**RTCA Special Committee 186, Working Group 3**

**ADS-B 1090ES MOPS Maintenance**

**Meeting #24**

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# DO-260A Field Definitions Need Clarification for Implementation of the NPRM Requirements

Revision 1

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**DO-260A Field Defintions Need Clarification for Implementation of the NPRM Requirements**

A few parameters defined by DO-260A have descriptions that are not concrete enough to implement without clarification. This paper will identify the parameters and paragraphs of interest, and recommend that WG-3 provide formal clarification through a Change 3 to DO-260A.

The NPRM requires "An indication if the flight crew has selected to receive ATC services". DO-260A §2.2.3.2.7.2.4.4 entitled "Receiving ATC Services" states the following:

> The "Receiving ATC Services" Operational Mode Code is a one-bit subfield ("ME" bit 29, Message bit 61) of the OM Code subfield in Aircraft Operational Status Messages. The ADS-B Transmitting Subsystem shall set this OM Code to ONE when the ADS-B Transmitting Subsystem is Receiving ATC Services, as indicated by an update having been received via an appropriate interface on board the transmitting aircraft within the past 5 seconds. Otherwise, this OM Code shall be set to ZERO.

It is unclear what the intent is with regard to setting this bit. I have spoken with several industry contacts and gotten some very different interpretations. One interpretation is that any 4096 code other than VFR (1200) should set this bit. Considering that we are now required to transmit the 4096 code in a squitter, it seems that this bit would be redundant if that is the intent. A further complication of this intent is that the VFR code is not 1200 in some countries. Would the ADS-B transmitter need to know what VFR code was currently applicable? Another interpretation I have heard is that this is a mechanism for reducing com channel traffic by allowing a pilot to press a button to indicate to ATC that he has a request as opposed to saying so over the com. Admittedly, this is not a likely interpretation but it illustrates the point that this language could use some improvement.

DO-260A §2.2.3.2.6.1.4 entitled "IFR Capability Flag" Subfield in Airborne Velocity Messages - Subtype "1" states the following:

> The "IFR Capability Flag " subfield is a 1-bit ("ME" bit 10, Message bit 42) field that shall be used to indicate IFR capability by being encoded as specified in Table 2-24.

Table 2-24: "IFR Capability Flag" Encoding

| Coding | Meaning |
|---|---|
| 0 | Transmitting aircraft has no capability for applications requiring ADS-B equipage Class "A1" or above |
| 1 | Transmitting aircraft has capability for applications requiring ADS-B equipage Class "A1" or above |

If you look at Table 2-3 in the front of the document, it would appear that you set this bit when you implement one or all of the following: Simultaneous Approaches, Separation Assurance and Sequencing, Flight Path Deconfliction Planning. This terminology is roughly equivalent to some of the applications being worked today in various working groups: Merging and Spacing, Sequencing and Merging, In Trail Procedures. Another possible interpretation is that we have TX/RX capability for all of the required message fields in Class A1 as well as the required transmit power and receiver sensitivity. Again, this paragraph could use some clarification to ensure consistent implementation.

The NPRM requires "An indication whether a cockpit display of traffic information (CDTI) is installed and operable". DO-260A §2.2.3.2.7.2.3.3 entitled "CDTI Traffic Display Capability" CC Code Subfield in Aircraft Operational Status Messages" states:

> The CC Code for "CDTI Traffic Display Capability" in Aircraft Operational Status Messages (TYPE=31, Subtype=0 or 1) is a 1-bit field ("ME" bit 12, message bit 44) that shall be set to ONE (1) as specified in Table 2-63 if the transmitting aircraft has a Cockpit Display of Traffic Information (CDTI) installed and that display is currently operating in a mode capable of displaying nearby ADS-B traffic. Otherwise, this CC code shall be ZERO (0).

Table 2-63: CDTI Traffic Display Capability Encoding

| **CDTI Traffic Display Capability** | **Meaning** |
|---|---|
| 0 | No capability for CDTI Traffic Display Capability |
| 1 | Transmitting Aircraft has CDTI Installed and Operating |

It is unclear what operational use this field has as defined. Having an operational CDTI is not sufficient to communicate capability to perform an application. It seems likely that this bit was a precursor to the ASA Capability Level (ACL) as defined in DO-289. If the NPRM intends to use this field to communicate capability to perform an ASA Application, then the requirements of that application should be met before setting this field. A possible operational use of this field is by the Ground Based Transceivers when determining if TIS-B targets should be produced for a participating aircraft. If that is confirmed, then those application requirements should be included in the text of this requirement to ensure consistency across transmit implementations. Otherwise, it is our recommendation to mark this field reserved until MOPS Requirements are defined for ACL.

## Supporting Information from Teleconference:

The following notes were taken during a Teleconference with Tom Pagano and Rich Jennings regarding these and other questions. I'm including this information here for reference.

**Question 1:**

Why does DO-260A require transmission of squitters that have been zeroed out? This can be confusing to interpret on the receive side as zeroed type codes cannot be distinguished.

Don's Proposal:

I recommended that we do not transmit zeroed type codes.

FAA Response:

Tom said that the reason for the requirement was to continue to transmit Pressure Altitude and that the other squitters were an unintentional side effect of the language. He recommended that I present a white paper to WG-3 recommending language for only transmitting zero type code position squitters. This change will be considered by the committee for inclusion in DO-260A Change 3. In the meantime, this would be a deviation to DO-260A Change 2.

Status:

**Closed**. We will only squitter position with Type Code 0. I need to write a new deviation to add to Kevin's list. I need to draft a paper to WG-3.

**Question 2:**

DO-260A §2.2.3.2.6.1.3 states that the Intent Flag bit is to be set for 18 seconds after any change to registers 40, 41, or 42. I asked if the original intent of this bit has been overcome by changes to the definition of the trajectory registers. If so, what is the requirement for this field?

Don's Proposal:

I recommended that we set this bit to zero and reserve it for future use.

FAA Response:

Tom took an action to look into the intent of this bit with respect to the changes in the intent registers. He recommended that we implement setting this flag when data in register 40 changes.

Status:

**Closed**. We will set the intent change flag when GICB 40 changes. If the requirement changes in the future, we will deal with it then.

**Question 3:**

DO-260A §2.2.3.2.7.2.4.4 defines the Receiving ATC Services bit. This bit is supposed to be set when you are receiving ATC services. That is the extent of the definition in DO-260A. What exactly is the logic for setting this bit?

Don's Proposal:

I suggested that this bit has been overcome by events. When this bit was created, the link did not transmit Mode A code. Since then, the airspace operators have realized many of the automation systems cannot operate without this information. As a result, the Mode A code is now squittered in Type 23 Subtype 7. With this information on the link, the Receiving ATC Services bit is redundant. I proposed reserving this bit for future use.

FAA Response:

Tom Pagano was sympathetic to this argument. Tom and Rich took the action to get an official response on this proposal. The problem is that this bit is called out in the rule so there are policy issues twisted up with the technical issues.

Status:

**Open**, pending FAA response. For now, our placeholder requirement should be that this bit is set whenever the Mode A code is not equal to 1200. Depending on the outcome of the FAA discussions, we may be asked to include this issue in a paper to WG-3.

**Question 4:**

DO-260A §2.2.3.2.6.1.4 defines the IFR Capability Flag bit. The language in this paragraph talks about implementing certain applications and messages sets. The text regarding the applications is particularly problematic because those application descriptions are very out of date. The question is what is the real criteria for setting this bit.

FAA Response:

Tom said that only the power levels, antenna diversity, and implemented messages should be considered when setting this bit. He recommended that this clarification be presented in a paper to WG-3.

Status:

**Closed**. We will set this bit to zero as we do not currently process any received reports as stated in Table 2-5. I will add this clarification to an issue paper to WG-3.

**Question 5:**

DO-260A §2.2.3.2.7.2.3.3 defines the CDTI Traffic Display Capability bit. It is unclear what operational use this field has as defined. Having an operational CDTI is not sufficient to communicate capability to perform an application. It seems likely that this bit was a precursor to the ASA Capability Level (ACL) as defined in DO-289. If this field is intended to communicate capability to perform an ASA Application, then the requirements of that application should be met before setting this field. Those application requirements should be included in the text of this requirement to ensure consistency across transmit implementations. Otherwise, it my recommendation to mark this field reserved until MOPS Requirements are defined for ACL.

FAA Response:

Like above, Tom Pagano was sympathetic to this argument. Tom and Rich took the action to get an official response on this proposal. The problem is that this bit is called out in the rule so there are policy issues twisted up with the technical issues.

Status:

**Open**, pending FAA response. Regardless of the outcome of this discussion, our requirement will be to set this bit to zero as we have no ADS-B in capability in Primus EPIC at this time. Depending on the outcome of the FAA internal discussion, I may need to submit this issue in a paper to WG-3.