

RTCA SC-159 WG-4 Action Item 7 Update

VDB Protocol Time-to-Alarm Protocol

Background: Currently, the only timing requirement related to the airborne authentication protocols is to remove or flag deviations and dPVT within 2 seconds of a protocol failure [Ref P10_Savoy from March 2012 and the current baseline]. In addition, we need to identify the time-to-detect allowances or requirements for those parts of the protocol that may require multiple “tests” to achieve reasonable false detection rates or to gain sufficient confidence to declare a protocol “failed.” Last, we need to include the working group’s agreement from March 2013 to require a new output to indicate the VDB authentication failure [Ref P17_Savoy from March 2012]. Note that only the first part of that proposal was agreed in principle at that meeting.

Note only MOPS text is shown below. The airborne authentication protocols are not contained in Annex 10, only the ground and VDB data broadcast requirements are given.

Strawman changes to Section 2.3.7.3 VDB Message Authentication Protocols: Changes are indicated from the current baseline (not from the published DO-253C).

GAEC D PAN equipment shall [LAAS-327] conform to the authentication protocols defined in this section.

Note: It is recommended that all PAN equipment conform to the authentication protocols.

PAN equipment that conforms to Authentication Protocols shall [LAAS-328] check the first character of the Reference Path Identifier (RPI) within [TBD] seconds after approach selection. If the character is in the set : { A, X, Z, J, C, V, P, T }, then the ground station supports Authentication Protocols, and the PAN equipment shall [LAAS-329] exercise protocols “a” through “f” below. When any of the VDB message authentication verification protocols fail, the equipment shall [LAAS-330] within 2 seconds remove or flag invalid the output of all deviations and differential PVT that are determined by applying LAAS differential corrections.

In addition, the equipment shall [LAAS-TBD] announce the presence of a VDB authentication failure within 2 seconds. The annunciation [LAAS-TBD] shall persist as long as the failure condition exists.

- a) Verify that the Station Slot Identifier (SSID) from the VDB message training sequence matches the slot indicated by the coding of the first character in the RPI from the Type 4 Message FAS data block per Table 2-11.
- b) Verify within 5 [TBC] consecutive received frames with Type 2 Messages that Type 2 Messages from the selected ground station are received only in the slot indicated by the SSID.

Note (1): The selected ground station is indicated by the GBAS ID in the message header of the Type 4 Message that contains the FAS datablock with the RPDS that matches the RPDS derived from the channel number per section 2.3.5.

Note (2): *It may take multiple frames with Type 2 Messages to verify the occupied slot depending upon the architecture of the VDB and PAN equipment. This verification is performed for the duration of use of Type 2 data from the selected ground station.*

Editorial Note: *The Type 2 Message can be transmitted at any rate from once per 20 consecutive frames to once per frame. A ground station provider with authentication could choose the most frequent rate to minimize the airborne receiver time needed to do this verification. However, CSG advocated meeting the requirements with the minimum transmit rate*

- c) Verify that the Type 2 Message being used has been received within the last 1 minute.
- d) Only use messages from slots assigned to the ground station in the Slot Group Definition (SGD) from the Type 2 Message, Additional Data Block 4.

Note: *Determining if the ground station supports the authentication protocols and determining the SGD from the Type 2 Message occur in parallel.*

- e) Continuously verify, within 5 [TBC] consecutive frames containing the selected FAS Data Block, that the selected FAS Data Block does not change at any time after approach selection, otherwise discontinue use of the ground station. All bits of the FAS datablock must be checked. All bits of the FAS datablock must be checked each time the FAS datablock is received.

Note (1): *FASLAL and FASVAL are not included in the FAS datablock.*

Note (2): *It may take multiple receptions of the FAS Data Block to confirm with confidence that there is a change in the received data.*

Editorial Note: *The FAS Data Block can be transmitted at any rate from once per 20 consecutive frames to once per frame. A ground station provider with authentication could choose the most frequent rate to minimize the airborne receiver time needed to do this verification; however, CSG advocated meeting the requirements with the minimum transmit rate (including tuning and re-tuning timing requirements).*

- f) Verify that the Slot Group Definition does not change at any time after approach selection.

Note: *The GPS receiver continues to output PVT in accordance with Section 2.1.*

If the first character of the Reference Path Identifier (RPI) is not in the set of { A, X, Z, J, C, V, P, T }, then the ground station does not support Authentication Protocols, and the PAN shall [LAAS-331] not exercise the Authentication Protocols.

Table 2-1 RPI First Character Mapping to SSID

First Character of Reference Path Identifier	Corresponding SSID
A	0
X	1
Z	2

Deleted: v

Deleted: ¶

J	3
C	4
V	5
P	6
T	7

