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EUROCAE WG-51, SG-1

ADS-B 1090ES MOPS Maintenance

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Response to Action Item 25-08
Allocation of Uncompensated Latency Requirements to GPIRU's

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Summary
The uncompensated latency requirements for a baseline ADS-B transmit system (standalone GNSS source and link transmit function) have been presented in 1090-WP25-11. This Working Paper addresses the allocation of those uncompensated latency requirements to GPIRU systems. It proposes an allocation of those requirements for two types of GPIRU's – federated and integrated. In both cases the total uncompensated latency requirements are proposed to equal the values presented in the referenced paper. It is presented as the response to Action Item #25-08.

There is substantial interest in the air transport avionics industry for the functional integration of GNSS and inertial data into a hybrid system known as a GPIRU. This concept is not new and has been well described in the industry literature over the past 15 years so a detailed description will not be repeated in this paper. What will be discussed is how versions of this architecture should comply with the new uncompensated latency requirements for ADS-B Out. Two major versions of GPIRU systems will be presented – an integrated version and a federated version.

A. Integrated GPIRU

An integrated GPIRU is defined as one that does not have a separate GNSS receiver LRU – the receiver function is integrated into the hybrid LRU. It is proposed that the uncompensated latency requirements for the standalone GNSS engine (maximum of 200 msec measured at B1) also be applied to the integrated GPIRU LRU. Thus for this architecture the overall system level uncompensated latency requirement would remain unchanged at -200 msec to +400 msec, 95%.

B. Federated GPIRU

A federated GPIRU is defined as one that has a standalone GNSS receiver LRU and a separate inertial system LRU. It is desirable to use the position outputs of both LRU's for the ADS-B Out transmit function – the direct GPS position output could be the primary source and the hybrid GPS/inertial position could be used as a backup source to "coast" through GPS outages caused by RAIM holes and/or interference events. However, Figure 1 of the reference paper does not provide an allocation of requirements for this architecture. The following changes are proposed for Figure 1:

a. Change A1 to B1 component from "GPS/INS hybrid" to "Integrated GPS/INS hybrid"
b. Change B1 to C components to include "Federated GPS/INS hybrid"

Thus the +/- 100 msec, 95% UL latency requirement that was allocated to an FMS or Data Concentrator could also be allocated against the federated GPIRU LRU. Of course this would mean that an airplane architecture that had both a federated GPIRU and a data concentrator would have to further suballocate this +/- 100 msec value between the 2 LRU's - but the probability of such an architecture being implemented is fairly low. Again for this architecture the overall system level uncompensated latency requirement would remain unchanged at -200 msec to +400 msec, 95%.

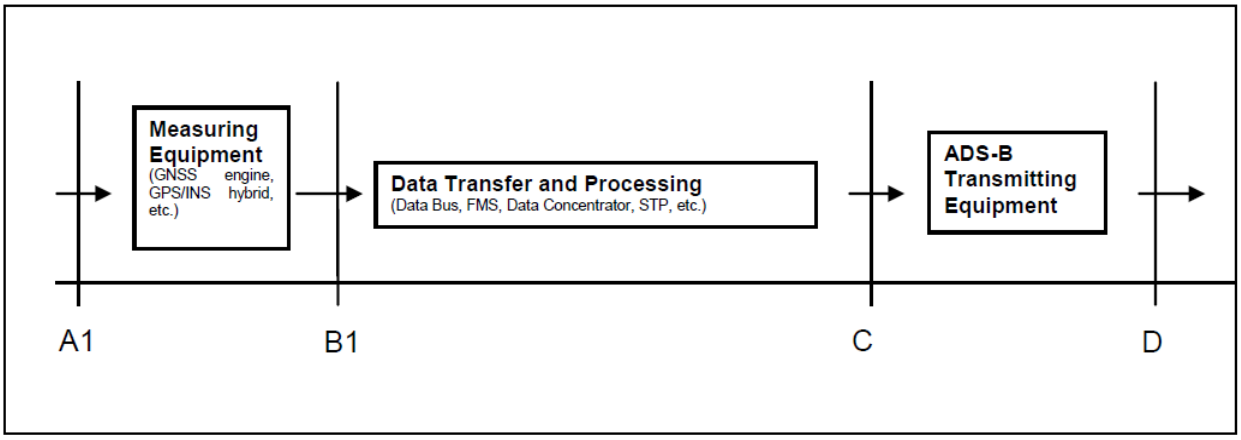

Figure 1: Functional Architecture Diagram