Upper Class E Traffic Management (ETM)  
Future Operational Environment above FL600

• New types of operations
  – Hypersonic flight, reintroduction of supersonic passenger flights, and very slow or on-station long endurance flights

• ATM scalability
  – Current manner of ATM service delivery cannot cost-effectively scale to meet the needs of the envisioned ETM environment
  – Current ATM services may not be desired in the ETM environment

• Solutions are needed that
  – Scale beyond current ATM infrastructure and manpower resources
  – Promote shared situation awareness among Operators
  – Include Cooperative Separation and Provided Separation by ATC (where required)
Upper Class E Traffic Management (ETM)  
Cooperative Separation Development

- ETM concept development requires FAA, NASA, industry, State agency, and stakeholder collaboration to evolve the current service mechanisms and realize solutions.

- NASA hosted two ETM Tabletops with FAA, industry, and government stakeholder Space Act partners to inform concept development.
  - Tabletop #1 (April 2019) focused on understanding planned operations above FL600 and began discussions around a concept of operations for ETM:
    - Established ETM foundational principles and assumptions for the cooperative environment.
    - Established clear ETM development responsibilities for Industry, FAA, and NASA.
  - Tabletop #2 (Dec 2019) explored ETM concept considerations associated with ATC/ETM interactions:
    - Identified operational issues/considerations and data impacts associated with operations transitioning to/from ETM environment, operations that occur both above and below FL600, contingency operations, and other topics that impact air traffic control operations.
    - Informed FAA ETM Concept of Operations document development.
    - Informed engineering plans and considerations.
Upper Class E Traffic Management (ETM)
Principles & Assumptions

• The ETM environment is notionally defined as Upper Class E airspace above FL600.
• ETM Operators include - but are not limited to – commercial, public/government, and research entities operating both manned and unmanned vehicles.
• Operations can move across multiple Flight Information Regions (FIRs).
• The ETM supporting architecture and associated services are scalable to meet the needs of market forces.
• Safe separation and demand capacity balancing are enabled through harmonized ETM airspace user interactions, established procedures, and compatible technology.
• FAA retains its authority and responsibility over the airspace.
• The ETM concept will be developed with consideration to international application.
Cooperative Separation
Overview

• Traffic management systems utilizing **cooperative separation** are community-based, where Operators are responsible for the coordination, execution and management of their operations, with community rules of the road approved by the FAA.

• Operators within cooperative separation environments are responsible for maintaining separation from one another.

• Cooperative separation utilizes a separate, collaborative set of separation services from those provided by ATC.
  • This federated set of services enables coordination between vehicle Operators, facilitated by third-party support providers, through networked information exchanges.

• Access to the airspace must be equitable. Operators cannot optimize their own operations at the expense of sub-optimizing the ETM environment as a whole.
ETM Development Collaboration

**FAA**
- Subject matter expertise
- Concept of operations
- Information requirements
- Roles/responsibilities definition
- Integration & interoperability needs

**Industry**
- Operational needs/use cases
- Cooperative sharing methods/architecture
- Right of way rules
- Equity of access rules & enforcement
- Participation in flight tests & demonstrations
- Readiness of technologies

**NASA**
- ETM research platform
- Flight test planning & execution
- Performance requirements for operations
Moving forward...

• Proceed with development of ETM Concept of Operations to mature and refine the concept through use cases, roles and responsibilities allocation, and high-level operational and technical requirements

• Perform engineering analyses to highlight opportunities and challenges in the current infrastructure, technology, policies, and rules with regard to their applicability to support future operations

• Build simulation environment and conduct simulations to derive and validate requirements