

Specifications of Airmate APRS Message Encoding

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1. Introduction

Airmate is a free Electronic Flight Bag application used by hundreds of thousands of pilots worldwide. In the interest of flight safety, Airmate apps report their position to Airmate servers for sharing with the community (this reporting may be disabled according to app privacy settings). If authorized by privacy settings, those position messages may be sent to OGN servers to improve traffic coverage and safety (<http://ognproject.wikidot.com/start>).

Position reporting to OGN is performed using Airmate APRS message format conformant to standard OGN-flavoured APRS aircraft beacon messages.

2. Versioning

In accordance with the OGN's versioning schema, sent messages may be versioned using the destto field of the APRS message.

Format version consists of two parts:

- 6-character long OGN-assigned TOCALL for Airmate: OGAIRM
- optional 1-character long format version

Thus, every version will be formatted as OGAIRM-<version>, for example OGAIRM-1. Note: The destto field may be set to OGAIRM. This implies version 1.

3. Message format

Every message will begin with a header and will contain a comment as described below.

Header

Header of each message is formatted as specified in the original APRS message specification (1):

```
<device_type><device_id>>OGAIRM,qAS,Airmate: /<timestamp>h<latitude>  
<symbol_table_id><longitude><symbol_code><heading>/<ground_speed>/A=  
<altitude> <comment>
```

Parameters:

device_type: 3-character device type identifier: AIR

device_id: 24-bit device identifier written in hexadecimal format. Device identifier is only

unique in the used namespace (either Airmate if the device identifier address type is set to 0, or to ICAO if it set to 1).

timestamp using the HMS format as specified in APRS 1.01 (e.g. 010203 means 01:02:03 UTC).

latitude encoded on 8 characters as specified in APRS 1.01

symbol_table_id encoded on 1 character as specified in APRS 1.01

longitude encoded on 9 characters as specified in APRS 1.01

symbol_code encoded on 1 character as specified in APRS 1.01

heading in degrees encoded on 3 digits as specified in OGN-flavoured APRS¹

ground_speed in knots encoded on 3 digits as specified in OGN-flavoured APRS¹

altitude in feet as specified in OGN-flavoured APRS

Comment format

Airmate is strictly compliant with OGN's comment format. Comments will be formatted as follows:

```
!W<precision_enhancement>! id<identifier> +<climb_rate>  
<turn_rate>rot <gps_accuracy>gps
```

Parameters:

precision_enhancement as specified in OGN-flavoured APRS

identifier: 32-bit device identifier. See below for details

climb_rate in feet/minute as specified in OGN-flavoured APRS

turn_rate in radians/minute as specified in OGN-flavoured APRS. Depending on the capability of the Airmate client app and connected sensors, this parameter may be missing.

GPS accuracy in the format gpsaxb where a is horizontal accuracy and b vertical accuracy (e.g. gps5x3 for 5m horizontal and 3m vertical). Depending on the capability of the Airmate client app and connected sensors, this parameter may be missing.

Device identifier

We have aligned our device identifier format to the one specified by OGN, in which device identifier is a sequence of 32 bits encoded in a hexadecimal format (most significant bit first). It encodes (listed from most to least significant bits):

- bit 0: stealth mode
- bit 1: do not track mode
- bits 2-5: aircraft type
- bits 6-7: address type namespace:
 - 00: unknown: used for Airmate own addresses (24-bit identifiers)
 - 01: ICAO: used when Airmate broadcast an ICAO 24-bit identifier for a known aircraft)
 - 10: FLARM 24-bit identifier
 - 11: OGN trackers 24-bit identifier

¹ OGN-flavoured APRS specification states that if heading and ground speed are set to 0 (i.e. the relevant part of the message is 000/000), this indicates no data is provided for either of the fields.

- bits 8-31: device id (24-bit device identifier, same as in APRS header)

When the address type is set to unknown (Airmate), the device id address is set to an internal value specific to Airmate space. If the ICAO 24-bit identifier of the aircraft used is known to the Airmate app, Airmate will broadcast the ICAO 24-bit identifier and will use ICAO (x01) as address type namespace.

4. Examples

```
AIRF00108>OGAIRM,qAS,Airmate:/151624h4325.51N\00635.48E^245/186/A=00
2805 !W00! idf00108 +198
AIRF00108>OGAIRM,qAS,Airmate:/151627h4325.46N\00635.35E^245/186/A=00
2822 !W60! idf00108 +198
AIRF00108>OGAIRM,qAS,Airmate:/151628h4325.42N\00635.22E^245/186/A=00
2839 !W30! idf00108 +204
AIRF00108>OGAIRM,qAS,Airmate:/151631h4325.37N\00635.09E^245/186/A=00
2855 !W90! idf00108 +198
AIRF00108>OGAIRM,qAS,Airmate:/151633h4325.33N\00634.96E^245/186/A=00
2872 !W60! idf00108 +198
AIRF00108>OGAIRM,qAS,Airmate:/151635h4325.29N\00634.83E^245/186/A=00
2889 !W21! idf00108 +204
```

5. References

1. APRS Protocol Reference, Protocol Version 1.0: <http://www.aprs.org/doc/APRS101.PDF>
2. OGN-flavoured APRS: https://github.com/svoop/ogn_client-ruby/wiki/OGN-flavoured-APRS/c6678fecc15222cb980f491d09dfaba7e2982df6
3. APRS SPEC Addendum 1.2 Proposals, <http://www.aprs.org/aprs12.html>