

EVALUATION OF GARBLED REPLIES FOR AIRCRAFTS INTERROGATED BY SSR SYSTEM

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Abstract. *In aviation, an undesirable phenomenon that can occur with increased airport traffic is garbling. The main problem is that if two aircraft are within a short critical distance to each other, the replay messages (response signals) can overlap. To better understand the garbling phenomenon by aviation students and engineers and to prevent the occurrence of this undesirable phenomenon that can lead to tragic events, we have modelled and simulated this phenomenon using an algorithm that statistically estimates the number of garbled replies (erroneous replay messages/ response signals) for several aircraft interrogated by a secondary surveillance radar.*

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1. Introduction

Secondary Surveillance Radar (SSR) helps identifying aircrafts and often works in conjunction with the *Primary Surveillance Radar (PSR)* for better target awareness, as illustrated in [Figure 1](#).



Figure 1. Airport antennae for SSR (left side top) and PSR (left side down).
The whole antennae system (right side).

The PSR radiates an electro-magnetic wave and receives the echo reflected from any objects (targets) detecting their presence, range (distance from PSR to target) and azimuth, but not their identity. In PSR system, energy is radiated via a

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