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SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES (D6)
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DUAL FREQUENCY ADS-B PROTOTYPE FLIGHT EXPERIMENTS FOR ENHANCED SAFETY

Abstract

An FAA-funded experimental payload with ADS-B (Automatic Direct Services-Broadcast) dual frequency (978MHZ and 1090 MHz) receive(ADS-B "In")/record and transmit capability (ADS-B "Out")was launched on a commercial stratospheric balloon funded by the NASA Flight Opportunities Program from Madras Oregon in July 2014. It reached a float altitude of over 30 kilometers (100,000 feet) MSL and floated for over 3 hours at this altitude midday during the maximum air traffic period for one of the busiest regions in the US (and therefore worst case ADS-B message traffic for the payload to receive and process). This experiment was a follow on to a December 2013 proof-of-concept flight to a float altitude of 95,000 feet altitude. During its time aloft the payload successfully received ADS-B messages from over 495 aircraft in both frequencies from up to 350 miles away. It also received TIS-B messages during ascent and descent and FIS-B messages at all times (including while at float altitude) from ADS-B ground based transceivers. During flight the payload and balloon were tracked remotely at all times in real-time using its ADS-B Out capability. The experiment results will be discussed.

The experiment demonstrated that at times of peak air traffic and therefore peak ADS-B message traffic the receiver did not saturate or "crash". This bodes well for potential uses below.

The experiment results further inform the potential of ADS-B In for utilization by crew of both commercial manned stratospheric balloons and commercial suborbital reusable launch vehicles (both of which FAA regulates and intends to seamlessly integrate in to the NAS). Additionally the experiment demonstrated basic proof-of-principle for possible use of stratospheric balloons with ADS-B In to support a launch or re-entry from a remote location by monitoring / tracking aircraft (and using by the AIS beacon installed on large ships potentially track ship traffic) with minimal latency. This capability could also be used downrange of an existing range or commercial spaceport where no real-time monitoring capability exists.

A planned follow on experiment with a stratospheric balloon to track an ADS-B Out equipped rocket and AIS-equipped ships as well as aircraft using lessons learned from this experiment and options for follow-on flights on suborbital vehicles will be discussed if time permits.