

SYSTEM REQUIREMENTS DOCUMENT

ORGANIC TACTICAL SURVEILLANCE SYSTEM – EXPEDITIONARY (OTSS-E)

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Prepared for:

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Contents

1. Scope/Introduction	7
1.1. Identification	7
1.2. Document Overview	7
1.3. Application	7
2. Applicable Documents.....	7
3. System or Subsystem Requirements	7
3.1. System Functional Requirements.....	8
3.1.1. Air Vehicle.....	8
3.1.2. Payloads	9
3.1.3. Ground Control Station.....	11
3.2. System External Interface Requirements	14
3.2.1. Interface Identification and and Diagrams.....	14
3.2.2. Mission Support Data Ingestion.....	14
3.2.3. Data Dissemination	15
3.3. System Internal Interface Requirements	15
3.4. System Internal Data Requirements	15
3.5. Safety Requirements	15
3.6. Security and Privacy Requirements	15
3.6.1. Link Encryption	15
3.6.2. Data at Rest Encryption	15
3.6.3. Threat Resilience	15
3.7. System Environment Requirements	16
3.7.1. Weather	16
3.8. Computer Resource Requirements.....	16
3.9. System Quality Factors	16
3.10. Design and Construction Constraints.....	16
3.10.1. Computing Equipment Origin.....	16
3.11. Personnel-Related Requirements.....	16
3.12. Training-Related Requirements.....	16
3.13. Logistics-Related Requirements.....	16
3.14. Packaging Requirements	16
3.15. Statutory, Regulatory, and Certification Requirements.....	16

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3.16.	Precedence and Criticality of Requirements	16
3.17.	Demilitarization and Disposal	16
4.	Verification Provisions	17
5.	Requirements Traceability	17

1. Scope/Introduction

This System Requirement Document (SRD) establishes the requirements for acquisition of the Organic Tactical Surveillance System – Expeditionary (OTSS-E).

1.1. Identification

The OTSS-E system will be designed to directly support tactical operations in austere deployed environments. The system will provide day/night imagery, secure communications relay, and acoustic surveillance capabilities with near real time dissemination and exploitation. The OTSS-E system will be operated by tactical ground units from both Air Combat Command (ACC) and Air Force Special Operations Command (AFSOC), including specialists from Security Forces, Tactical Air Control, Pararescue and Combat Weathermen. OTSS-E will be operated directly by tactical airmen, without the need for dedicated rated aircrew or maintenance specialists. When maintenance action is required, OTSS-E will be replaced with spares and returned to depot for repair. The OTSS-E program will be managed by the Air Force Materiel Command (AFMC) Tactical Surveillance Program Office, with AFSOC as lead sponsor.

1.2. Document Overview

This SRD establishes performance requirements for all aspects of the OTSS-E Unmanned Aircraft System (UAS), including the Air Vehicle (AV), Ground Control Station (GCS), and all required support equipment.

1.3. Application

This document is intended to be the sole authoritative source of requirements for the development of the OTSS-E system.

2. Applicable Documents

In the event of conflict between the requirements of this document and any other referenced document, the requirements of this document shall take precedence except as specifically provided for in the contract. All conflicts shall be brought to the attention of the procuring activity. The following additional documents form a part of this SRD to the extent specified herein. Documents listed in this section are specified in sections 3, 4, or 5 of this SRD. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document warfighter's are cautioned that they should meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

Note: This section has been omitted from this experiment. Participants should not need to reference external documents.

3. System or Subsystem Requirements

This section provides the detailed requirements for the OTSS-E system. Each requirement represents the minimum level of technical acceptability for the system; consequently, there are no objective measures. In all cases, Threshold = Objective.

3.1. System Functional Requirements

3.1.1. Air Vehicle

3.1.1.1. Performance

3.1.1.1.1. Maximum Airspeed

The Air Vehicle shall have a maximum airspeed greater than 30 miles per hour. (r1.1.1.1.1)

3.1.1.1.2. Maximum Altitude

The Air Vehicle shall have a maximum altitude greater than 1000 feet above ground level. (r1.1.1.1.2)

3.1.1.1.3. Endurance

The Air Vehicle shall have a maximum endurance greater than 30 minutes. (r1.1.1.1.3)

3.1.1.1.4. Time to Climb

The Air Vehicle shall climb to 100 feet above ground level in less than 15 seconds. (r1.1.1.1.4)

3.1.1.1.5. Takeoff Weight

The Air Vehicle shall have a takeoff weight less than 30 pounds. (r1.1.1.1.5)

3.1.1.2. Communication

3.1.1.2.1. Control Communication Range

The Air Vehicle control communications system shall have a maximum operational range greater than 10 miles. (r1.1.1.2.1)

3.1.1.2.2. Lost Communications Detection

The System shall detect the loss of control communications link. (r1.1.1.2.2)

3.1.1.3. Navigation

3.1.1.3.1. Stationary Position Accuracy

The Air Vehicle shall have position error of less than 0.1 second in Latitude and Longitude and less than 10 feet vertically while stationary. (r1.1.1.3.1.1)

3.1.1.3.2. Moving Position Accuracy

The Air Vehicle shall have position error of less than 0.05 second in Latitude and Longitude and less than 5 feet vertically while in motion. Motion is defined as an absolute velocity greater than 1 foot per second. (r1.1.1.3.1.2)

3.1.1.3.3. Moving Position Accuracy (GPS Jammed)

The Air Vehicle shall have position error of less than 0.2 second in Latitude and Longitude and less than 10 feet vertically while in motion and while GPS is being jammed. Motion is defined as an absolute velocity greater than 1 feet per second. (r1.1.1.3.1.3)

3.1.1.3.4. Lost Communication Behavior

In the event of loss of the control communications link, the Air Vehicle will return to the launch location. (r1.1.1.3.3)

3.1.2. Payloads

Note: for the purposes of payload performance measurement, 'night operations' refers to conditions where the illuminance is measured as less than 1.0 lux.

3.1.2.1. Full Motion Video Camera

3.1.2.1.1. Camera Metadata

The Full Motion Video metadata shall comply with Motion Imagery Standards Board (MISB) ST 0902 minimum metadata set. (r1.1.2.1.1)

3.1.2.1.2. Imaging Range

3.1.2.1.2.1. High Accuracy

The Full Motion Video system shall have a Ground Sample Distance (GSD) less than 0.25 meter outside of 800 feet slant range. (r1.1.2.1.2.1)

3.1.2.1.2.2. Low Accuracy

The Full Motion Video system shall have a Ground Sample Distance (GSD) less than 0.50 meter outside of 0.5 mile slant range. (r1.1.2.1.2.1)

3.1.2.1.3. Pointing Accuracy

The Full Motion Video system shall have pointing error less than 2 degrees in all modes. (r1.1.2.1.3)

3.1.2.1.4. Resolution

3.1.2.1.4.1. Day Resolution

The Full Motion Video system shall have a GSD less than 0.10 during daytime operations. (r1.1.2.1.4.1)

3.1.2.1.4.2. Night Resolution

The Full Motion Video system shall have a GSD less than 0.50 during night operations. (r1.1.2.1.4.2)

3.1.2.1.5. Frame Rate

3.1.2.1.5.1. Day Frame Rate

The Full Motion Video system shall have a framerate of 30 frames per second during day operations. (r1.1.2.1.5.1)

3.1.2.1.5.2. Night Frame Rate

The Full Motion Video system shall have a framerate of 25 frames per second during night operations. (r1.1.2.1.5.2)

3.1.2.2. Wide Area Camera

3.1.2.2.1. Resolution

3.1.2.2.1.1. Day Resolution

The Wide Area Camera system shall have a GSD less than 0.50 meters during day operations. (r1.1.2.2.1.1)

3.1.2.2.1.2. Night Resolution

The Wide Area Camera system shall have a GSD less than 0.75 meters during night operations. (r1.1.2.2.1.2)

3.1.2.2.2. Frame Rate

3.1.2.2.2.1. Day Frame Rate

The Wide Area Camera system shall have a frame rate greater than 2 frames per second during day operations. (r1.1.2.2.2.1)

3.1.2.2.2.2. Night Frame Rate

The Wide Area Camera system shall have a frame rate greater than 1 frame per second during night operations. (r1.1.2.2.2.2)

3.1.2.2.3. Latency

3.1.2.2.3.1. Day Latency

The Wide Area Camera system shall have a latency less than 2 seconds during day operations. (r1.1.2.2.3.1)

3.1.2.2.3.2. Night Latency

The Wide Area Camera system shall have a latency less than 3 seconds during night operations. (r1.1.2.2.3.2)

3.1.2.2.4. Coverage Area

The Wide Area Camera system shall have a continuous coverage area of 375,000 square feet at an altitude of 200 feet AGL. (r1.1.2.2.4)

3.1.2.3. Mission Software

3.1.2.3.1. Payload Health Monitoring

The Mission Software shall monitor the health of payloads. (r1.1.2.3.1)

3.1.2.3.2. Imagery Re-transmission

The Mission Software shall re-transmit Wide Area images upon operator request. (r1.1.2.3.3)

3.1.2.4. Payload Communications

3.1.2.4.1. Range

The Payload communications link shall have a maximum range greater than 2 miles. (r1.1.2.4.1)

3.1.2.4.2. Data Offboard Rates

The Payload communications link shall have a data rate greater than 30 Mb/s. (r1.1.2.4.3)

3.1.3. Ground Control Station

3.1.3.1. Flight Software

3.1.3.1.1. Autonomous Control

3.1.3.1.1.1. Fly Programmed Route

The System shall execute a user defined route. (r1.1.3.1.1.1)

3.1.3.1.1.2. Hold Position

The System shall maintain position when commanded. (r1.1.3.1.1.2)

3.1.3.1.2. Direct Control

3.1.3.1.2.1. Pitch Control

The System shall enable the operator to directly control pitch angle. (r1.1.3.1.2.1)

3.1.3.1.2.2. Roll Control

The System shall enable the operator to directly control roll angle. (r1.1.3.1.2.2)

3.1.3.1.2.3. Yaw Control

The System shall enable the operator to directly control yaw angle. (r1.1.3.1.2.3)

3.1.3.1.2.4. Lateral Speed Control

The System shall enable the operator to directly control lateral speed. (r1.1.3.1.2.4)

3.1.3.1.2.5. Vertical Speed Control

The System shall enable the operator to directly control vertical speed. (r1.1.3.1.2.5)

3.1.3.1.3. Flight Planner

3.1.3.1.3.1. User Planned Route

The System shall enable the user to plan a route. (r1.1.3.1.3.1)

3.1.3.1.3.2. Display Current Route

The Ground Control Station shall display the current active route. (r1.1.3.1.3.2)

3.1.3.1.3.3. Display Weather Data

The System shall display weather data on a common operating picture. (r1.1.3.1.3.3)

3.1.3.1.3.4. Display Threat Data

The System shall display threat data on a common operating picture. (r1.1.3.1.3.4)

3.1.3.1.3.5. Display Blue Force Data

The System shall display blue force data on a common operating picture. (r1.1.3.1.3.5)

3.1.3.1.4. Primary Flight Display

3.1.3.1.4.1. Airspeed

The Primary Flight Display shall display the current airspeed. (r1.1.3.1.4.1)

3.1.3.1.4.2. Altitude

The Primary Flight Display shall display the current altitude. (r1.1.3.1.4.2)

3.1.3.1.4.3. Heading

The Primary Flight Display shall display the current heading. (r1.1.3.1.4.3)

3.1.3.1.4.4. Yaw Angle

The Primary Flight Display shall display the current yaw angle. (r1.1.3.1.4.4)

3.1.3.1.4.5. Roll Angle

The Primary Flight Display shall display the current roll angle. (r1.1.3.1.4.5)

3.1.3.1.4.6. Pitch Angle

The Primary Flight Display shall display the current pitch angle. (r1.1.3.1.4.6)

3.1.3.1.4.7. Lateral Speed

The Primary Flight Display shall display the current lateral speed. (r1.1.3.1.4.7)

3.1.3.1.4.8. Vertical Speed

The Primary Flight Display shall display the current vertical speed. (r1.1.3.1.4.8)

3.1.3.1.4.9. Current Waypoint

The Primary Flight Display shall display the current waypoint. (r1.1.3.1.4.9)

3.1.3.2. Mission Software

3.1.3.2.1. System Management

The Ground Control Station shall display the system health and status. (r1.1.3.2.1)

3.1.3.2.2. FMV Camera Control

3.1.3.2.2.1. Pan

The Ground Control Station shall enable the operator to pan the FMV Camera. (r1.1.3.2.2.1)

3.1.3.2.2.2. Tilt

The Ground Control Station shall enable the operator to tilt the FMV Camera. (r1.1.3.2.2.2)

3.1.3.2.2.3. Zoom

The Ground Control Station shall enable the operator to zoom the FMV Camera. (r1.1.3.2.2.3)

3.1.3.2.2.4. Take Still Image

The Ground Control Station shall enable the operator to take a still image using the FMV Camera. (r1.1.3.2.2.4)

3.1.3.2.2.5. Switch Day/Night Modes

The Ground Control Station shall enable the operator to switch the FMV Camera modes between day and night operations. (r1.1.3.2.2.5)

3.1.3.2.3. Wide Area Camera Control

3.1.3.2.3.1. Manual Image Collection

The Ground Control Station shall enable the operator to manual collect Wide Area images. (r1.1.3.2.3.1)

3.1.3.2.3.2. Automated Image Collection

The Ground Control Station shall enable the operator to initiate automated collection of Wide Area images. (r1.1.3.2.3.2)

3.1.3.3. Physical

3.1.3.3.1. Power Requirements

3.1.3.3.1.1. Battery Life

The Ground Control Station shall have a battery life greater than 5 hours. (r1.1.3.3.1.1)

3.1.3.3.1.2. Shore Power

The Ground Control Station shall be able to connect to shore power using a standard 110 volt 15 amp electrical outlet. (r1.1.3.3.1.2)

3.1.3.3.2. Transportability

3.1.3.3.2.1. Handling Equipment

The System shall not require peculiar equipment to transport, setup or breakdown. All equipment necessary for operation must be included in the basic packout. (r1.1.3.3.2.1)

3.1.3.3.2.2. Setup Time

The System shall be able to be setup in less than 15 minutes by a single operator. (r1.1.3.3.2.2)

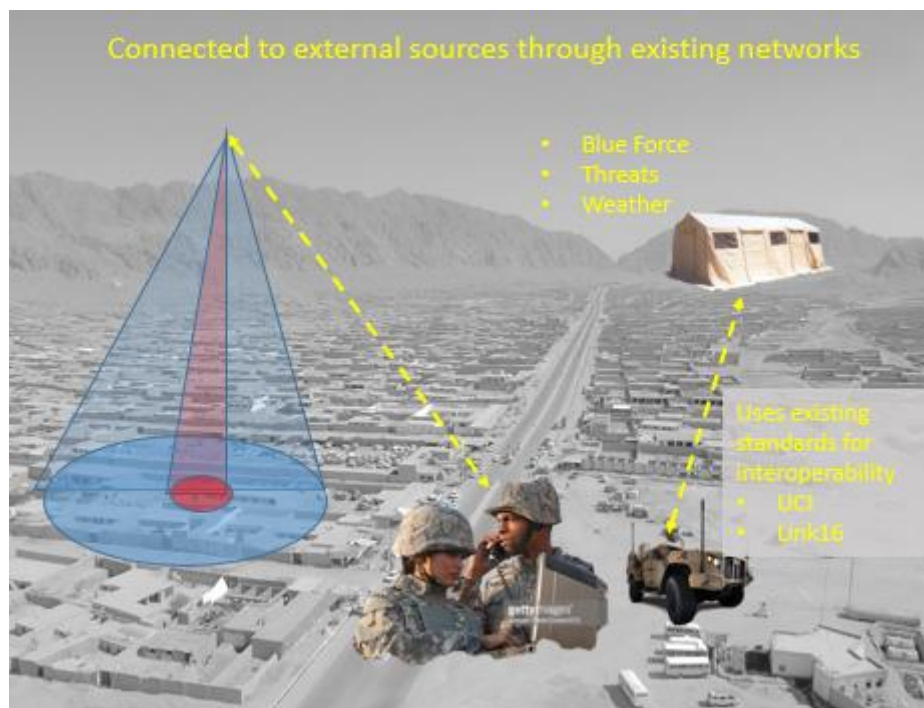
3.1.3.3.2.3. Weight

The System (including all transportation equipment) shall weigh less than 100 pounds. (r1.1.3.3.2.3)

3.2. System External Interface Requirements

3.2.1. Interface Identification and and Diagrams

The OTSS-E system is intended for use in austere location with limited support. Because of this, the system shall be designed to minimize dependencies on external systems to the greatest extent possible.



3.2.2. Mission Support Data Ingestion

3.2.2.1. Weather Data

The System shall be able to ingest external weather data. (r1.2.2.1)

3.2.2.2. Threat Data

The System shall be able to ingest external threat data. (r1.2.2.2)

3.2.2.3. Blue Force Data

The System shall be able to ingest external blue force data. (r1.2.2.3)

3.2.3. Data Dissemination

3.2.3.1. Video Data

The System shall be able to disseminate streaming video to external sources (r1.2.3.1)

3.2.3.2. Imagery

The System shall be able to disseminate imagery files to external sources (r1.2.3.2)

3.3. System Internal Interface Requirements

Intentionally omitted for training.

3.4. System Internal Data Requirements

Intentionally omitted for training.

3.5. Safety Requirements

Intentionally omitted for training.

3.6. Security and Privacy Requirements

3.6.1. Link Encryption

3.6.1.1. Control Link

The Vehicle Control link must be encrypted using FIPS 140-2 compliant encryption. (r1.6.1.1)

3.6.1.2. Payload Link

The Payload communications system must be encrypted using FIPS 140-2 compliant encryption. (r1.6.1.2)

3.6.2. Data at Rest Encryption

3.6.2.1. Flight Computer

The Flight Computer must be encrypted at rest. (r1.6.2.1)

3.6.2.2. Mission Computer

The Mission Computer must be encrypted at rest. (r1.6.2.2)

3.6.3. Threat Resilience

3.6.3.1. Link Flooding

The system shall be resilient to control link flooding. Link flooding is defined as receiving 10 or more messages per second on the control link. (r1.6.3.2.2)

3.6.3.2. GPS Jamming

The system shall be resilient to GPS jamming. GPS jamming is assumed to make GPS inoperable during the period of jamming. (r1.6.3.4.2)

3.7. System Environment Requirements

3.7.1. Weather

3.7.1.1. Percipitation

The system shall be resilient to moderate or higher rain. Moderate rain is defined as greater than 2.5 millimeter per hour. (r1.7.1.1.2)

3.8. Computer Resource Requirements

Intentionally omitted for training.

3.9. System Quality Factors

Intentionally omitted for training.

3.10. Design and Construction Constraints

3.10.1. Computing Equipment Origin

3.10.1.1. Flight Computer

The Flight Computer shall be manufactured in the United States. (r1.6.4.1)

3.10.1.2. Mission Computer

The Mission Computer shall be manufactured in the United States. (r1.6.4.2)

3.11. Personnel-Related Requirements

Intentionally omitted for training.

3.12. Training-Related Requirements

Intentionally omitted for training.

3.13. Logistics-Related Requirements

Intentionally omitted for training.

3.14. Packaging Requirements

Intentionally omitted for training.

3.15. Statutory, Regulatory, and Certification Requirements

Intentionally omitted for training.

3.16. Precedence and Criticality of Requirements

Intentionally omitted for training.

3.17. Demilitarization and Disposal

Intentionally omitted for training.

4. Verification Provisions

Intentionally omitted for training.

5. Requirements Traceability

Intentionally omitted for training.