



## Agency Priority Goal Action Plan

# Enhance Commercial Space Innovation

### Goal Leaders:

Teri L. Bristol, Chief Operating Officer, Air Traffic Organization (FAA)

Wayne Monteith, Associate Administrator for Commercial Space Transportation (FAA)

### Deputy Goal Leader:

Mike Artist, Vice President, Air Traffic System Operations (FAA)

# Overview

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## Goal Statement

Develop and implement Time-Based Launch/Reentry Procedures (TBLP) and Dynamic Launch/Reentry Windows (DLRW) for integrating Cape Canaveral Air Force Station/Kennedy Space Center (CCAFS/KSC) launch complex commercial space launch and reentry operations into the National Airspace System (NAS).

By September 30, 2021, the Federal Aviation Administration (FAA) will develop and implement TBLP/DLRW procedures at two additional U.S. launch/reentry sites, further integrating commercial space launches and reentries into the NAS, using lessons learned in FY 2020 CCAFS/KSC pilot project.

## Challenges

- The Commercial Space industry is experiencing rapid growth and innovation, challenging established launch and reentry mission norms. The FAA's Air Traffic Organization (ATO) is developing flexible procedures and capabilities with the ability to respond to the changing needs of the launch and reentry operator (LRO) community.
- Launch and reentry operations in the NAS have historically operated out of Federal Ranges and were managed by the Department of Defense (DoD) and/or the National Aeronautics and Space Administration (NASA), in support of DoD and civil government missions. The airspace required for these missions was also predominately managed by DoD and NASA. This airspace management structure led to a model in which launches and reentries were largely segregated from other NAS stakeholders, leading to inefficiencies and delays for the aviation community.
- With the advent of commercial launch and reentry operations, there is increased emphasis on the efficiency of these launch and reentry operations. Work with Federal Ranges, FAA Air Traffic facilities, and LROs has led to the concept development of TBLP/DLRW as a method to increase efficiency and reduce delays associated with launch and reentry operations.
- Due to the volume of activity operating from the CCAFS/KSC launch complex, the volume of air traffic along the east coast of the United States, and the complexity of air traffic operations near CCAFS/KSC, more than ninety percent of the aircraft operations directly affected by launch airspace

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closures are related to CCAFS/KSC operations (Figure 1). The increase in launch operations efficiency decreases the time that airspace is restricted, thus minimizing the negative effects on air operations.

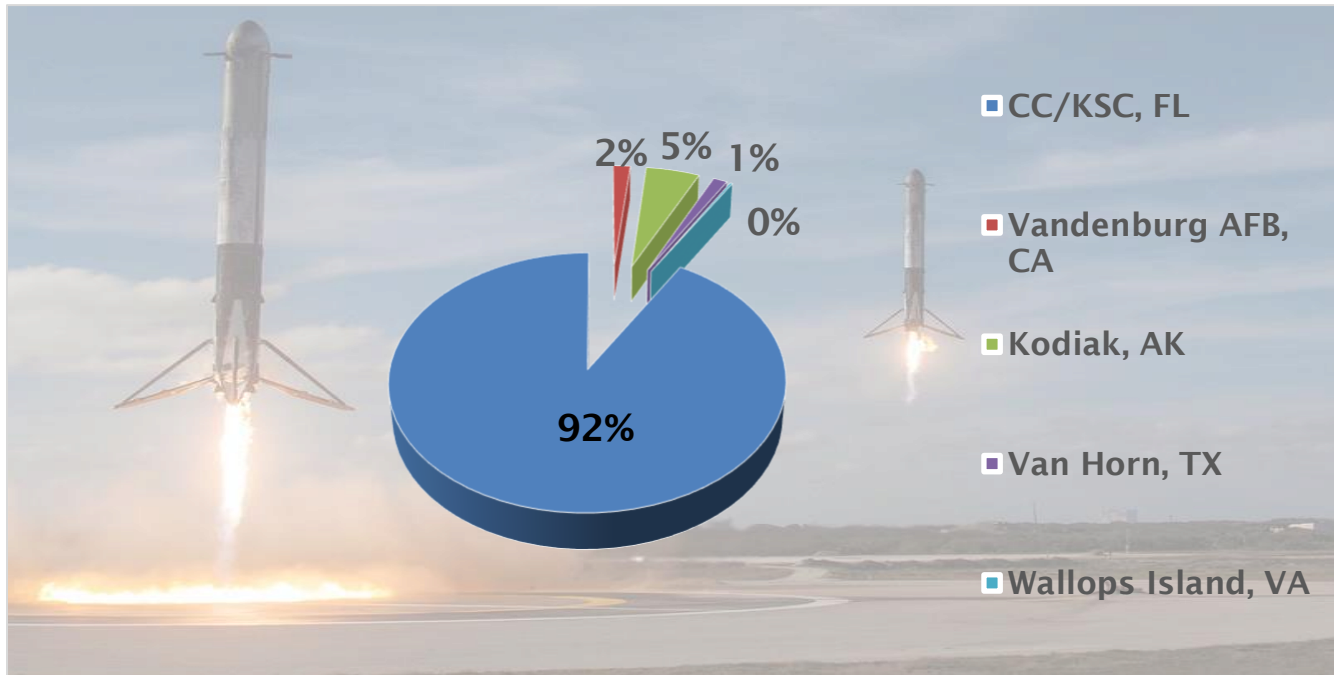


Figure 1: 2018 Launch Effects by Launch Site

- The DoD has determined that assured access to space is vital across the full range of military operations to maintain a competitive advantage in the critical war fighting domain associated with space. DoD has a stated need for rapid and flexible access to space in support of national defense.

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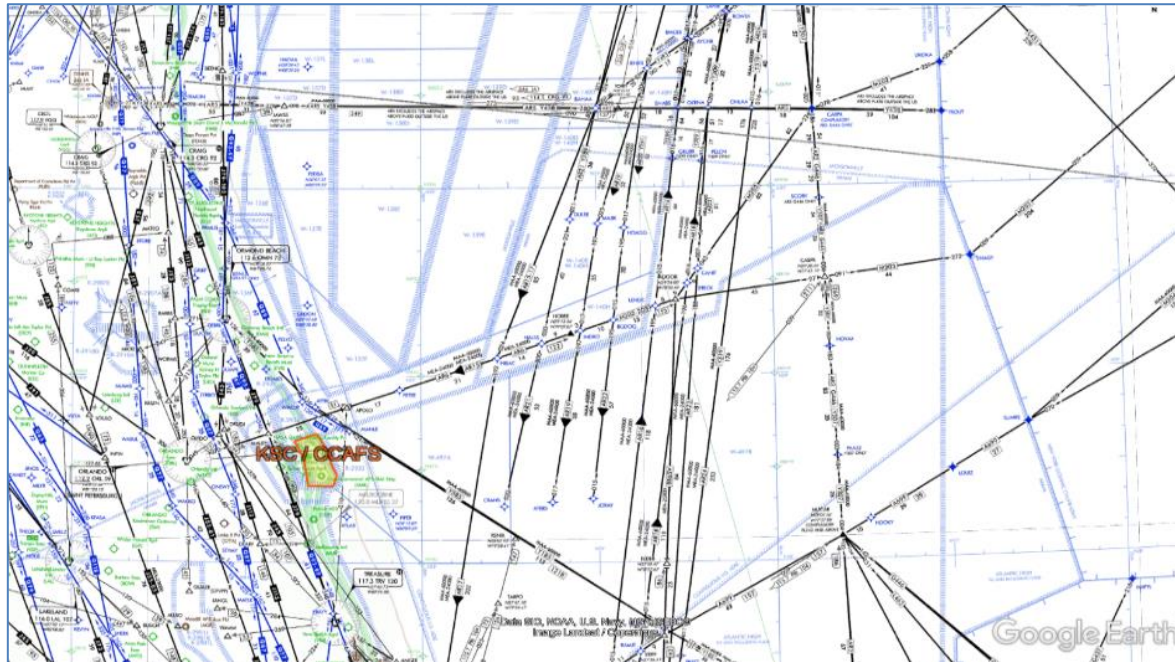


Figure 2: Depiction of the Airspace and Airways near CCAFS/KSC

*During a launch or reentry, efficiency and delays occur when flights that usually use the airways over the ocean (right) are rerouted or delayed. Under TBLP/DLRW, efficiency is increased and delays are reduced by limiting the time during which a flight cannot use the airways over the ocean.*

## Opportunities

- TBLP/DLRW will ensure efficient access to the NAS for commercial LROs. Such efficient access will help support the economic development of commercial space operators—a key business sector—while minimizing the negative effects on the aviation community. Work with TBLP/DLRW will help evolve NAS integration of launch and reentry operations and will contribute to faster and more flexible access to space for all stakeholders, advancing national defense initiatives.

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- Commercial and General Aviation constituents of the NAS both benefit from the increase in space launch operations. Both segments will experience a decrease in the disruption of normal air access and routing, allowing them to save time and money traditionally lost during long-duration space launch limitations to NAS access.

# Leadership & Implementation Team

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**Teri Bristol**  
Chief Operating Officer



**Tim Arel**  
Deputy Chief Operating Officer

## Service Units



**Glen A. Martin**  
Vice President  
Safety & Technical  
Training



**Jeff Planty**  
Vice President  
Technical Operations



**Mike Artist**  
Vice President  
System Operations  
Services



**Angela McCullough**  
Vice President  
Mission Support Services



**Jeffrey Vincent**  
Vice President  
Air Traffic Services



**Jeff Yamell**  
(A) Vice President  
Management Services



**Kristen Burnham**  
Vice President  
Program Management  
Organization



**David Boulter**  
Vice President  
Flight Program  
Operations

# Goal Structure & Strategies

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**Impact Statement:** Integrating Space Launches into NAS by Using TBLP/DLRW to improve NAS efficiency.

**Performance Metric:** Develop and implement new time-based procedures for integrating CCAFS/KSC launch complex commercial space launches and reentry operations into the NAS.

**Target 1:** Develop TBLP to more efficiently manage air traffic affected by and in the vicinity of launch/reentry activity. Due Q3 2020.

**Target 2:** Develop DLRW, based on launch/reentry operator triggers, to gain additional efficiency and supported by TBLP. Due Q4 2020.

- This is a new APG and both targets are establishing a baseline. FY 2021 and subsequent year targets will be developed and based on the results of these FY 2020 targets

Using existing Traffic Flow Management System (TFMS) capabilities in combination with available safety information, airspace efficiency improvements are possible. By identifying and routing only the aircraft directly affected by the Aircraft Hazard Area (AHA) while it is active, the number of aircraft affected and the NAS delay can both be reduced. Efficiency gains are derived from procedural and process changes that move from permission-based airspace management to time-based airspace management. Specifically, Flow Constrained Area (FCA)-based reroutes avoid the use of permission-based airspace management by using time-based airspace management.

Further efficiencies may be achieved through the introduction of DLRW, which rely on launch/reentry operators providing timely information on triggers within their launch and reentry sequences to facilitate the adjustment of TBLP.

FAA's Air Traffic Control System Command Center (ATCSCC) Space Operations Office will be the lead organization for TBLP/DLRW implementation. Operational components of the implementation will be managed during real-time operations from the Challenger Space Operations room at the ATCSCC. The Space Operations Office has real-time capability to communicate with all affected FAA Air Traffic facilities, FAA's Office of Commercial Space Transportation, LROs, and involved range facilities.

# Summary of Progress – FY 20 Q1-Q2

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## Time-Based Launch/Reentry Procedures

Procedures and processes for the implementation of TBLP at CCAFS/KSC have been developed. A key component of the implementation of TBLP/DLRW is the establishment of launch hotlines. Hotlines allow for the exchange of real-time information between FAA Air Traffic facilities, launch and reentry operators, and range operators. Mission hotlines were recently established and are in use during CCAFS/KSC operations. To meet the goal of developing Time-Based Launch/Reentry Procedures, FAA completed the following milestones in conjunction with its partners:

- Completed and distributed the TBLP briefing video for Air Traffic Controllers and dispatchers.
- Briefed the New York Air Route Traffic Control Center (ARTCC).
- Began training New York Air Traffic Controllers on Flow Controlled Area (FCA) rerouting.
- Conducted aviation industry briefings, including Airline operations executives (VP+1), Collaborative Decision Making (CDM) Spring Session, National Customer Forum, Air Traffic Control Association (ATCA) Annual Conference, New York Delay Initiative Meeting, and Airlines for America (A4A) Executive group.
- Completed FAA facility briefings to Washington, Jacksonville, and Miami ARTCCs.
- Completed briefing to the Air Force Space Command, 45th Space Wing.
- Developed preliminary metrics for determining airspace impacts for launch activity from KSC/CCASF, based on historical data derived from the previous five years of launch activity. FAA will monitor metrics during upcoming launches to further refine and validate them.



# Summary of Progress – FY 20 Q1-Q2

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## Develop Dynamic Launch/Reentry Windows

To meet the goal of developing Dynamic Launch/Reentry Windows, FAA completed the following milestones with FAA and partners:

- Conducted an industry forum for input on Dynamic Launch/Reentry concept development.
  - Funded a work effort through the MITRE Corporation for the development of DLRW.
- Conducted industry engagement interviews with nine launch/reentry operators and range operators to determine triggers within launch and reentry mission timelines that can be used to dynamically manage the airspace.

## 2018 Launch Effects by Launch Site

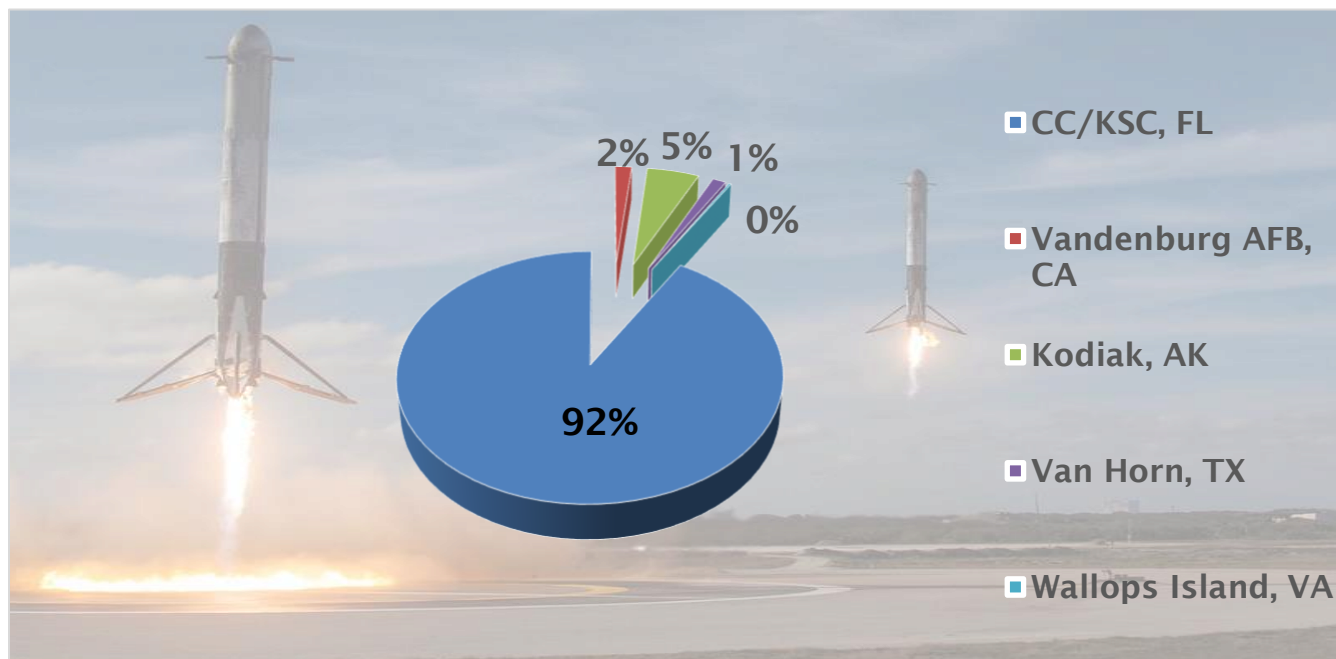


Figure 3: 2018 Launch Effects by Launch Site

# Key Milestones

Milestone Summary					
Milestone	Deadline	Status	Change from Previous Quarter	Owner	Notes
Complete and distribute the TBLP briefing video to Air Traffic Controllers and dispatchers.	FY 2020 Q1	Completed	Not applicable	FAA's ATCSCC	Add the course to FAA's Electronic Learning Management System (eLMS): TBLP Video Briefing Item # FAA65000988.  Video was also posted to the Collaborative Decision Making (CDM) Training site for industry use.
Brief the New York Air Route Traffic Control Center (ARTCC).	FY 2020 Q1	Completed	Not applicable	FAA's ATCSCC	New York ARTCC briefed 9/25/2019.
Start to train New York Air Traffic Controllers on the Flow Controlled Area (FCA) rerouting.	FY 2020 Q1	Completed	Not applicable	FAA's ATCSCC	Training kickoff was 9/25/2019. Additional training was conducted week of Jan 20, 2020.
Develop preliminary metrics to demonstrate effectiveness of TBLP.	FY 2020 Q2	Completed	Not applicable	FAA's ATCSCC	Developed preliminary metrics to determine the measure the effectiveness of TBLP. Will track and evaluate the metrics during the next year.

# Key Milestones

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Milestone	Deadline	Status	Change from Previous Quarter	Owner	Notes
Develop FAA briefing and coordination schedule for DLRW.	FY 2020 Q3	In process	Not applicable	FAA's ATCSCC	On target. Completed Wallops Flight Facility site visit to introduce TBLP/DLRW efforts.
Develop industry briefings and coordination schedule for DLRW.	FY 2020 Q4	In process	Not applicable	FAA's ATCSCC	Ongoing effort. Spirit Airlines briefed Nov. 14, 2019; Delta Air Lines briefed Jan. 15, 2020; JetBlue Airline briefed Jan 16, 2020; American Airlines briefed Jan 22, 2020; Southwest Airlines briefed Feb 6, 2020; United Airlines briefing is to be determined.
Replicate procedures at two additional launch and reentry sites around the United States.	FY 2021 Q4	In process	Not applicable	FAA's ATCSCC	On target.

# Key Indicators

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In Q2, FAA developed preliminary metrics to demonstrate the effectiveness of TBLP (see Table 1 on pg. 10). Launch effects have traditionally been measured by determining the number of aircraft directly affected by the launch hazard area. While this is an important metric, it does not fully account for launch effects, nor does it effectively account for impacts on NAS. Additional measures are being developed that will indicate the total time that the airspace and near CCAFS/KSC are affected.

In Q1, FAA worked to establish baseline information from past launch activity at CCAFS/KSC that will capture these airspace and route impacts. These data will form the baseline used to measure future launch effects and change resulting from TBLP. This should be accomplished during the current APG cycle.

# Data Accuracy & Reliability

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- FAA's ATCSCC Space Operations Office routinely collects data on launch and reentry operations through available data, operational records, logs, and observations by the Space Operations office.
- TBLP/DLRW will be implemented once procedures and coordination for their use have been developed, outreach to affected stakeholders has been completed, and an operational demonstration of their use has been completed.
- FAA's ATCSCC Space Operations office will continue to work to ensure that commercial space launch/reentry operations are safely and efficiently integrated into the NAS. Opportunities to execute TBLPs and utilize DLRW continues to be a priority goal.

# Additional Information

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## **Stakeholder and Congressional Consultations**

Partners in this effort include Airlines for America, International Air Transport Association, National Business Aviation Association, Department of Defense, NASA, SpaceX, Blue Origin, Sierra Nevada, Boeing, Northrup Grumman, Virgin Galactic, Virgin Orbit, Pacific Spaceport Complex Alaska, Mohave Air and Space Port, Spaceport America, and other commercial launch operators.

Meetings were held with Jacksonville, Miami, Washington, and New York ARTCCs. The National Air Traffic Controllers Association (NATCA) was consulted in TBLP/DLRW concept development and implementation.