NAS Integration of Transiting Operations (NITRO)

Informational Update

Presented to: REDAC/ NAS Operations Subcommittee
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NAS Users and Operations are Changing

Increasing diverse users and vehicles operations, with varying demand, and rapid pace of innovation and technology changes
NAS Integration of Transiting Operations (NITRO)

Enable the integration of diverse users and operations transiting the NAS to operate at and recover from Upper Class E/Higher airspace, and vehicles operating at higher altitudes including the upper limits of Class A airspace

- Align FAA strategic initiatives
- Identify operational service gaps and needs
- Forecast the timeline to adapt to future demands
- Establish Path forward to ensure successful operational transition/integration and capitalize on new opportunities

Stakeholders Collaborative Sessions

- Held January – June 2021
- Improve Collective Understanding of Upper Airspace & Space operational decisions and actions through scenario activity
- Reconcile and Align Priorities, Objectives, and Outcomes
NITRO ATO Vision and Priorities

**ATO NITRO Vision:** Safely integrate Upper Airspace and Space Launch/Reentry vehicle operations into the NAS, while synchronizing and accelerating efforts for the ATO, to support a more dynamic air traffic operation.

**Priority 1**
Enable safe and efficient growth for Space L/R operations that optimizes operations for all NAS users

- Increasing Demand
- Evolving data sharing, automation, capabilities and procedures

**Priority 2**
Increase access for operations transiting to and from Upper E/Higher Airspace

- Emerging Demand
- Initial exploration of needed services and policies

**Priority 3**
Optimize routine services in Upper E/Higher Airspace operations

*Data Sharing ➔ Procedures ➔ Capabilities*
Innovative business models with new operations (e.g., commercial winged reentries, sub-orbital, vertical and horizontal launches, reusable rockets, captive carry) operating at new locations

Reusability (e.g., Boosters, Payload Fairings, Engines)
- Driving down cost of launch services due to technology advances such as reusable rocket boosters and capsules
- Reusability may require more airspace reservations to recover assets

New Locations
- Inland operations including sub-orbital services such as Virgin Galactic captive-carry launch and Blue Origin New Shepard vertical launch. Boeing CST-100 capsule orbital reentries represent a shift from capsule recoveries at sea
- Boca Chica, TX for SpaceX Starship
- Virgin Orbit for airborne captive carry launches departing from Mojave, California and launching satellites over the Pacific Ocean

Advent of Space Tourism
- Getting closer to providing services for hire, and building multiple vehicles
  - Virgin Galactic (tourist flights beginning in early 2022)
  - Blue Origin (1st crewed flight launched 7/20/2021, 8 tourist flights/year starting in 2023)

DoD demand for rapid launch/satellite replenishment
## ATO Priority 1 Summary

**Enable safe and efficient growth for Space L/R**

### Enhance Safety by Improving Situational Awareness (SA) for Launch/Reentry Nominal and Off-Nominal Operations

<table>
<thead>
<tr>
<th>0-3-year – 2024</th>
<th>5-year – 2026</th>
<th>7-year – 2028</th>
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</thead>
<tbody>
<tr>
<td>Consistent Practices, Streamlined Planning &amp; Execution</td>
<td>Capability Supported Situational Awareness for Rapid Response</td>
<td>Integrated Capabilities for Improved Conflict Resolution</td>
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### Establish Data Requirements and Implement Internal/External Data Sharing Mechanisms to Support Data-Driven Decisions

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<tr>
<td>Leverage Existing Data Mechanism and Processes</td>
<td>Data Sharing Procedures Tailored to Operator &amp; Operation</td>
<td>Information Infrastructure Meets Evolving Data Exchange Needs</td>
</tr>
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### Develop Procedures and Deconfliction Methods for Diverse Vehicles and Operations

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<td>Modified Procedures to Manage Segregated Airspace</td>
<td>Support More Dynamic Airspace Use (National &amp; International)</td>
<td>Integrated Automation for Improved NAS Safety and Efficiency</td>
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• Promising business outlook in next 5-10 years,
  • Supersonic Transport – NPRM to allow domestic test. Routine oceanic operations expected beyond 2030
  • Unmanned Aircraft – alternatives to 91.113 for operations beyond visual line of sight
  • Unmanned Airships – policy clarifications needed on vehicle type

• Unclear regulatory and business outlook,
  • Hybrid Vehicles – unclear regulatory path, components belong to multiple vehicle types

✓ ANG Developed initial ConOps version to document development to date
  • Finalized May 2020

• NASA/FAA/Industry RTT Established to further mature ConOps – March 2021
ATO Priority 2 Summary

Increase Access Transiting to Upper Class E

0-3-year – 2024

- Identify Policy Barriers and Mitigations to Safely Improve Access
- Prepare ATO Workforce for Future Operations
- Collaborate with Industry on Future Concepts to Reduce Impact on All NAS Users
- Automation for the Safe Management of Vertically Transiting Operations

- Policies for Improved Access and Standardized Practices for Users
- Standard Operating Practices and ATO Workforce Needs Identified
- Optimize Users Access Needs Given System Constraints
- Leverage Existing Capabilities to Achieve Increased Airspace Access

5-year – 2026

- Regulate Changes to Accelerate and Expanded Access
- Procedures Tailored to Vehicle Type
- Operator Mission Planning Guidelines Consider NAS Impact
- Capabilities Improve Mission Planning

7-year – 2028

- Established Policies for Regular Access as Industry Evolves
- Flexible Procedures Applied to Novel Vehicles
- Community-Based Performance Metrics are Routinely Applied
- Decision Support Tailored to Vehicle Types to Support Increased Traffic Density

WORK IN PROGRESS
- Determine safety requirements and risk-based conflict management procedures based on Target Level of Safety
- Implement policy changes and procedures to support this diverse industry
- Establish strategic partnerships and international collaboration to support data-driven solutions
- Implement decision support to enable interoperability among traffic management environments (ATM, ETM, xTM)

**Upper E Market Growing Fast**

- Security & Science
- Communications
- Persistent Monitoring
- Supersonic Transport
- Commercial Space Launch
- Hypersonic
Enable Airspace Access Based on Air Traffic Management Procedures Using TLS

Implement Policy Changes and Procedures to Support Diverse Operations

Establish Strategic Partnership with Industry to Support Data-Driven Decisions

Implement Decision Support Allowing Strategic and Tactical Interoperability

Leverage Existing Capabilities to Support Operations in Upper E/Higher Airspace

Evolve Strategic Deconfliction Procedures

Enable Cooperative Deconfliction Management Services

Collaborate with Internal/External Stakeholders to Solidify the Operational Concept

FAA and User CNS/Information Requirements are Defined

Establish Foundation for Cooperative ETM Environment

Provide Initial Framework for Operators Strategic Planning

Metrics for Enabling Upper Class E/Higher Airspace Operations

Initial Infrastructure to Support Information Sharing and Negotiation

Establish Roles & Responsibilities of Operators and FAA

Automation for Expedited Sharing of Status Information

Initial Automation for Decision Support

Optimize routine services in Upper Class E

0-3-year – 2024

5-year – 2026

7-year – 2028

WORK IN PROGRESS
Priority Area Challenges and Opportunities

- **Challenges:**
  - Operations forecasts variability in all Priority areas
  - Operations transiting through and operating in Upper Class E/Higher airspace — broad range of operating profiles, performance characteristics, and vehicle types

- **Opportunities**
  - Engage APO to further clarify industry forecasts and evolve strategic planning
  - Engage established mechanisms to understand and consider Industry feedback/recommendations
  - Explore partnerships and third-party service suppliers
Next Steps

• September 2021: Executive coordination and release the version 1.0 of the NITRO ATO Corporate Plan