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Integration of Reusable Spacecraft into the National Airspace System

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Integration of Reusable Spacecraft into the National Airspace System

By Henry Neiberlien



Abstract

In the rapidly evolving world of Aviation the traffic density above the United States will continue to worsen. New Technologies like Unmanned Aircraft and an increase in commercial aircraft traffic will strain the National Airspace System. More and more launches are occurring from the United States, and this will stain the increasingly crowded airspace above us. In order to find a solution new technologies of the FAA NextGen program can be utilised to evolve space traffic management in our airspace. Especially reusable spacecraft which will transcend the airspace the most often, and sometimes from conventional airports. Instead of closing large portions of our airspace, we should integrate these crafts into the current system. Technologies such as ADS-B and TCAS can provide live GPS tracking for spacecraft and let them communicate to convention aircraft and UAS systems. It is time spacecraft become part of our NAS not an anomaly that closes it.

Intergration Methodology

- Inclusion of Automatic Dependent Surveillance-Broadcast (ADS-B) equipment on board spacecraft, and launch vehicles.
- Live tracking of spacecraft by radar, GPS, and by ATC with live updates sent to the visual displays of aircraft.
- Introduction of a new type of Temporary Flight Restriction (TFR) that follows the vehicle in real time.
- Research the possibility of Air Traffic Controllers managing both aircraft and spacecraft in the National Airspace System.
- Utilization of new emerging technologies to expand the reach of the FAA's NextGen program to include commercial space activities.

Conclusion

In conclusion the changing airspace above the united states requires the integration, not the exclusion of reusable spacecraft into the National Airspace System. In order to do this technology being proposed and currently mandated by the FAA NextGen can be utilised. Reusable spacecraft are specifically targeted for this system due to the fact they will transition the airspace around the launch site twice, not just only for downrange launch. Live tracking of these spacecraft with data sent directly to ATC and aircraft cockpit displays. This new system will minimize the impact spacecraft activity has on the NAS, creating a seamless transition from launch to all clear, and vehicle return. All of these points will help reusable spacecraft to become a part of the airspace system not an event that disrupts it.

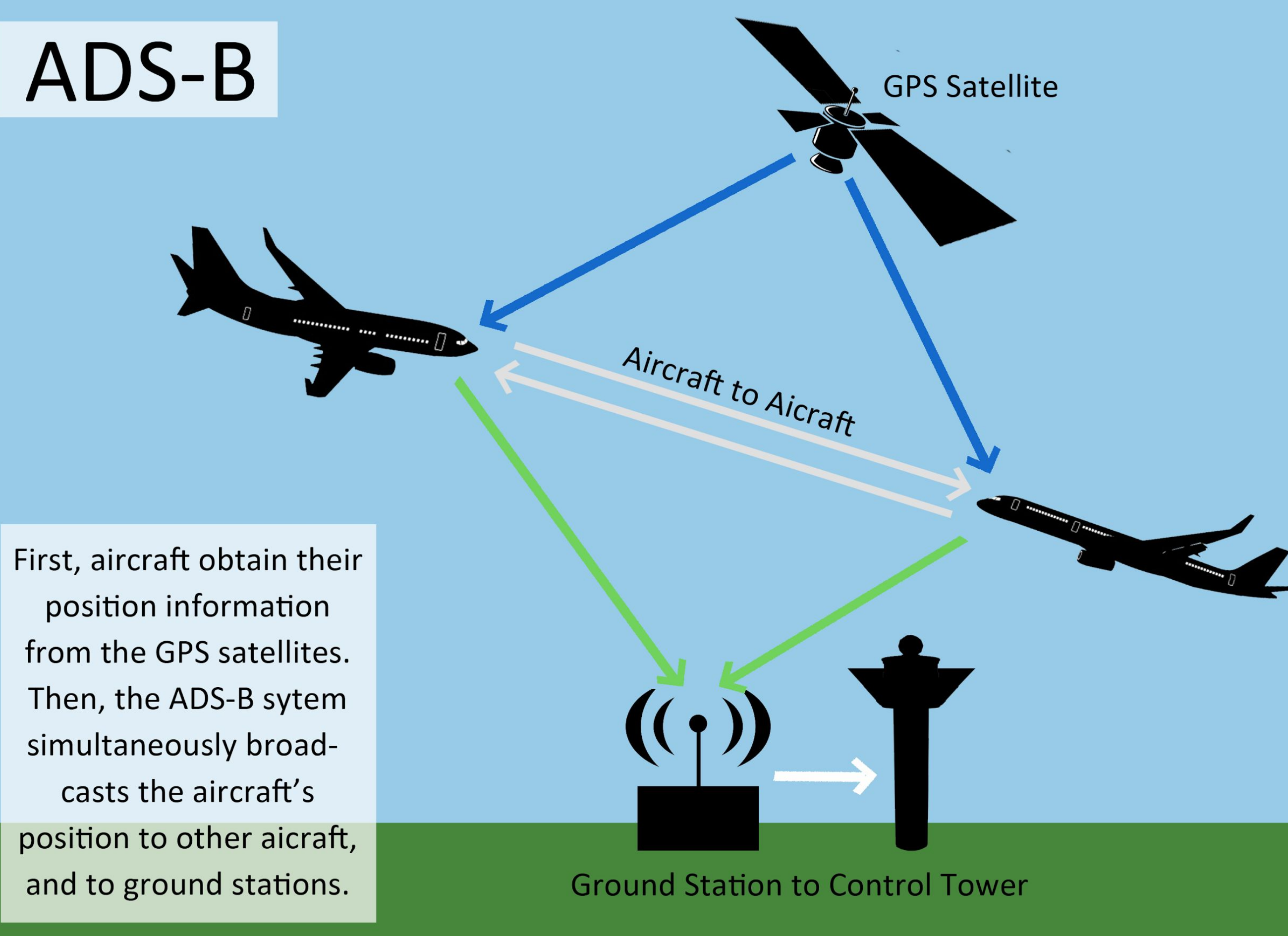
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4. Special thanks to Embry-Riddle AMS department for guidance on ADS-B and TCAS systems

Introduction

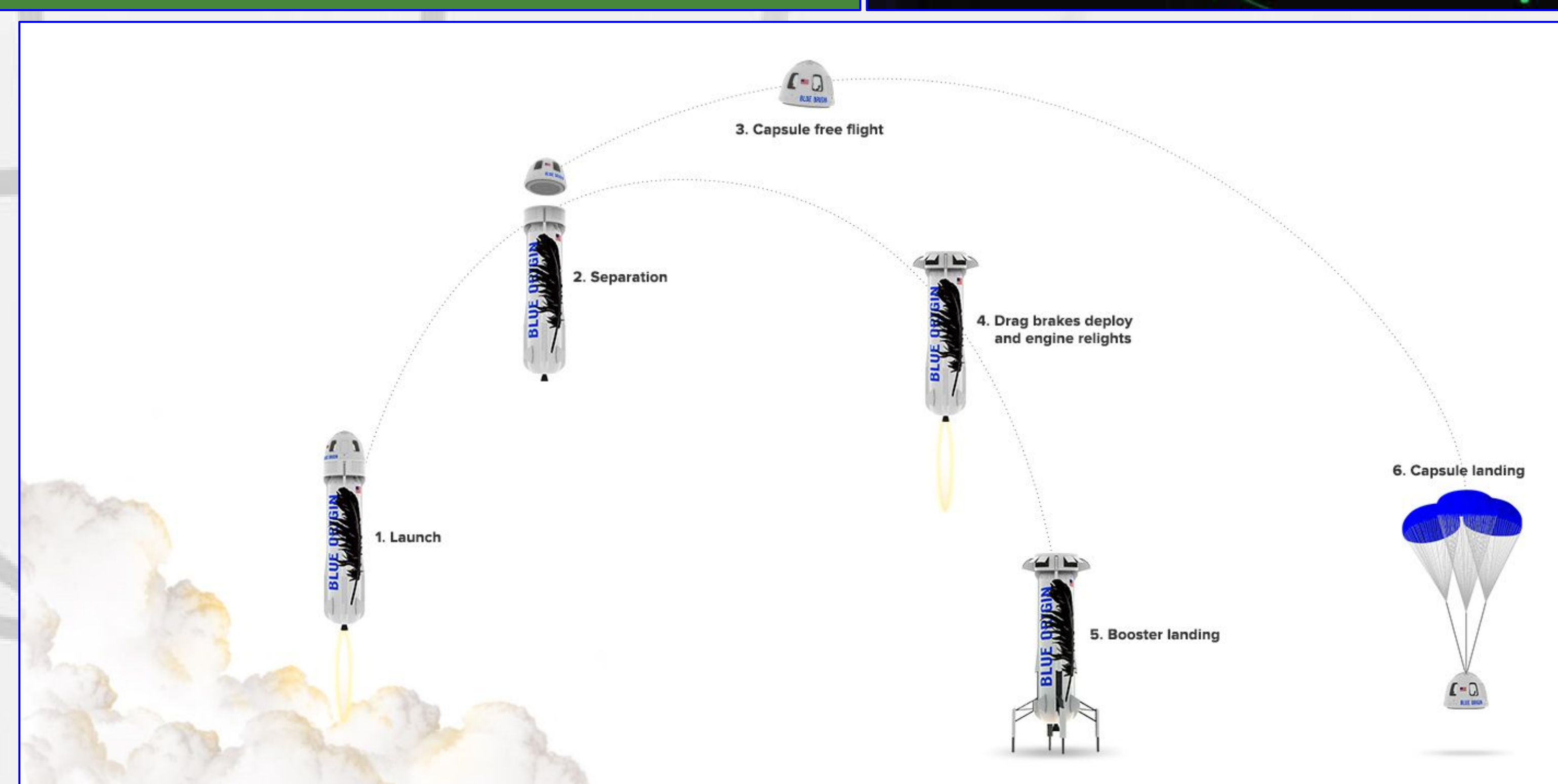
The National Airspace System or NAS in the United States is more crowded than ever. With increasing commercial flight demand, increasing private aviation activity, and determination for the introduction of autonomous UAS systems into the airspace make the NAS under more strain than ever before. Historical access to space in the U.S. has taken place along the space coast, Cape Canaveral and Kennedy Space Center. However private spaceflight has created new and innovating ways to access space, including reusable suborbital and orbital spacecraft. A reusable spacecraft is not expended after every flight like a conventional rocket and is designed to be reused on future missions. These crafts that can be reused and launched often do not quite fit with the current method of a using a temporary flight restriction around the launch site for many hours. Since some of these spacecraft will be launching from existing airports, this could shut down air traffic and delay numerous flights from arriving on time. Spacecraft will become more common in the NAS as investment grows in commercial spaceflight and integrating them into them into our airspace should be a priority. Thankfully emerging technologies and intercommunication between aircraft can make this a reality as our NAS transitions into the FAA's NextGen system.

ADS-B



Acknowledgements and Further Information

Henry Neiberlien is a junior in the Commercial Space Operations degree program and the news editor for The Avion newspaper, the official university newspaper of ERAU. The information presented in the poster is based on an essay entered in the STM writing competition. Digital and hard copies of the original essay are available. Special thanks to Dr. Howard and the CSO program for making this conference possible. Some companies in the industry are already working with the FAA and ADS-B technologies for space applications. Henry Neiberlien has a number of articles and other works published in The Avion newspaper's latest issue, that can be found on campus or at theavion.com. Mr. Neiberlien's contact information is provided below.



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