RTCA Special Committee 186, Working Group 3

ADS-B 1090 MOPS, Revision A

Meeting #8

Action Item 2-16

TIS-B Management Message Format

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At the second meeting of WG-3, Action Item 2-16 was identified to draft a candidate TIS-B Management Message for Service Volume coverage.

This Working Paper presents a briefing that reviews the requirements for the Service Volume Message and presents a proposed format.

Introduction

- TIS-B formats make provision for management messages
- Management messages not currently required by the TIS-B MASPS
- Management message seems to be required to define coverage area for TIS-B users
- Management message seems very useful for selection of coarse messages in overlapping regions

TIS-B coverage Area Definition

- TIS-B user needs to know limit of TIS-B coverage
  - To alert pilot that TIS-B service is terminating
- Management message can serve as a “keep alive”
  - to alert pilot that aircraft has dropped below minimum service altitude
- TIS-B station should broadcast management message
  - To provide station SVID, and service area limits
  - Limits could include 2D area and minimum altitude at the limits of coverage

SVID Use for Track Stability

- Airborne aircraft may receive TIS-B messages from more than one TIS-B ground station in transition region
- Coarse formats are normally based on surveillance from a rotating beam sensor. Unless adjacent sensor data is merged:
  - Messages from different ground stations should not be mixed
  - Different biases may cause track to be wander
- Airborne user should select data from only one ground station based on the Service Volume ID (SVID) in the coarse format
  - Can choose message based on data from nearest radar
- SVID not necessary for fine format
  - Data quality will be similar to GPS (e.g., time difference multilateration surveillance system)
  - NAC can be used to select data source

TIS-B Format Approach

- DF=18 extended squitter defined for non-transponder services

- CF Field current definition
  - CF=0 indicates standard extended squitter formats from a non-transponder device
  - CF=1 to 7 undefined
- Propose definition of additional CF field codes as follows:
  - CF=2: Coarse TIS-B service based on ASR quality surveillance
  - CF=3: Fine TIS-B service based on high qualityu surveillance (e.g., a surface multilateration system)
  - CF=4: TIS-B management messsages

Data Fields

- Aircraft address not needed for management message
  - Can be used for message data
- Remainder of message contained in the ME field

Management Message Data Formats

- 24-bit AA Field
  - Subtype 1: SVID and Lat, Lon MSBs
  - Subtype 2: SVID and Minimum Height
- 56-bit ME Field
  - Subtypes 1 &2: Rho-theta map
    - 360, 90 or 30 degree sectors
  - Subtype 3 & 4: Cartesean map
    - Up to 10 vertices

24-Bit AA Field Formats

Bits	
1	Subtype Code =1
2	
3	
4	SVID
5	
6	
7	
8	
9	
10	LAT MSBs
11	
12	
13	
14	LSB-100NM
15	
16	
17	
18	LON MSBs
19	
20	
21	
22	LSB-100NM
23	
24	

Bits	
1	Subtype Code =2
2	
3	
4	SVID
5	
6	
7	MSB=8000 ft
8	
9	Min altitude
10	
11	LSB=500ft
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

ME Field Rho-Theta Formats

Bits	
1	
2	Subtype Code=1
3	
4	
5	R-T Control Field
6	
7	
8	Reserved
9	
10	
11	
12	Radar Site Lat
13	
14	
15	LSB-1.5 NM
16	
17	
18	Radar Site Lon
19	
20	
21	LSB-1.5 NM
22	MSB=64 NM
23	
24	
25	Range 1
26	
27	
28	LSB=1 NM
29	MSB=64 NM
30	
31	
32	Range 2
33	
34	
35	LSB=1 NM
36	MSB=64 NM
37	
38	
39	Range 3
40	
41	
42	LSB=1 NM
43	MSB=64 NM
44	
45	
46	Range 4
47	
48	
49	LSB=1 NM
50	MSB=64 NM
51	
52	
53	Range 5
54	
55	
56	LSB=1 NM

Bits	
1	
2	Subtype Code=2
3	
4	
5	
6	Reserved
7	
8	MSB=64 NM
9	
10	
11	Range 6
12	
13	
14	LSB=1 NM
15	MSB=64 NM
16	
17	
18	Range 7
19	
20	
21	LSB=1 NM
22	MSB=64 NM
23	
24	
25	Range 8
26	
27	
28	LSB=1 NM
29	MSB=64 NM
30	
31	
32	Range 9
33	
34	
35	LSB=1 NM
36	MSB=64 NM
37	
38	
39	Range 10
40	
41	
42	
43	MSB=64 NM
44	
45	
46	Range 11
47	
48	
49	LSB=1 NM
50	MSB=64 NM
51	
52	
53	Range 12
54	
55	
56	LSB=1 NM

ME Field Cart. Formats

Bits	
1	
2	Subtype Code=3
3	
4	
5	Cart Control Field
6	
7	
8	
9	Vertex 1 Lat
10	
11	LSB- 3 NM
12	
13	
14	Vertex 1 Lon
15	
16	LSB- 3 NM
17	
18	
19	Vertex 2 Lat
20	
21	LSB- 3 NM
22	
23	
24	Vertex 2 Lon
25	
26	LSB- 3 NM
27	
28	
29	Vertex 3 Lat
30	
31	LSB- 3 NM
32	
33	
34	Vertex 3 Lon
35	
36	LSB- 3 NM
37	
38	
39	Vertex 4 Lat
40	
41	LSB- 3 NM
42	
43	
44	Vertex 4 Lon
45	
46	LSB- 3 NM
47	
48	
49	Vertex 5 Lat
50	
51	LSB- 3 NM
52	
53	
54	Vertex 5 Lon
55	
56	LSB- 3 NM

Bits	
1	
2	Sub Type Code=4
3	
4	
5	Control Field
6	
7	
8	
9	Vertex 6 Lat
10	
11	LSB- 3 NM
12	
13	
14	Vertex 6 Lon
15	
16	LSB- 3 NM
17	
18	
19	Vertex 7 Lat
20	
21	LSB- 3 NM
22	
23	
24	Vertex 7 Lon
25	
26	LSB- 3 NM
27	
28	
29	Vertex 8 Lat
30	
31	LSB- 3 NM
32	
33	
34	Vertex 8 Lon
35	
36	LSB- 3 NM
37	
38	
39	Vertex 9 Lat
40	
41	LSB- 3 NM
42	
43	
44	Vertex 9 Lon
45	
46	LSB- 3 NM
47	
48	
49	Vertex 10 Lat
50	
51	LSB- 3 NM
52	
53	
54	Vertex 10 Lon
55	
56	LSB- 3 NM