**SPxY Project : Antenna Feed Testing Plan**

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# Scope

This Document sets up a method for testing the antenna feed of the SPxY project. The newly made patch antenna will hence be tested in different situations to qualify them at best. The tests that are determined in this note are to be performed as part of the qualification process.

# Antenna Patches Test Plan:

1. **Initial Setup and Configuration:**

* **Preparation:**
  + Ensure the antenna patches are properly installed and connected to the respective signal sources.
  + Verify all necessary equipment for testing (spectrum analyzers, network analyzers, signal generators) are calibrated and ready.

2. **Bandwidth Verification:**

* **Frequency Range Testing:**
  + Using a spectrum analyzer, sweep through the frequency ranges of S (2.4 Ghz) and X bands (10.4Hz) to verify the antennas' ability to transmit and receive within the specified ranges.
  + Record and analyze the bandwidth capabilities for both bands.

3. **Signal Quality Testing:**

* **Signal Strength and Stability:**
  + Measure the signal strength and stability of transmitted and received signals for both S and X bands.
  + Evaluate the signal-to-noise ratio (SNR) to determine signal quality under varying conditions.

4. **Radiation Pattern and Gain Analysis:**

* **Radiation Pattern Test:**
  + Use a network analyzer or antenna measurement system to analyze the radiation patterns of the antennas.
  + Verify that the antennas radiate signals in the desired direction with the expected gain.

5. **Polarization and Cross-Polarization Testing:**

* **Polarization Verification:**
  + Test the polarization characteristics of the antennas to ensure they match the intended polarization (linear, circular, etc.) for each band.
  + Evaluate cross-polarization levels to minimize interference.

6. **Environmental and Durability Testing:**

* **Environmental Stress Tests:**
  + Subject the antennas to environmental conditions (temperature, humidity) representative of operational scenarios to ensure performance consistency.
  + Verify that the antennas maintain functionality under stress conditions.

7. **Interference and Crosstalk Assessment:**

* **Interference Testing:**
  + Test for potential interference between the S and X band antennas and other nearby systems.
  + Check for crosstalk or unwanted coupling effects between the antennas.

8. **Performance Validation:**

* **Real-World Testing:**
  + Conduct real-world simulations or field tests to validate antenna performance in actual operational conditions. The antenna patches shall be tested with the newly manufactured antenna dish.
  + Verify signal quality and stability during movement or changes in orientation.

9. **Documentation and Reporting:**

* Document all test procedures, observations, and results obtained during each testing phase.
* Create a detailed report outlining the performance characteristics, strengths, weaknesses, and any recommendations or improvements needed for the antennas.