



Agency Priority Goal Action Plan

Enhance Commercial Space Innovation

Goal Leaders:

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Overview

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, 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 from the FY 2020 CCAFS/KSC pilot project.

Challenges

- The Commercial Space industry is experiencing rapid growth and innovation, challenging established launch and reentry mission norms. FAA's Air Traffic Organization 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 in 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 for increasing efficiency and reducing delays associated with launch and reentry operations.

Overview

- 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 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.
- 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.

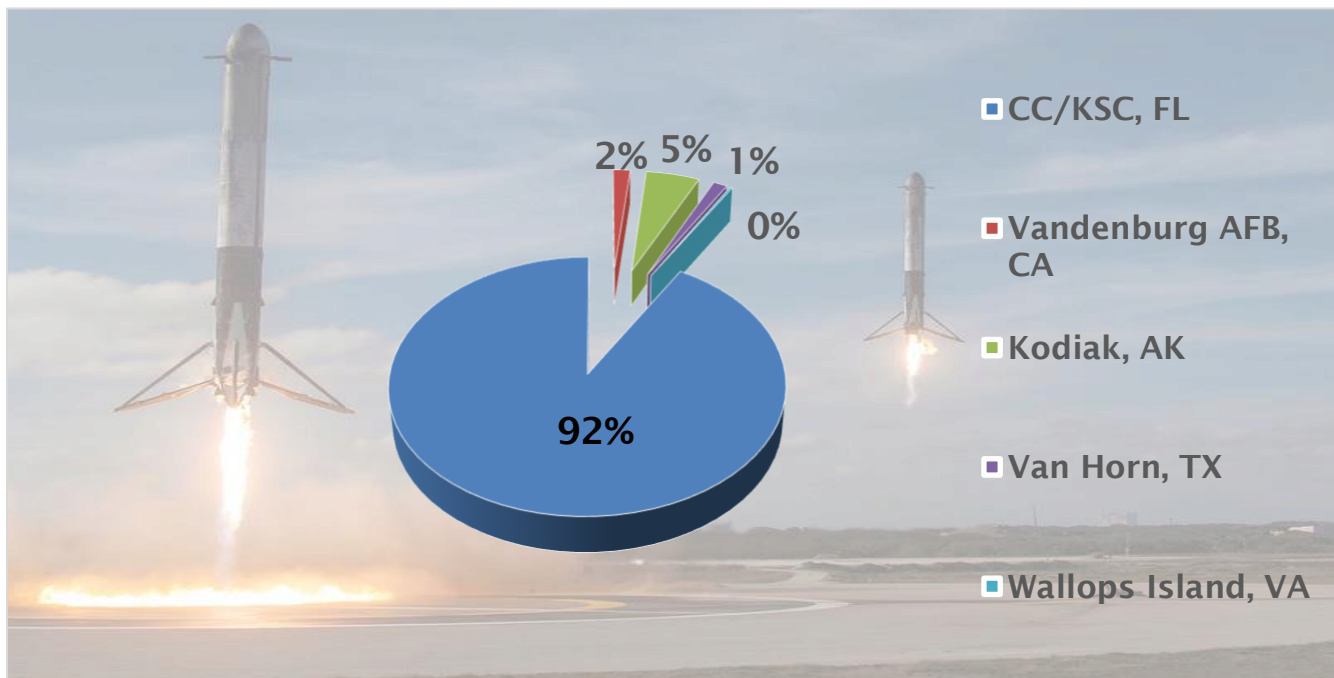


Figure 1: 2018 Launch Effects by Launch Site

Overview

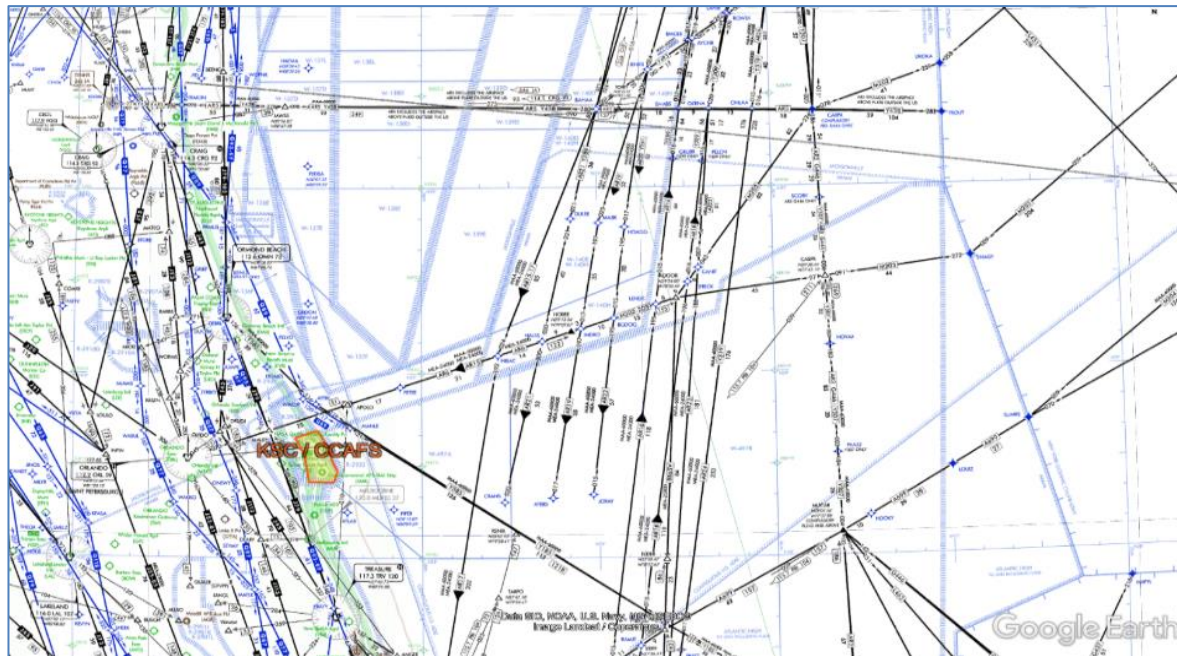


Figure 2: Depiction of the Airspace and Airways near CCAFS/KSC

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.

Overview

Opportunities

- TBLP/DLRW will ensure efficient access to the NAS for commercial LROs, which will 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.
- 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



Service Units



Goal Structure & Strategies

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.

Target 3: 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. Due Q4 2021.

Airspace efficiency improvements are possible using existing Traffic Flow Management System capabilities in combination with available safety information. By identifying and routing only the aircraft directly affected by the Aircraft Hazard Area 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 LROs 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 2020 Q1-Q4

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, which allow for the exchange of real-time information between FAA Air Traffic facilities, LROs, and range operators. Mission hotlines were recently established and are in use during CCAFS/KSC operations. In June 2020, FAA completed development of TBLP to more efficiently manage air traffic affected by and in the vicinity of launch/reentry activity by completing 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 FCA rerouting;
- Conducted aviation industry briefings, including Airline operations executives, Collaborative Decision Making (CDM) Spring Session, National Customer Forum, Air Traffic Control Association Annual Conference, New York Delay Initiative Meeting, and Airlines for America Executive group.
- Completed FAA facility briefings to Washington, Jacksonville, and Miami ARTCCs;
- Completed a briefing to the Air Force Space Command, 45th Space Wing;
- Developed preliminary metrics for determining airspace impacts for launch activity from CCAFS/KSC, 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;
- Provided training materials via the CDM website. The CDM is a joint FAA/industry team whose charter is to address long-term (12-24 months) integration of CDM/ Traffic Flow Management capabilities and applying them to an operational environment; and
- Refined and developed TBLP.

Summary of Progress – FY 2020 Q1-Q4

Develop Dynamic Launch/Reentry Windows

To meet the goal of developing DLRW, FAA completed the following milestones in conjunction with its partners:

- Conducted an industry forum for input on DLRW 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;
- Began developing preliminary metrics for DLRW to measure the amount of time saved in launch and reentry airspace due to DLRW. FAA will monitor metrics during upcoming launches to further refine and validate them; and
- Completed multiple beta tests with SpaceX at Cape Canaveral Space Force Station in Florida in September 2020.

Summary of Progress – FY 2020 Q1-Q4

2018 Launch Effects by Launch Site

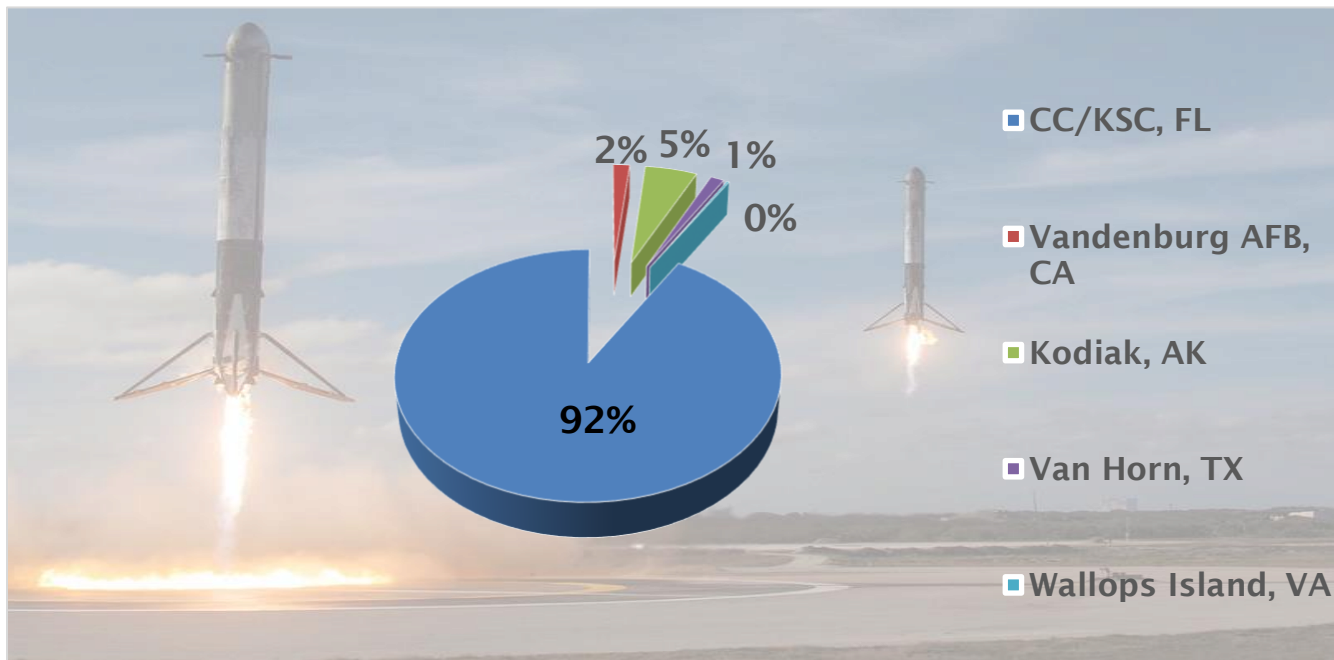


Figure 3: 2018 Launch Effects by Launch Site

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	Complete	Not Applicable	FAA's ATCSCC	Added the course to FAA's Electronic Learning Management System: TBLP Video Briefing Item # FAA65000988. Video was also posted to the CDM Training site for industry use.
Brief the New York ARTCC	FY 2020 Q1	Complete	Not Applicable	FAA's ATCSCC	New York ARTCC briefed 9/25/2019.
Begin training New York Air Traffic Controllers on the FCA rerouting	FY 2020 Q1	Complete	Not Applicable	FAA's ATCSCC	Completed training of the New York Air Traffic Controllers in January 2020.
Milestone	Deadline	Status	Change from Previous Quarter	Owner	Notes
Develop preliminary metrics to demonstrate effectiveness of TBLP	FY 2020 Q2	Complete	Not Applicable	FAA's ATCSCC	Developed preliminary metrics to measure the effectiveness of TBLP. Will track and evaluate the metrics during the next year ¹ .

¹ FAA anticipates making these metrics publicly available in 4th quarter of 2021.

Key Milestones

Develop FAA briefing and coordination schedule for DLRW	FY 2020 Q3	Complete	Not Applicable	FAA's ATCSCC	Developed initial briefing and schedule with Air Traffic Control System Command Center and ARTCCs in Miami and Jacksonville.
Develop preliminary metrics to demonstrate effectiveness of DLRW	FY 2020 Q3	Complete	Not Applicable	FAA's ATCSCC	Developed preliminary metrics to measure the total time Atlantic Routes are closed.
Milestone	Deadline	Status	Change from Previous Quarter	Owner	Notes
Develop industry briefings and coordination schedule for DLRW	FY 2020 Q4	Complete	Complete	FAA's ATCSCC	<p>Developed industry briefings and provided to partners below:</p> <ul style="list-style-type: none"> • Spirit Airlines briefed 11/14/19 • Delta Air Lines briefed 1/15/20 • JetBlue Airline briefed 1/16/20 • American Airlines briefed 1/22/20 • Southwest Airlines briefed 2/6/20 <p>The United Airlines original briefing was cancelled due to the airline's COVID-19 restrictions. FAA is working with</p>

Key Milestones

					United to provide a briefing when their personnel can be made available. To ensure training during COVID-19, FAA provided training materials via the CDM website. The CDM is a joint FAA/industry team whose charter is to address long-term (12-24 months) integration of CDM/Traffic Flow Management capabilities and apply them to an operational environment. FAA is ready to provide that additional training when industry is available.
Develop procedures with Air Traffic facilities and launch and reentry operators	FY 2021 Q3	In Progress	In Progress	FAA's ATCSCC	FAA is developing Letters of Agreement.
Identify two additional launch and reentry sites that will be used to replicate DLRW procedures	FY 2021 Q1	Complete	Complete	FAA's ATCSCC	Identified the following two sites; <ul style="list-style-type: none"> • SpaceX Boca Chica, TX Private Launch Site • Blue Origin Van Horn, TX Private Launch Site

Key Indicators

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.

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 Q3, FAA began developing preliminary metrics for DLRW to measure the time amount of time saved in launch and reentry airspace due to DLRW. FAA will monitor metrics during upcoming launches to further refine and validate them.

In Q4, FAA continued to monitor draft metrics by further refining and validating them.

Data Accuracy & Reliability

- 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

Stakeholder and Congressional Consultations

Partners in this effort include Airlines for America, International Air Transport Association, National Business Aviation Association, DoD, 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 was consulted in TBLP/DLRW concept development and implementation.