Software Requirements Specification (SRS)

1. Introduction

1.1 Purpose

This Software Requirements Specification defines the functional and non-functional requirements for the Autonomous Drone Delivery System (ADDS) software.

Requirements are derived from the operational scenarios outlined in the CONOPS.

1.2 System Scope

ADDS provides automated mission assignment, route planning, telemetry monitoring, and notification services for package delivery via autonomous drones.

1.3 Definitions, Acronyms, and Abbreviations

- **ADDS** – Autonomous Drone Delivery System
- **AVS** – Aerial Vehicle Subsystem
- **CCS** – Control Center Subsystem
- **UIS** – User Interface Subsystem
- **RTH** – Return-to-Home

2. Overall Description

2.1 Product Perspective

The CCS interacts with:

- Drone flight controllers over a secure telemetry channel.
- Customer and operator front-end applications via REST APIs.
- External services including weather and mapping providers.

2.2 User Classes and Characteristics

- **Operator:** Trained personnel responsible for monitoring missions.

- **Customer:** End-users scheduling deliveries and receiving notifications.

- **Administrator:** Personnel configuring system-level parameters.

3. Specific Requirements

3.1 Functional Requirements

REQ-001 – The system shall accept delivery requests submitted via the mobile or web application.

REQ-002 – The system shall automatically select a suitable drone based on payload, distance, and battery state.

REQ-003 – The system shall calculate an optimized route using current airspace restrictions and weather data.

REQ-004 – Upon detection of GNSS signal loss, the system shall command the drone to **enter a stable hover and wait for operator input**.

REQ-005 – The system shall record video evidence of each delivery and store it for **a minimum of 72 hours**.

REQ-006 – All command and telemetry communications between CCS and drones shall be encrypted using **AES-256**.

REQ-007 – The system shall store mission and telemetry data for **at least 90 days** to support investigations and performance analysis.

REQ-008 – The system shall authenticate all operator access using **multi-factor authentication** (MFA).

REQ-009 – The system shall notify the customer of delivery completion within **30 seconds** of the delivery event.

REQ-010 – The system shall support **up to 100 concurrent active drone missions** in a single deployment region.

3.2 Performance Requirements

- PR-001 – The average latency between an operator command and drone acknowledgement shall be **≤ 500 ms**.

- PR-002 – The system shall maintain an availability of **99.95%** over any rolling 30-day period.

3.3 Environmental and Operational Requirements

- ENV-001 – The system shall support drone operations in sustained winds up to **25 knots** and allow operations in **light rain** conditions.

- ENV-002 – The system shall support ambient temperatures from −10 °C to +40 °C.

3.4 Safety Requirements

- SAF-001 – If primary obstacle detection sensors fail, the drone shall reduce speed and ascend to a safe loiter altitude until operator intervention.

- SAF-002 – An emergency terminate-flight command shall be executed by the drone within **5 seconds** of receipt.

3.5 Security Requirements

- SEC-001 – All external API endpoints shall require TLS 1.3 or later.

- SEC-002 – Passwords shall be at least 12 characters and include upper-case, lower-case, numeric, and special characters.

- SEC-003 – Security-related logs shall be retained for **12 months**.

4. Traceability

| Requirement | Derived From CONOPS Section |

|---|---|

| REQ-001–003 | CONOPS §3.1 Normal Delivery |

| REQ-004 | CONOPS §3.2 GNSS Loss Scenario |

| REQ-006, PR-001 | CONOPS §2.2 and §4 |

| ENV-001 | CONOPS §3.3 Adverse Weather |

5. Non-Functional Requirements

- NFR-001 – The system shall be horizontally scalable to support deployment in multiple metropolitan regions.

- NFR-002 – Code shall be modularized to achieve at least 80% unit test coverage in core mission logic.

- NFR-003 – The system shall be deployable on major cloud providers (e.g., AWS, Azure).