diversity of space launch operations requires the development of new policies, procedures and licensing criteria. Cooperation between all stakeholders is necessary and discussions about real solutions to these emerging problems have already begun.

As noted above, the FAA has recognized that the growing number of space flight operations requires them to reevaluate their management of the airspace and as a result, tasked an Aviation Rulemaking Committee (ARC) with providing recommendations on airspace prioritization policies. As a member of the ARC, ALPA will continue to support the FAA and participate in the safety risk analysis activities as well as rulemaking. Recommendations for this ARC are due in late 2018.

The FAA has also established the spaceport categorization ARC, which will develop recommendations for the FAA to establish a spaceport categorization scheme. The ARC includes participants from both the commercial space and the aviation community. With new spaceport categorizations, it is likely that more airports or

other locations could become designated spaceports. However, with a narrower set of intended operations, it should be easier for all stakeholders to understand how the spaceport is intended to support the space industry.

A Transition to Integration Is Needed

The FAA needs a comprehensive plan to integrate commercial space operations and avoid major disruptions for the other users of the NAS as the demand for access to the NAS for commercial space operations increases. As commercial space operations increase, and as the locations where the commercial space operations continue to expand, the FAA may need to evaluate and standardize the spectrum of commercial space vehicles and operations to reduce NAS impacts while maintaining a high level of safety. At some point, segregation of commercial aviation operations from commercial space operations will not be a viable solution.

Prior to reaching this point, a significant amount of planning and investment is needed to create and implement a commercial space integration strategy very similar to an integration plan drafted for Nextgen. Full integration into the NAS will require strategic and tactical policy and regulations for:

1. Standardized airworthiness certification and equipage standards for space vehicle design.
2. Pilot / Astronaut / Operator training and qualifications requirements
3. Airspace redesign and procedure deconfliction to integrate commercial space operations near major hub airports.

4. Enhancements to ATC Automation tools to better manage terminal, enroute, and oceanic traffic in real-time.
5. Separation standards that allow ATC to separate spacecraft from other aircraft without the use of segregated airspace.
6. Traffic Flow Management tools to effectively manage NAS operations.

Legislation Restricts the FAA From Establishing Integration Rules

To ensure that the commercial space industry has an ample “learning period”, Public Law 114-90 prohibits the FAA from promulgating any regulations governing the design or operation of a launch vehicle intended to protect the health and safety of crew and spaceflight participants until the year 2023, absent death, serious injury, or close call. However, when Congress passed The U.S. Commercial Space Competitive Act of 2015, it encouraged the FAA to continue to work with the commercial space and airline industry on ways to improve human space flight safety.

ALPA maintains that commercial space operations require segregated airspace until the “learning period” has gathered enough quantitative data to validate a high level of safety is maintained before the integration of commercial space operations begins. However, it is not too early for the FAA and the industry to begin making plans for the integration of space and aviation operations without segregated airspace.

FAA Needs to Regulate Space Vehicle Design

The FAA should proactively begin developing policies for spacecraft airworthiness and certification to fully maximize the time available for safe integration of commercial space operations. Policies are needed that standardize the design requirements for the range of space vehicles. As part of this set of requirements, the FAA should include Communication, Navigation, and Surveillance (CNS) requirements so that the space vehicles are compatible with commercial aviation operations in the same airspace areas.

FAA Needs to Regulate Flight Crew Qualification, Training, and Certification Requirements

The FAA should require each flight crew member to obtain a space vehicle operator license for the type of vehicle the pilot will operate. The requirements must include:

- Mandatory training requirements and flight time with a certified space flight instructor,
- Critical safety training
- Operator and crew qualifications
- Crew resource management and crew roles and responsibilities
- Use of standard operating procedures
- An annual medical examination by a licensed physician board certified in aerospace medicine

The FAA should also establish commercial space operator training requirements, standards, and any currency requirements to ensure flight crew, ground crew,

maintenance inspections, and safety critical ground operations are fully trained and qualified for the operations.

More Collaboration Needed Between Space and Aviation Stakeholders

The three ARCs that the FAA initiated in 2018 are getting some dialogue started, but additional interaction and collaboration is needed. Although the two sectors are symbiotic, they have developed independently with distinct trade associations and communities. A concerted effort is needed to overcome the lack of communication and coordination between traditional aviation and commercial space segments of the industry. Open debate and exchange of information will be critical to successful future operations of both segments of the aerospace industry. ALPA is willing to take a leadership in facilitating discussions between the two sectors.

Governmental Resources Need Enhanced

Sufficient government resources are required to support the safe and efficient integration of commercial space operations into existing aviation infrastructure and operations. The AST has the sole responsibility for approval of commercial space launches and space operations in the NAS and also authorize licenses to operate the launch and landing facilities for space operations. In conjunction with other FAA offices, AST safeguards the public through trajectory and catastrophic event modeling to determine the volume of airspace required for segregated airspace. It is not possible for the AST to manage this important responsibility with 98 employees and an annual budget of around \$20 million.

Existing FAA resources are not adequate to conduct the research and analysis needed to adapt and adopt necessary new policies, regulations and procedures. Significant data exists from past successful and unsuccessful flights that should inform the establishment of new policies and procedures to protect aircraft and minimize operational disruption for either sector. The FAA should consider establishing capabilities such as a “space and air traffic management system” (SATMS) to more equitably support both the evolving and expanding space transportation industry and the mature and continuously growing airline industry in a systematic and integrated manner.

Safety oversight and air navigation services by the FAA’s air traffic control organization and the AST must receive sufficient funding to support a more complex system and fulfill their congressional directives. Without adequate resources for planning, oversight and provision of services, safe and efficient operations of both sectors will be negatively impacted.

Inter-Governmental Coordination

In addition to increased resources, the government needs more formal mechanisms for coordination. Competing departments within the FAA, the new National Space Council and a new role for the Department of Commerce (DOC) in space traffic management have led to increased confusion. A clear leader and defined roles within

these government entities must be established, along with regular communications structures.

Distinct governmental advisory committees should assign overlapping members, hold combined meetings or be merged. Clear and consistent government roles must be identified as soon as possible.

Conclusions and Recommendations

The magnitude and complexity of space transportation operations are placing new demands on aviation infrastructure, including the NAS. As more space vehicles transition through airspace that is primarily used by traditional aircraft new policies, regulations and procedures are necessary to provide for safe and efficient operations of both important industries.

- ALPA has an important role in the integration of space transportation operations into commercial aviation infrastructure, operations and the NAS.
- As with any new entrant or in the case of commercial space where the introduction of enhanced technologies are introducing significant advancements in capability, there must be a means to safely integrate with existing aircraft operations and infrastructure without decreasing the level of safety of the existing operations.
- In addition to the existing FAA environmental review process for commercial spaceports, the FAA should create additional opportunities for public

comments in the spaceport approval process, that discuss the intended operations at the spaceports.

- The FAA should include Communication, Navigation, and Surveillance (CNS) requirements so that the space vehicles are compatible with commercial aviation operations in the same airspace areas.
- The FAA should evaluate the need to require each flight crew member to obtain a space vehicle operator license for the type of vehicle the pilot will operate.
- The FAA should establish commercial space operator training requirements, standards, and any currency requirements to ensure flight crew, ground crew, maintenance inspections, and safety critical ground operations are fully trained and qualified for the operations.
- Commercial airline and space operators need to better understand each other's operations. This in turn reduces the likelihood of disruptive operations affecting both groups of operators.
- The safety of the traveling public needs to remain the highest priority for the FAA and the aerospace industry. Commercial airline and space transportation operators need to better understand each other's operations to reduce the likelihood of disruptive operations affecting both sectors.
- Stakeholder collaboration, planning and analysis that informs new policies, procedures and regulations should begin now. ALPA can provide leadership to bring stakeholders together from both the commercial aviation and the commercial space segments.

- The FAA must be given the adequate resources to support more complex analysis, licensing operations, safety oversight, air traffic control services and NAS integration driven by these demands.
- A coordinated government-wide effort is needed to develop and carry out new policies, regulations and procedures for NAS integration, space vehicle certification and spaceport development.
- Unless and until new, fully informed policies, regulations and procedures are put in place, airspace segregation may be the safest risk mitigation.

Thank you for the opportunity to engage. We look forward to continued collaboration to further innovation in aerospace and maintain the safety of our system.