Test Plan for UHF 2U Antenna Deployment

Scenarios and Test Cases

1. Basic Scenarios:

Scenario 1: Initial Deployment

- **Test Case 1:** Launching the spacecraft for the first time.
  - *Expected Result:* Successful deployment of the antenna.

Scenario 2: Redeployment

- **Test Case 2:** Second launch of the spacecraft.
  - *Expected Result:* The algorithm recognizes the already deployed antenna and does not redeploy it.

2. Scenarios for Operation at Different Temperatures:

Scenario 3: High Temperature

- **Test Case 3:** Deployment simulating high temperature conditions.
  - *Expected Result:* Successful antenna deployment at high temperatures.

Scenario 4: Low Temperature

- **Test Case 4:** Deployment simulating low temperature conditions.
  - *Expected Result:* Successful antenna deployment at low temperatures.

3. Scenarios for Operation During Vibrations:

Scenario 5: Strong Vibrations

- **Test Case 5:** Deployment after strong vibrations on the spacecraft.
  - *Expected Result:* Successful antenna deployment after vibrations.

4. Error Handling Scenario:

Scenario 6: Communication Error with Antenna

- **Test Case 6:** Injecting an error - communication failure with the antenna.
  - *Expected Result:* The algorithm should handle the error and take appropriate measures (e.g., generate an error message).

5. Scenarios for Waiting Timer:

Scenario 7: Short Waiting Timer Period

- **Test Case 7:** Setting a short period for the waiting timer.
  - *Expected Result:* Successful antenna deployment within the specified period.

6. Algorithm Operation Scenario:

Scenario 8: MCU and GPO Deployment Algorithms Operation

- **Test Case 8:** Activation of MCU Deployment Algorithm by Antenna MCU.
  - *Expected Result:* Successful antenna deployment using MCU Deployment Algorithm.
- **Test Case 9:** Activation of GPO Deployment Algorithm by UHF Transceiver.
  - *Expected Result:* Successful antenna deployment using GPO Deployment Algorithm.

Main Loop Approach

```
from abc import ABC, abstractmethod
import time


class Antenna(ABC):
    def __init__(self):
        self.deployed = False

    @abstractmethod
    def deploy(self):
        pass


class DeploymentAlgorithm(ABC):
    @abstractmethod
    def activate_algorithm(self, antenna):
        pass


class AntennaMCU(DeploymentAlgorithm):
    def activate_algorithm(self, antenna):
        print("Antenna MCU activates deployment algorithm.")
        # Implement MCU Deployment Algorithm logic
        time.sleep(10)  # Simulating the algorithm execution
        print("MCU Deployment Algorithm completed.")


class UHFTransceiver(DeploymentAlgorithm):
    def activate_algorithm(self, antenna):
        print("UHF Transceiver activates GPO Deployment Algorithm.")
        # Implement GPO Deployment Algorithm logic
        time.sleep(10)  # Simulating the algorithm execution
        print("GPO Deployment Algorithm completed.")


class DeployableAntenna(Antenna):
```

```
    def __init__(self):
        super().__init__()
        self.mcu = AntennaMCU()
        self.uhf_transceiver = UHFTransceiver()

    def deploy(self):
        if not self.deployed:
            print("Antenna deployment started.")
            self.mcu.activate_algorithm(self)
            self.uhf_transceiver.activate_algorithm(self)
            self.deployed = True
            print("Antenna deployed successfully.")
        else:
            print("Antenna is already deployed.")


if __name__ == "__main__":
    antenna = DeployableAntenna()
    antenna.deploy()
```