WFOV-AMSAT PAYLOAD CONOP PROPOSAL FOR Millennium Space Systems

The AMSAT payload would consist of a software defined radio, manufactured by RINCON Research Corporation, and placed into operation in the amateur satellite service. It would be an FCC licensed, internationally coordinated digital transponder and bent pipe transponder.

Frequency Bands: 5660 MHz uplink, ~ 10 MHz wide

10475 MHz downlink ~ 10 MHz wide

Modes of operation:

The payload would implement a digital transponder and a bent pipe transponder using a channelized uplink (frequency division multiplexed) and would divide these channels between digital uplinks and bent pipe uplinks based on demand and as coordinated but will be settable by the operators to best fit the available channel capacity as USAF WFOV changes position around the earth. The downlink will consist of a single carrier digital signal and a single frequency band producing an FDM linear transponder (bent pipe).

Power: In our initial meetings we were told there was a 100+ W available. We need maximum possible transmit power so we proposed to consume every available watt but stay beneath the power cap. We propose that the operators of USAF WFOV simply turn our transponder off when there is insufficient power to operate our payload as opposed to our increase in complexity of making multiple power settings at this time. THIS CAN BE RECONSIDERED IN COOPERATION WITH MSS.

Mass: In our intial meetings we were told that we had up to 20 Kg of mass. We propose to build a total payload that is significantly less than 20 Kg total mass, inclusive of antennas, electrics, and cables.

Size: We do not currently know the mass volume allowed or what the actual envelope is currently. But we foresee a very small footprint on the cold plate for thermal control, and small footprint external to the body of the USAF WFOV bus for our antennas.

Antennas:

The current CONOP utilizes short horns operating in the 10 GHz amateur satellite service allocation and will have a half power beam width that will subtend the visible earth. The receive antenna concept is a phased array consisted to two separate flat panels mounted on the available space adjacent to the nadir pointing face but consisting of one each panel, mounted on the +X and –X face. The 10 GHz band will need at least two horns, one for the digital transponder and one for the bent pipe transponder.

Operation of our payload:

We propose the only control needed by AMSAT is power on/power off. We plan to command and control the payload IN BAND using the digital uplink with our payload doing decryption, verification, and identification. We will downlink telemetry from our payload on the digital downlink. This can and will include any digital data needed by the primary mission. We propose NO need for any data from our payload to be transmitted for our payload to any system already on USAF WFOV. There will be zero contact between our digital system and our data and the USAF WFOV payloads. We will provide, in coordination with MSS, analog signals consisting of telemetry points from our payload that MSS wishes us to incorporate.