MissionSupport

NAS Integration of Transiting Operations (NITRO)

Informational Update

Presented to: REDAC/ NAS Operations Subcommittee

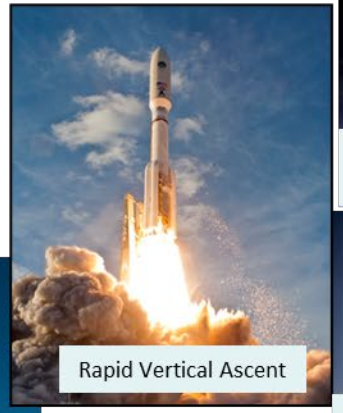
By: Guillermo Sotelo, ATO Strategy, AJV-S11

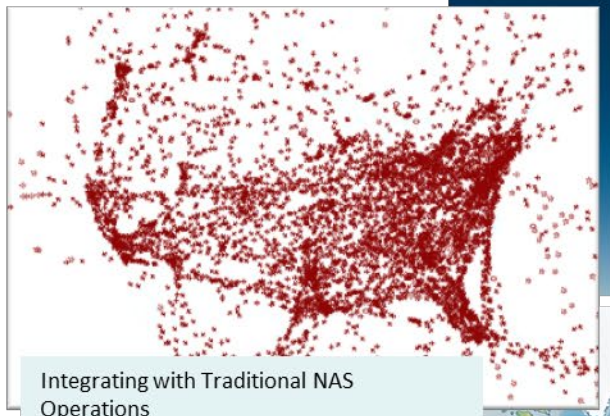
Date: August 31, 2021

Federal Aviation Administration

NAS Users and Operations are Changing

Increasing diverse users and vehicles operations, with varying demand, and rapid pace of innovation and technology changes

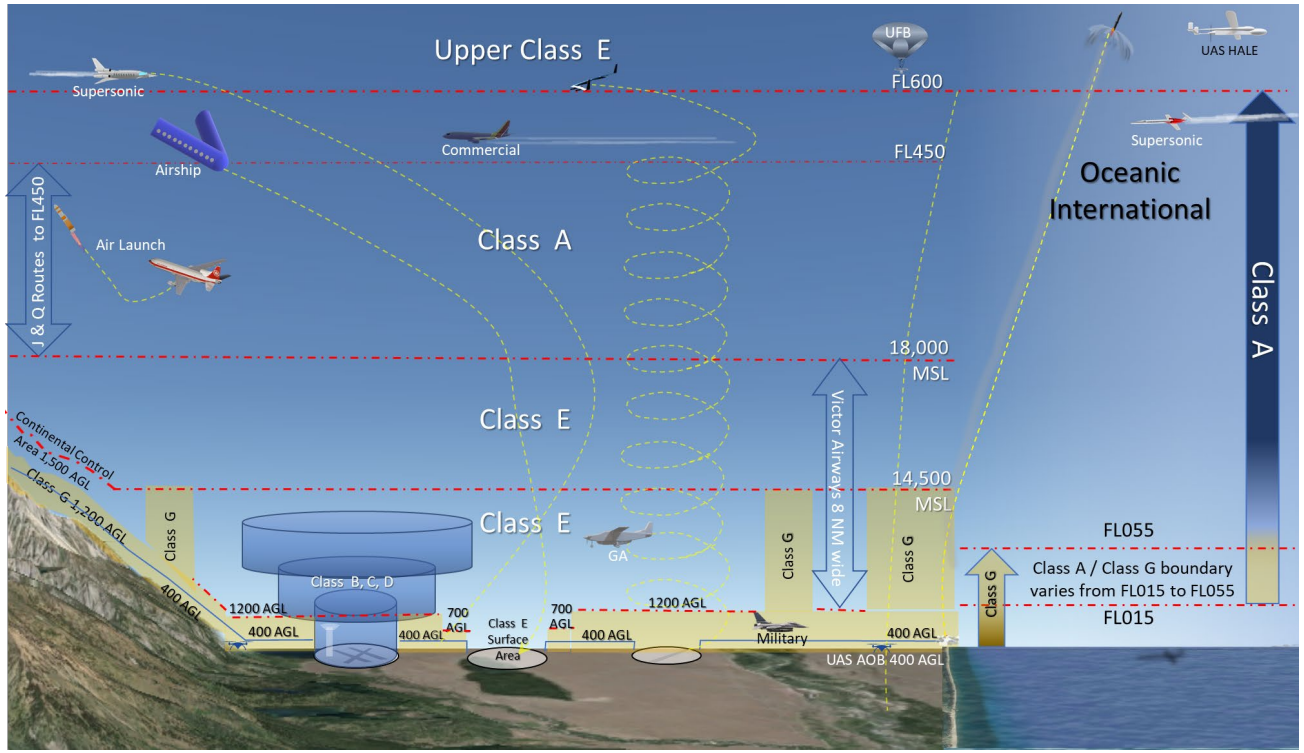




MissionSupport

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



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

- 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

MissionSupport

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	*Priority 2*	*Priority 3*
Enable safe and efficient growth for Space L/R operations that optimizes operations for all NAS users	**Increase access for operations transiting to and from Upper E/ Higher Airspace**	**Optimize routine services in Upper E/ Higher Airspace operations**
• Increasing Demand • Evolving data sharing, automation, capabilities and procedures	• Emerging Demand • Initial exploration of needed services and policies	

Data Sharing → Procedures → Capabilities

ATO Priority 1
Enable safe and efficient growth for Space L/R

Forecasting Operations
Qualitative Forecast - Drivers

- 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

	0-3-year – 2024	5-year – 2026	7-year – 2028
Enhance Safety by Improving Situational Awareness (SA) for Launch/Reentry Nominal and Off-Nominal Operations	Consistent Practices, Streamlined Planning & Execution	Capability Supported Situational Awareness for Rapid Response	Integrated Capabilities for Improved Conflict Resolution
Establish Data Requirements and Implement Internal/External Data Sharing Mechanisms to Support Data-Driven Decisions	Leverage Existing Data Mechanism and Processes	Data Sharing Procedures Tailored to Operator & Operation	Information Infrastructure Meets Evolving Data Exchange Needs
Develop Procedures and Deconfliction Methods for Diverse Vehicles and Operations	Modified Procedures to Manage Segregated Airspace	Support More Dynamic Airspace Use (National & International)	Integrated Automation for Improved NAS Safety and Efficiency

WORK IN PROGRESS

ATO Priority 2
Increase Access transiting to Upper Class E

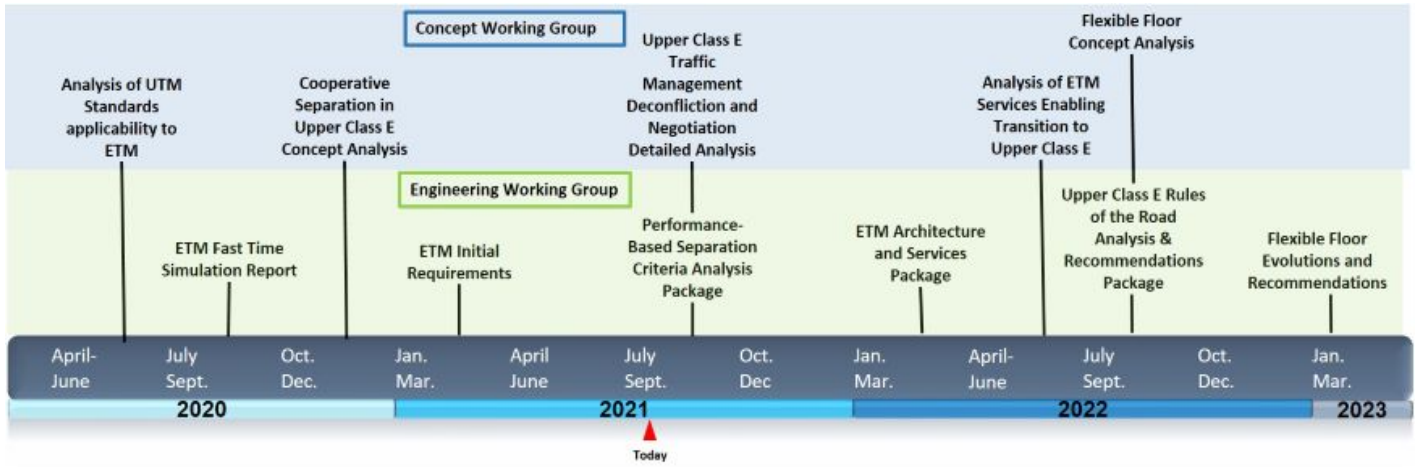
Unlocking Demand – Addressing Regulatory Barriers

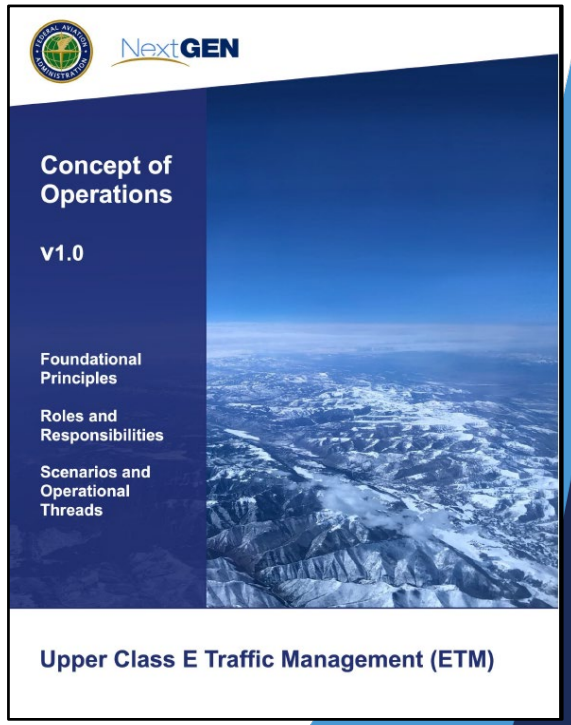
- Promising business outlook in next 5-10 years,
  - Supersonic Transport – NPRM to allow domestic test. Routine oceanic operations expected beyond 2030
  - Unmanned Aircraft – alternatives to 91.113 for operations beyond visual line of sight
  - Unmanned Airships – policy clarifications needed on vehicle 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





MissionSupport

7

ATO Priority 2 Summary

Increase Access Transiting to Upper Class E

	0-3-year – 2024	5-year – 2026	7-year – 2028
Identify Policy Barriers and Mitigations to Safely Improve Access	Policies for Improved Access and Standardized Practices for Users	Regulatory Changes to Accelerate and Expanded Access	Established Polices for Regular Access as Industry Evolves
Prepare ATO Workforce for Future Operations	Standard Operating Practices and ATO Workforce Needs Identified	Procedures Tailored to Vehicle Type	Flexible Procedures Applied to Novel Vehicles
Collaborate with Industry on Future Concepts to Reduce Impact on All NAS Users	Optimize Users Access Needs Given System Constraints	Operator Mission Planning Guidelines Consider NAS Impact	Community-Based Performance Metrics are Routinely Applied
Automation for the Safe Management of Vertically Transiting Operations	Leverage Existing Capabilities to Achieve Increased Airspace Access	Capabilities Improve Mission Planning	Decision Support Tailored to Vehicle Types to Support Increased Traffic Density

WORK IN PROGRESS

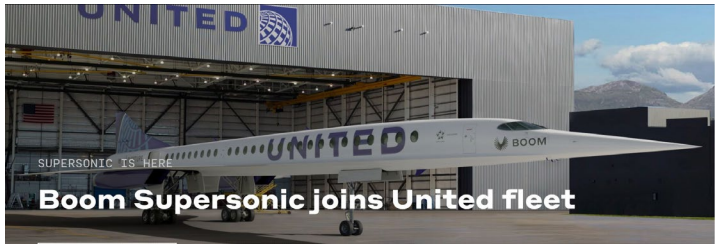
MissionSupport

ATO Priority 3

Optimize routine services in Upper Class E

Upper E Market Growing Fast

- 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)



Security & Science

Communications

Persistent Monitoring

Supersonic Transport

Commercial Space Launch

Hypersonic

ATO Priority 3 Summary

Optimize routine services in Upper Class E

	0-3-year – 2024	5-year – 2026	7-year – 2028
Enable Airspace Access Based on Air Traffic Management Procedures Using TLS	Leverage Existing Capabilities to Support Operations in Upper E/ Higher Airspace	Evolve Strategic Deconfliction Procedures	Enable Cooperative Deconfliction Management Services
Implement Policy Changes and Procedures to Support Diverse Operations	Collaborate with Internal/ External Stakeholders to Solidify the Operational Concept	FAA and User CNS/Information Requirements are Defined	Establish Foundation for Cooperative ETM Environment
Establish Strategic Partnership with Industry to Support Data-Driven Decisions	Provide Initial Framework for Operators Strategic Planning	Metrics for Enabling Upper Class E/Higher Airspace Operations	Initial Infrastructure to Support Information Sharing and Negotiation
Implement Decision Support Allowing Strategic and Tactical Interoperability	Establish Roles & Responsibilities of Operators and FAA	Automation for Expedited Sharing of Status Information	Initial Automation for Decision Support

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