Communications System

Piccolo includes a sophisticated datalink that is built on the MHX-910 frequency hopping spread spectrum radio modem from Microhard Systems Inc. The datalink has up to 40 Kbaud of throughput and is used for command and control, autopilot telemetry, payload data transfer functions, differential GPS corrections uplink, and pilot in the loop commands. The MHX-910 operates in the 902-928 MHz ISM frequency band with a maximum 1 Watt output power and error detection using a 16 bit cyclic redundancy check (CRC) checksum with forward-error-correction (FEC). The system is expected to have a communication range of greater than 20 nautical miles line-of-sight with the vertically installed quarter-wave antenna used on the Uglo 7, and the Ground Control Station (GCS) antenna located on the top of a vehicle (used for metal ground plane). The frequency hopping spread spectrum capabilities of the radio provide security, reliability and high tolerance to interference.

The data sent to or from the autopilot are made up of multiple bi-directional streams which are multiplexed onto the wireless channel and is managed by the GCS. Each stream represents an endpoint in the avionics, which is either defined by software or by a physical port on the avionics. The implementation of the stream multiplex/demultiplex logic is based upon a packet protocol running on a bi-directional link. The ground station and avionics work together to guarantee the delivery of autopilot data stream. The delivery guarantee works by using sequence and acknowledge numbers in each packet. The sequence and acknowledge numbers in the packets are also used in determining a lost link event by determining when the last successful communication occurred between the GCS and the autopilot. A complete description of the communications system and hardware is given in the "Communications for the Piccolo Avionics" document available on Cloud Cap's website.