

RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS (DO-282), Revision A

Meeting #15

Simulated Results for UAT Basic ADS-B Message Sensitivity

Presented by Mike Castle and Larry Bachman, JHU-APL

SUMMARY

This Working Paper presents the simulated results for the sensitivity of the UAT Basic ADS-B Messages. These results indicate what kind of assumption about UAT Basic Message sensitivity must be made to achieve results consistent with Appendix K in DO-282.

This Working Paper discusses the sensitivity of the UAT receiver to Basic Message reception. In DO-282, the requirement for ‘Long ADS-B Message as Desired Signal’ (§2.2.8.2.1.1) states that at “A desired signal level of -93 dBm applied at the antenna end of the feedline **shall produce a rate of Successful Message Reception of 90% or better ...**” This requirement was supported in the MAUS program that was run to generate the results shown in Appendix K of DO-282. However, no requirement was placed on the Basic ADS-B Messages in DO-282. This paper seeks to characterize the performance seen in the simulator for UAT Basic Messages, which can then guide decisions about future requirements for UAT receiver sensitivity.

Two runs, one for each type of receive filter, were made to collect simulated data for the receiver sensitivity to the basic message. 500 equipage type A0 transmitting aircraft were simulated over a five minute window transmitting ADS-B Messages to the receiving aircraft, totaling 150,000 messages collected for each run. Of these messages, approximately half are Basic ADS-B Messages, and half are Long Messages. No external interference was present on the channel.

Figure 1 shows the MSR as a function of signal level for the case of the 1.2 MHz receive filter. MSR curves run in MAUS have some vertical thickness (approximately 3%) in them due to a statistical variability in the method of calculating MSR. In addition, note that several points exist where the MSR is 0 along the bottom of the plot. These points correspond to messages that arrive when the receiving aircraft is transmitting ADS-B messages.

In Figure 1, the Long Message curve appears to agree with the required sensitivity very well. For this receive filter, the results from MAUS plotted in the Basic Message curve indicate that the Basic Message sensitivity will be approximately -93.4 dBm.

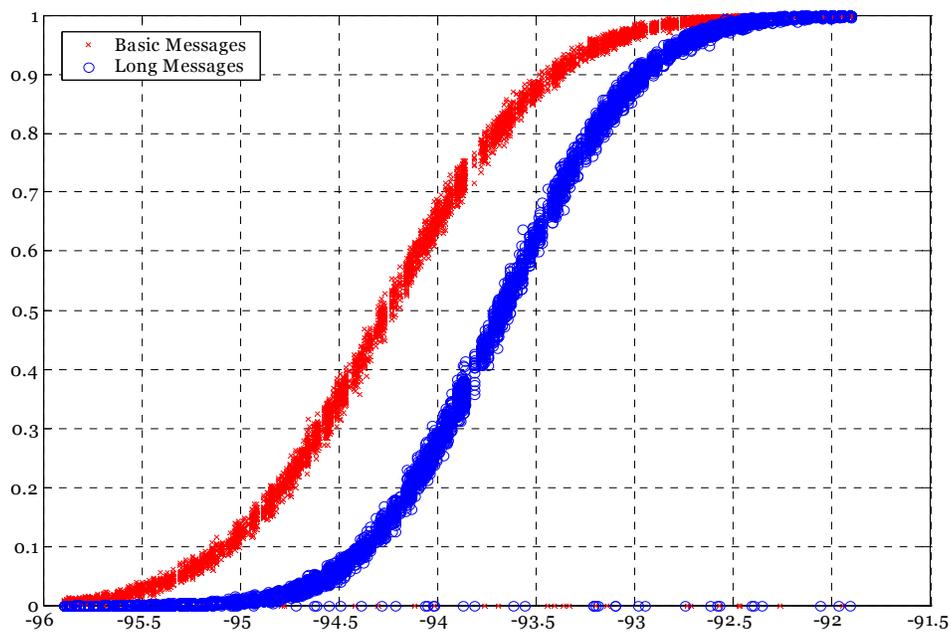


Figure 1 - Message Success Rate as a Function of Signal Level for an UAT Receiver with a 1.2 MHz Filter

Figure 2 shows the same type of plot for the 0.8 MHz receive filter. Once again, the requirement for Long Messages seems satisfactory. The Basic Message sensitivity for this filter as indicated by MAUS simulations is approximately -94 dBm.

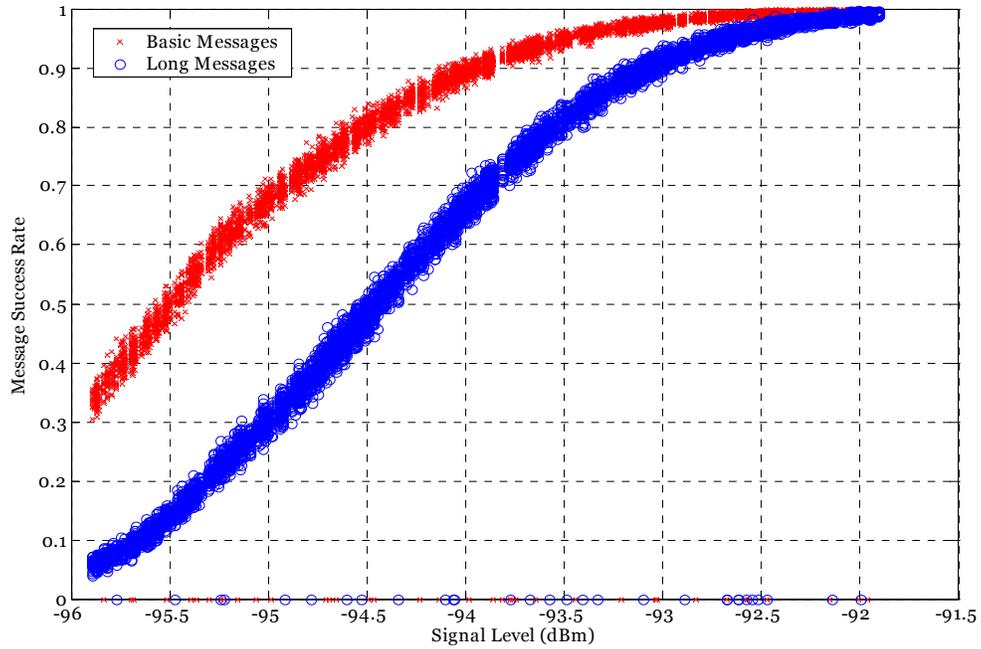


Figure 2 - Message Success Rate as a Function of Signal Level for an UAT Receiver with a 0.8 MHz Filter