System: Package Delivery Drone

Use Case: Deliver Package

Primary Actor: Customer of Package Purchased.

Secondary Actor(s): Facility Server, Package Drop Server, Facility Personnel, Satellites, Natural Environment.

Brief description/goal of use case: Complete autonomous package delivery for customers.

Preconditions: There must be energy available to power the drone. There must be a facility server setup to handle incoming delivery requests. Customers must have a device that can act as a server to serve as authentication during delivery and an account setup detailing their direction for delivery.

Flow of events: List numerically the sequence of events for the use case. See above and rubric for rules.

1. The Drone is powered on by facility personnel.
2. The Drone receives authentication to continue operation.
3. The Drone communicates with the facility server (UC-1-1)
    3.1. The Drone provides a connection request to facility server.
    3.2. The Drone receives an established connection to the facility server.
    3.3. The Drone provides data from its latest flight log to the server.
4. The Drone Requests Package Transaction (UC-1-2)
    4.1. The Drone provides notice to facility server that it is ready to accept a package.
    4.2. The Drone receives identification for new package to be delivered from facility server.
    4.3. The Drone receives customer identification from facility server.
    4.4. The Drone receives package drop server identification.
5. The Drone Monitors Package Reception (UC-1-3)
    5.1. The Drone receives package for shipment from facility personnel.
    5.2. The Drone receives package loaded confirmation from facility personnel.
    5.3. The Drone provides package loaded confirmation to facility server.
6. The Drone Initializes Delivery (UC-1-4)
    6.1. The Drone receives a delivery flightpath from the facility server.
    6.2. The Drone provides confirmation that it is out for delivery to the facility server.
    6.3. The Drone closes connection with the facility server.
7. The Drone navigates to customer destination. (UC-1-5)
    7.1. The Drone interfaces with heat, humidity, wind, and obstacles from the natural environment.
    7.2. The Drone transfers forces for flight to the natural environment.
    7.3. While steps 7.1 and 7.2 are occurring, the Drone also requests positional data from satellites.

8. The Drone communicates with package drop server. (UC-1-6)
    8.1. The Drone provides a connection request to package drop server.
    8.2. The Drone provides package drop server identification.
    8.3. The Drone receives an established connection from package drop server.
    8.4. The Drone provides an arrival alert to package drop server.
9. The Drone finalizes delivery to customer. (UC-1-7)
    9.1. The Drone receives identification from customer.
    9.2. The Drone provides customer access to package.
    9.3. The Drone receives confirmation of package delivered from customer.
    9.4. The Drone delivers confirmation of package receipt to package drop server.
10. The Drone initializes return to facility (UC-1-8)
    10.1.   The Drone receives mission return flightpath from package drop server.
    10.2.   The Drone provides confirmation that it is returning to package facility to the package drop server.
    10.3.   The Drone closes established connection with package drop server.
11. The Drone navigates back to the facility. (UC-1-9)
    11.1.   The Drone requests return flight path from satellites.
    11.2.   The Drone transfers forces for flight to the natural environment.
    11.3.   While steps 11.1 and 11.2 are occurring, the Drone also requests positional data from satellites.
12. The Drone is powered off by facility personnel.

Alternative flows:

The Drone monitors power status required to proceed with mission operations. (UC-2-1)

1. At primary flow step 4, the Drone provides low battery alert to facility server.
2. The Drone closes its established connection with the server.
3. The Drone notifies facility personnel that it requires charging.
4. The Drone is handled by facility personnel to establish charging connection.
5. The Drone receives energy from charging station.
6. The Drone provides notification to facility personnel when it thinks it has finished charging.
7. The Drone receives confirmation from facility personnel that it is charged.
8. The Drone requests established connection from facility server.
9. The Drone receives an established connection from facility server.
10. The Drone provides confirmation to facility server that it has charged.
11. The Drone tells the facility server that it is ready for a package.

The Drone is scheduled for required maintenance. (UC-3-1)

1. The Drone receives scheduled maintenance alert from facility server.
2. The Drone alerts facility personnel of required maintenance.
3. The Drone receives gives old parts to facility personnel.
4. The Drone receives new parts from facility personnel.
5. The Drone receives confirmation that maintenance was complete from facility personnel.
6. The Drone initiates new server maintenance request.

Extension use case(s): Monitor Power and Perform Authentication Services.

Exception flows:

2.a Authentication credentials fail verification during initial power.

       2.a.1 The Drone fails to verify user authentication
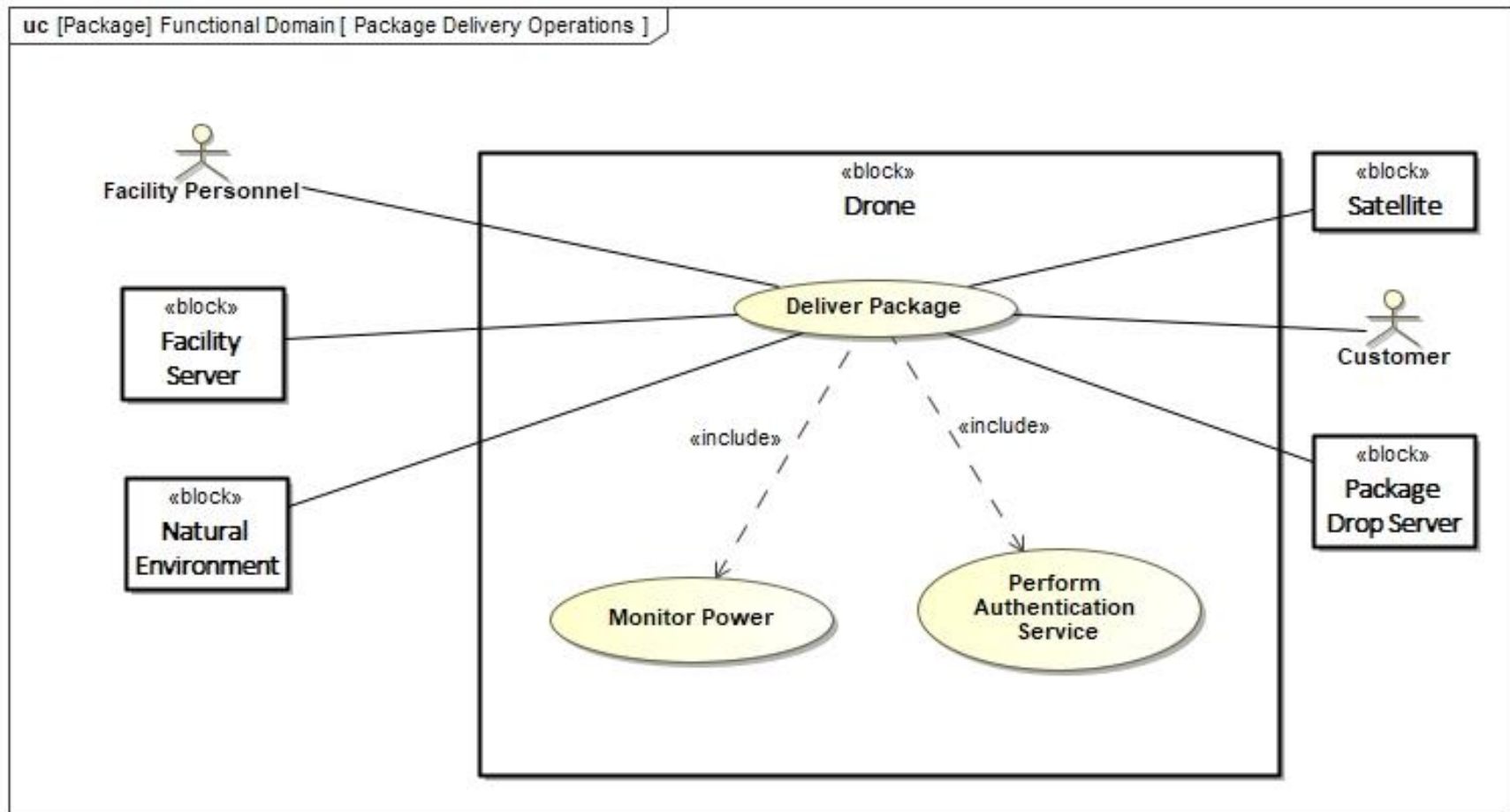
       2.a.2 The Drone displays verification failure to user
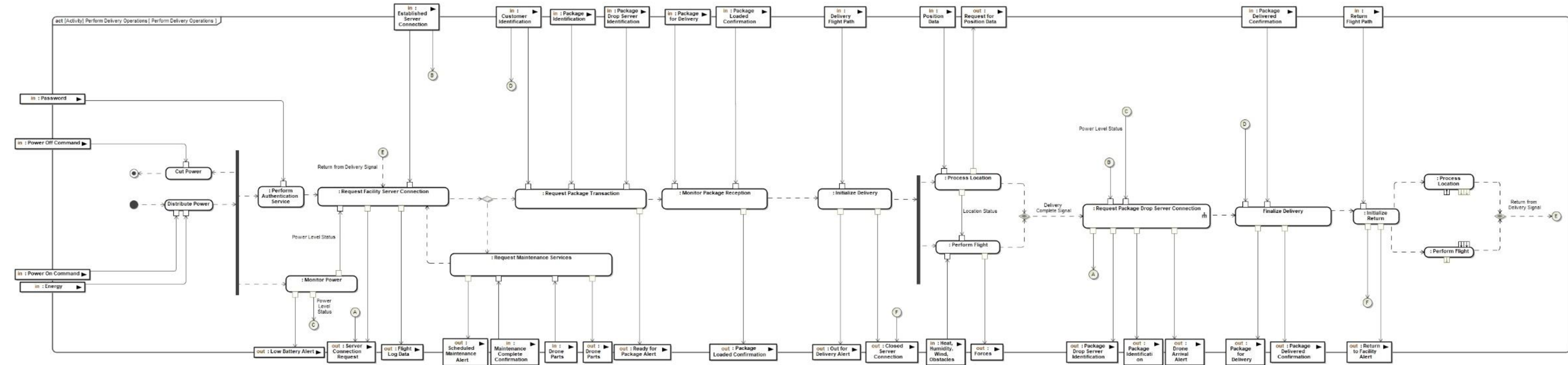
       2.a.3 The Drone checks state of its location.

       2.a.4 The Drone verifies location state at package delivery facility.

       2.a.5 The Drone returns to step 2.

Use Case Diagram:

System Level Activity Diagram:

Use Case Activity Diagram