

**RTCA Special Committee 186, Working Group 3**  
**EUROCAE WG-51, SG-1**

**ADS-B 1090ES MOPS Maintenance**

**WG-3 Meeting #30**  
**SG-1 Meeting #7**  
**Joint Session**

**RTCA Headquarters**  
**Washington DC**  
**18 – 21 August 2009**

**More Comments on the Draft of Appendix P**  
**In Response to Action Item 25-03**

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<b>Summary</b>
This Working Paper addresses additional comments on the draft of Appendix P in Working Paper 1090-WP30-05.

**Looking at Working Paper 1090-WP30-05, I have the following comments.**

1st paragraph. The next to last sentence talks about more recent "requirements" and cites three RTCA documents. It's my understanding that those documents do not contain any requirements beyond the DO-242A requirements. Let me know if you find any, and tell me the paragraph number. If my understanding is correct, then I think the majority of the draft text in this paragraph is inappropriate. Therefore I propose limiting the new material to just the first sentence.

2nd paragraph. The 2nd sentence begins, "since ADS-B will be sharing ...". Realizing that 1090ES has been approved by the FAA, and 1090ES transmissions are now operational, I propose the wording, "since ADS-B is sharing ...". Also at the end of the same sentence, I propose adding, "in the future", for the same reason.

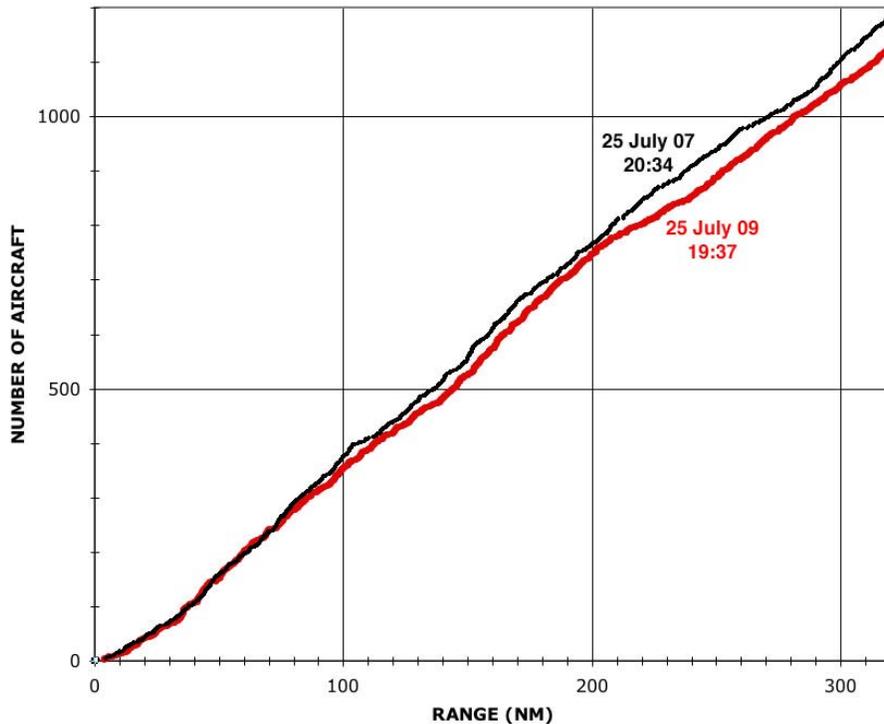
The remainder of this paragraph, and the next two paragraphs seem inappropriate to me. They give a lot of detail, which doesn't add to the points being made. All that needs to be stated is that airborne measurements were made in 2007 along with simultaneous SSR measurements, to use as a basis for projecting into the future.

Paragraph 4 in P.5.1 This is good material, appropriate here.

Paragraph 5 in P.5.1. This seems unnecessary, and I propose not keeping it. If it were deleted, the remaining material would be sufficient by itself.

Paragraph 6 in P.5.1. This is a rough draft needing some editorial work (having the word "based" twice in the first sentence). I think the last two sentences could be eliminated because the point would be obvious to any technical person.

Paragraph 7 in P.5.1. In describing the measurements, I propose adding a figure to summarize the results. Here is a draft.



**Traffic Density Measurements, 25 July 2007  
Centerpoint is JFK Airport**

I suggest eliminating "the number of aircraft was normalized to 1000" because this is describing measurements; the text already said that measurements were made, and the text below this point will say that the measurements were used to develop future environments 1, 2, 3, and 4, so there is no need to describe a process of normalization.

Also I suggest starting a new paragraph where the subject changes from the measurements in 2007 to the development of four future environments.

Section P.5.2. In describing the four environments, I propose showing the assumed growth factors more clearly, as in the example table I sent previously.

Also, we should add here some material to describe the assumptions such as the 2:1 reduction in PRF. Here is a draft.

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" In considering future higher aircraft densities, it is necessary to consider possible changes in the frequency management by the FAA of 1030/1090 MHz. For example, the FAA recognizes that the rate of All-Call interrogations by SSRs is higher than needed by about 2:1 and the FAA is implementing a plan to make a 2:1 reduction. Looking many years into the future, it is reasonable to assume that the 2:1 reduction has been made, and that assumption was used in this study. Other similar assumptions can be summarized as follows.

Terra Fix. The FAA is planning to phase-out the Terra Fix, and it was assumed that it will be phased-out for environments 1, 2, 3, and 4.

Extended All-Call Lockout. Although the FAA is considering extending All-Call Lockout beyond 60 NM, that change was not assumed in this study.

Fewer SSRs. With increasing ADS-B, the FAA is planning to reduce the number of SSRs by 50 percent. For this study, an SSR reduction by 8 percent was assumed for all four interference environments.

Unwanted Mode A Replies. Airborne measurements have revealed a mechanism in which unwanted Mode A replies are triggered by low-level Mode S interrogations. This problem is limited to certain transponder models, and transponder standards have been changed to eliminate the problem in the future. But it was assumed in this study that this problem will not be controlled in the future.

TCAS Interference Limiting. Some limitations in the effectiveness of TCAS interference limiting have been observed. It was assumed for this analysis that no steps will be taken in the future to keep Interference Limiting working effectively.

TCAS Hybrid Surveillance. It is generally expected that Hybrid Surveillance will improve the efficiency of TCAS and reduce the effects of TCAS on the frequency band use. This study assumed that Hybrid Surveillance will reduce TCAS interrogation effects by 60 percent in the four future environments."

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Section P.5.3.2 Class A3 Results. I think we should use the same four requirements that are in Appendix P currently. In other words, adding a column for 60 NM is inappropriate. There is no RTCA requirement for R = 60 NM and T = 12 sec.

It might be interesting and useful to make an overall summary of the Appendix P results. We could include the existing four cases together with these four new cases. Draft:

<b>Environment</b>	<b>A3 Range</b>
<b>Power Limited</b>	<b>140 NM</b>
<b>Low Density</b>	<b>135 NM</b>
<b>LA[24k]</b>	<b>70-80 NM</b>
<b>LA[30k]</b>	<b>60-70 NM</b>
<b>NY[x1.4]</b>	<b>&gt; 40 NM</b>
<b>NY[x1.7]</b>	<b>&gt; 40 NM</b>
<b>NY[x2.1]</b>	<b>35 NM</b>
<b>NY[x2.5]</b>	<b>30 NM</b>

Section P.5.3 says, "**all update intervals were calculated on the assumption that an update could be done upon receipt of either a position or velocity squitter. Some applications may put more stringent requirements on the nature of updates.**" That is incorrect for the Lincoln Laboratory analysis. Instead of using a simple assumption like that, we used the more substantive analysis given in Appendix K of DO-260A and in Appendix B of "1090 MHz Extended Squitter Assessment Report" (reprinted in full in 1090-WP29-17). The level of performance on which Lincoln's analysis was based is the ADS-B MASPS (DO242A), which requires both P and V time registered. Our analysis applies to a tracking received that makes use of individual receptions and makes available time-registered P and V to all applications at all times.