MASPS for ADS-B Rev. A

Tracking Information (committee secretary only)	
Change Issue Number	15
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Short Title for Change Issue:	Effective received update rate versus altitude differential

MASPS Document Reference:		Originator Information:	
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Paragraph number(s)	3.3.1	E-mail	steveheppe@adsi-m4.com
Table/Figure number(s)	Table 3-4	Other	

Proposed Rationale for Consideration (originator should check all that apply):	
	Item needed to support of near-term MASPS/MOPS development
X	DO-260/ED-102 1090 MHz Link MOPS Rev A
X	ASA MASPS
	TIS-B MASPS
X	UAT MOPS
	Item needed to support applications that have well defined concept of operation
	Has complete application description
	Has initial validation via operational test/evaluation
	Has supporting analysis, if candidate stressing application
	Item needed for harmonization with international requirements
	Item identified during recent ADS-B development activities and operational evaluations
X	MASPS clarifications and correction item
X	Validation/modification of questioned MASPS requirement item
	Military use provision item
	New requirement item (must be associated with traffic surveillance to support ASAS)

Nature of Issue:		Editorial	X	Clarity		Performance	X	Functional

Issue Description:

Current MASPS update rate requirements seem to be framed in an overly simplistic manner since they are driven by lateral offset or slant range and ignore altitude differential. Hence if aircraft A is at 3000 feet, and aircraft B is at 20,000 feet directly above, they are required to maintain an effective 3 second update rate (95%) for Aid to Visual Acquisition. However, these two aircraft cannot possibly interact, and most display systems would filter-out the target information since it would merely clutter the display.

From a safety standpoint, the highest update rates should be maintained for aircraft in close proximity at roughly the same altitude, but lower update rates can be allowed if altitude differentials are large (just as lower update rates can be allowed if lateral separation is large). Hence the MASPS do not frame "true minimum requirements," and should be adjusted.

Of course from the standpoint of a given transmitter (e.g., aircraft B in the example above), there may also be an aircraft C in close proximity at the same altitude and this aircraft would need a high update rate. So aircraft B would need to operate at a high update rate even though aircraft A does not require it. This is beside the point – the MASPS should frame true minimum requirements and not simplifications intended to ease documentation.

Issue Description (continued):

In the case of a multi-frequency system such as VDL/4, different airspaces may share a subset of frequencies and have other frequencies that are not shared. For example en route airspace might operate on two Global Signaling Channels (GSC1 and GSC2) while a terminal area airspace might operate on GSC2 and a local signaling channel (LSC). Continuing the example above, aircraft A in the terminal area would operate on GSC2 and LSC while aircraft B in overflight would operate on GSC1 and GSC2. These two aircraft would receive each other's transmissions on GSC2 (which they have in common), but would not see transmissions on the channels which are disjoint. This would be reasonable and safe, and in fact the pilots of the two aircraft would be unlikely to be aware of each other's presence anyway since their respective display software packages would filter-out target reports having such large vertical separations. An adjustment to the MASPS, capturing the true minimum requirement, would enable this spectrum planning flexibility.

For all ADS-B systems including single-frequency systems such as Mode S and UAT, a "zone of silence" or perhaps a zone of reduced performance may exist directly above and below an aircraft. So an accurate reflection of the true minimum requirement is desirable to avoid overly constraining the eventual solution.

Aircraft in flight have little or no need to observe aircraft on the surface, particularly if the surface aircraft is off the movement area. Aircraft on the surface may have a high update rate requirement among themselves (even exceeding the airborne requirement). The separation of domains may be considered an extreme case of altitude separation, and further demonstrates that a one-dimensional relationship between update rate and lateral separation is overly simplistic.

Originator's proposed resolution:

(Conceptual) For Aid to Visual Acquisition, allow a reduced reporting rate by a factor of 2 if altitude separation is greater than 3000 feet. Allow a reduced reporting rate by a factor of 3 if altitude separation is greater than 6000 feet. For Separation Assurance and Sequencing, allow a reduced reporting rate by a factor of 1.5 if altitude separation is greater than 6000 feet. Insert text to specifically exempt reporting between pairs of aircraft in non-interacting domains (e.g., airborne versus surface non-movement area).

Working Group 6 deliberations:

February 28, 2001: This Issue Paper was discussed by ad hoc group at their February 2001 meeting. A generic broadcast ADS-B system does not have position awareness of potential listeners and therefore cannot adjust its transmission characteristics. Even though this could be done in some ADS-B implementations, it cannot be imposed on the generic ADS-B transmitter. This could be addressed on the reception side as reports are assembled for passage to applications. Therefore, it was agreed that this issue paper will be REJECTED. An attachment to this Issue Paper will be written that will further discuss the rational on which the rejection was based. [AI 3-9]