Safely Enabling Civilian Unmanned Aerial System (UAS) Operations In Low-Altitude Airspace By Unmanned Aerial System Traffic Management (UTM)

National Aeronautics and Space Administration

MOTIVATION

• Many UAS will operate at lower altitude (Class G, below 2000 feet)
• There is urgent need for a system for civilian low-altitude airspace and UAS operations
• Stakeholders want to work with NASA to enable safe operations

CONCEPT OVERVIEW

• UTM System will provide following services:
  - Airspace design and geofencing
  - Weather integration
  - Congestion management
  - Separation management
  - Contingency management

PARTNERSHIPS

• UAS manufacturers
• Online retailers
• Communication/navigation/surveillance providers
• System integrators
• Emerging UAS operators
• Cargo operators
• FAA, NOAA, DoD
• UAS test sites

NEXT STEPS

• Obtain authorization to proceed with further development of UTM
• Refine UTM design, architecture, and use cases
• Explore partnership arrangements to engage traditional and non-traditional partners
• Define a spiral development process to do rapid prototyping and early fielding with regular updates

LINE-OF-SIGHT TO BEYOND LINE-OF-SIGHT

Unmanned Aerial System Traffic Management (UTM)

• Based on autonomy, automation, autonomous operations related to automation

AERONAUTICS

• Self-configuration
• Self-optimization
• Self-protection
• Self-healing

Appropriate operational data recording

AUTHORIZATION

• Authorization
• Airport and gate operations
• Airspace design and geofence definition
• Transportation network management
• Sequencing and spacing
• Trajectory changes
• Separation management

Transition to UTM and Air Traffic Management airspace

UTM WORKSHOP

KEY FINDINGS

• Overwhelmingly positive response
• Stakeholders support NASA’s leadership and vision
• Many partners are ready to engage
• There is urgency to put a system in place

UTM SYSTEM

PORTABLE SYSTEM

PERSISTENT SYSTEM

NOTIONAL SCENARIO

Safely Enabling Civilian Unmanned Aerial System (UAS) Operations In Low-Altitude Airspace By Unmanned Aerial System Traffic Management (UTM)

Multiple customers with differing mission needs

Low-altitude
Communication, Navigation, and Surveillance (CNS) options including but not limited to:
  - Low-altitude radar
  - Surveillance coverage (cell and satellite)
  - Navigation
  - Communication

Real-time Weather & Wind

Weather & Wind Predictions

Airspace Constraints

Other low-altitude operations

Constraints based on community needs (e.g., noise, sensitive areas, etc.)

3D maps: terrain and human-made structures

Near-term goal: enable low-altitude operations within 5 years

Long-term goal: accommodate increased demand 10-15 years

www.nasa.gov

March 2015