Results
A summary of results from testing can be seen below. Notably, testing the P900 was prioritized over the pMDDL900, meaning we were unable to test the pMDDL900 at distances over 200m.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Minimum Viable</th>
<th>P900</th>
<th>pMDDL900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Rate (bytes/sec)</td>
<td>6,700</td>
<td>1950</td>
<td>25000 - 6000</td>
</tr>
<tr>
<td>Latency (ms)</td>
<td>&lt; 250</td>
<td>30 - 80</td>
<td>-115 °</td>
</tr>
<tr>
<td>Distance (Km)</td>
<td>&gt; 5 km</td>
<td>25</td>
<td>0.2 °</td>
</tr>
<tr>
<td>Mesh Capability</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Phase 5: Mesh
The final phase of testing was to configure many radio modules as a mesh, and repeat the data integrity and latency tests. This phase tested the expanded capability of a mesh network.

Reference

Additionally, we noticed that the pMDDL900 was more inconsistent in our testing and prone to data loss, but performed well when it did work.

Conclusion
The P900 met CfAR’s requirements for data rate, latency, and distance, but was not capable of meshing, as desired. The pMDDL900 was able to meet requirements for data rate, latency, and meshing, however we weren’t able to complete distance testing.

We recommend further testing for both modules for reliability. In particular, the distance capabilities of the pMDDL900 should be explored further.

Introduction
UVic CfAR’s Unmanned Aerial Vehicle uses a costly radio antenna system, Silvus Radio [3], to communicate with their ground & flight stations. UVic CfAR hopes to replace this model with a significantly lower cost modem to perform the desired communication features as the Silvus Radio™.

Project Goal
The goal of the project was to validate and integrate Microhard™’s Wireless P900 and pMDDL900 modems in UVic CfAR’s current ground & flight station. The validation factors were as follows:

• Data rate of 6700 bytes/sec for Control & Telemetry
• Latency less than 250ms
• Distance of greater than 5 km
• Capable of sending data through IP
• Mesh capability: Inter agent communication and Relay

Test Phases
To thoroughly test the P900 and pMDDL900 radios, we split testing into different phases.

Phase 1: Validation
The first phase of testing was to validate that two units could send short messages back and forth in close proximity.

Phase 2: Data Integrity
The second phase of testing was to increase the amount of data which was being sent and ensure that data was not lost in transmission. This phase of testing measured the data rate & accuracy of the radios.

Phase 3: Latency
The third phase of testing was measured the communication delay between radios.

Phase 4: Distance
The fourth phase of testing involved increasing the distance between radio modems until data integrity tests would fail. This phase was to determine the maximum lossless communication distance for the two radios.

Phase 5: Mesh
The final phase of testing was to configure many radio modules as a mesh, and repeat the data integrity and latency tests. This phase tested the expanded capability of a mesh network.

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