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Tracking Protocol Description

This document describes the messages stream produced by the glideradar_master daemon that receives the data from the various stations and processes it in a more useful format.

AMQP message format

AMQP messages from the glideradar_master dameon are sent to the *ygg.glideradar.processed_messages* topic exchange.

Every AMQP message has a *type* header that specifies the message type.

The payload is JSON-encoded and the contents are type-specific.

Bayeux message format

The Bayeux interface is accessible at the URI

`http(s)://tracker.acao.it/faye`

The client should subscribe to the `/glideradar/processed/**` channel.

The general structure of all the messages is the following:

```
{
  type: "<TYPE>",
  payload: Object,
  timestamp: "2015-06-24T16:48:30.000+02:00"
}
```

There are several message types, for each type *payload* contains the encapsulated data whose structure is type-specific.

TRAFFICS_UPDATE

"payload" contains an object with the following attributes:

```
{
 stations: Object,
 traffics: Object
}
```

Both *stations* and *objects* should be treated as associative arrays.

Stations

stations contains updates for all the active stations, every attribute (key) is the station identifier defined by us.

This is an example of a station object:

```
{
  alt: 240.1,
  cog: 0,
  flarm_code: null,
  gps_fix_qual: 1,
  gps_fix_type: 3,
  gps_hdop: 1.34,
  gps_pdop: 2.9,
  gps_sats: 7,
  gps_vdop: 2.57,
  last_update: "2015-06-24T14:50:31.000Z",
  lat: 45.80802766666667,
  lng: 8.772236333333334,
  name: "ACAO",
  sog: 0.013,
}
```

`alt`	Altitude in meters
`cog`	Course-Over-Ground in degrees
`flarm_code`	FLARM identifier. Null if not available.
`icao_code`	ICAO identifier. Null if not available.
`gps_fix_qual`	GPS Fix quality
`gps_fix_type`	GPS Fix type (0,1=Not available, 2=2D, 3=3D)
`gps_hdop`	GPS Horizontal dispersion
`gpd_pdop`	GPS Position dispersion
`gps_sats`	Number of GPS sats active
`gps_vdop`	GPS Vertical dispersion
`last_update`	Last update received this station
`lat`	Latitude in decimal degrees. Positive values for N, negative values for S
`lng`	Longitude in decimal degrees. Positive values for E, negative for W
`name`	Station identifier, equal to the key
`sog`	Speed Over Ground in m/s

Traffics

traffics contains updates for all the object for which an update has been received within the last 1-second frame.
traffics attributes (keys) are an unique, opaque, identifier for the specific traffic.

This is an example of a traffic entry:

```
{
  alt: 238.1,
  cog: 0,
  cr: 0.1,
  last_update: "2015-06-24T14:50:30.000Z",
  lat: 45.809054001026,
  lng: 8.770054324061164,
  plane_id: 1851,
  sog: 0,
  tr: 0,
  type: 1,
}
```

`alt`	Altitude in meters
`cog`	Course-Over-Ground in degrees
`cr`	Climb rate in m/s
`last_update`	Last update received for the specified traffic
`lat`	Latitude in decimal degrees. Positive values for N, negative values for S
`lng`	Longitude in decimal degrees. Positive values for E, negative for W
`plane_id`	Plane identifier, equal to the key
`sog`	Speed Over Ground in m/s
`tr`	Turn rate in °/s
`type`	Traffic type according to FLARM specified types

TRAFFIC_NEW

```
{
  plane_id: 3906,
  plane_info: {
    common_radio_frequency: "128.450",
    flarm_code: "DF0860",
    flarm_id: "flarm:DF0860",
    home_airport: "LILC",
    icao_code: null,
    owner_name: "ACAO",
    plane_id: 3906,
    race_registration: "",
    registration: "I-IVWP",
    type: 1,
    type_id: 56,
    type_name: "Schleicher ASK-21",
  },
  text: “New traffic I-IVWP (DF0860), type 1”,
}
```

This message is sent when new traffic is showing up as a convenience for the tracking visualizer. The information in *plane_info* comes from FlarmNet and an internal database which has higher priority.

If the tracking visualizer is started after TRAFFIC_NEW was sent the same data can be obtained with an HTTP request to `http(s)://tracker.acao.it/ygg/planes/<id>` with an `Accept: application/json` header or the .json extension appended to the URI.

TRAFFIC_ALIVE

```
{
  since: “2015-06-24T15:01:36.000Z”,
  text: “Traffic MOBIL1 (DF0853) Not alive”,
}
```

Traffic that is still active but whose signal has been lost is alive again. *Since* contains the timestamp when the traffic has been lost.

TRAFFIC_LOST

```
{
  text: “Traffic MOBIL1 (DF0853) Reception lost”,
}
```

Traffic data was not received for 10 seconds so it is now considered lost.

TRAFFIC_REMOVED

```
{
  text: “Traffic D-2155 (DF0879) removed”,
}
```

Traffic data was not received for several minutes so it was removed from the list of active traffics.

STATION_ONLINE

```
{
  since: “2015-06-24T15:01:36.000Z”,
  sta_id: “ACAO”,
  sta: {
    alt: 238.7,
    cog: 0,
    flarm_code: null,
    gps_fix_qual: 1,
    gps_fix_type: 3,
    gps_hdop: 0.94,
    gps_pdop: 1.64,
    gps_sats: 9,
    gps_vdop: 1.34,
    last_update: "2015-06-24T15:01:43.000Z",
    lat: 45.80802883333333,
    lng: 8.7722475,
    name: "ACAO",
    sog: 0.037,
  },
  text: “Station ACAO Now online”,
}
```

A new station is online.

STATION_OFFLINE

```
{
  sta_id: “ACAO”,
  sta: {
    alt: 238.7,
    cog: 0,
    flarm_code: null,
    gps_fix_qual: 1,
    gps_fix_type: 3,
    gps_hdop: 0.94,
    gps_pdop: 1.64,
    gps_sats: 9,
    gps_vdop: 1.34,
    last_update: "2015-06-24T15:01:43.000Z",
    lat: 45.80802883333333,
    lng: 8.7722475,
    name: "ACAO",
    sog: 0.037,
  },
  text: “Station ACAO Now online”,
}
```

A station went offline.

LAND

```
{
  text: “Traffic D-KMOS (DD8ECC) Landed”,
}
```

A landing has been detected.

TAKEOFF

```
{
  text: “Traffic D-KMOS (DD8ECC) Takeoff”,
}
```

A takeoff has been detected.

TOW_STARTED

```
{
  text: “Traffic I-EIAG (DD8ECC) tow started with D-1234 (DD1234)”,
  towing: {
    traffic: Object,
    alt: 340.5,
    cog: 278,
    cr: 4.5,
    last_update: "2015-06-24T15:24:18.000Z",
    lat: 45.80918566781867,
    lng: 8.77411480499005,
    plane_id: 4052,
    sog: 34.2,
    tr: 0,
    type: 1,
  },
}
```

A tow has been detected. The towed glider's data is included in the message.

TOW_ANOMALY

```
{
  text: “Traffic I-EIAG (DD8ECC) tow detected in tow_released. Missed landing?”,
}
```

The tow detection heuristic has detected an abnormal condition.

TOW_RELEASED

```
{
  text: “Traffic I-EIAG (DD8ECC) Tow released”,
  duration: 355,
  towing: {
    traffic: Object,
    alt: 1256.5,
    cog: 332,
    cr: 2.5,
    last_update: "2015-06-24T15:24:18.000Z",
    lat: 45.80918566781867,
    lng: 8.77411480499005,
    plane_id: 4052,
    sog: 43.2,
    tr: 0,
    type: 1,
  },
}
```

The tow detection heuristic has detected a release.