FGTracker protocol

A communication protocol between FGMS and FGTracker

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# Abstract

The **F**light**G**ear **M**ulti**P**layer Server ([fgms](http://fgms.freeflightsim.org/fgms.html)) is a standalone network server that powers the [FlightGear](http://fgms.freeflightsim.org/FlightGear.html) [MP Network](http://fgms.freeflightsim.org/mp_network.html). It allows flying with other pilots over a network inside [fgfs](http://fgms.freeflightsim.org/FlightGear.html#fgfs).[[1]](#footnote-1)

The [FlightGear](http://fgms.freeflightsim.org/FlightGear.html) Tracker (FGTracker) tracks flights performed on multiplayer servers.[[2]](#footnote-2) While FGTracker is not a participant of MP Network, instead, FGMS sends the position data directly to FGTracker via a TCP stream in plain text.

# Protocol versions

FGTracker is a server which listens incoming connections from a TCP socket (known port 8000), while FGMS is a client which make connections to FGTracker.

There are 4 protocol versions since the launching of FGTracker. Here below only list the two commonly used protocol. They are “NOWAIT” and “V20151207”.

|  |  |  |
| --- | --- | --- |
|  | NOWAIT | V20151207 |
| Introduced since | 2013.10.15  FGMS 0.10.23 or above  FGMS 0.11.6 or above  FGTracker V1.6 | 2015.12.07  FGMS 0.12.0 or above  FGTracker V2.0 |
| Improvements over previous versions | -FGMS will not wait “OK” message from FGtracker before sending next message | -Heading, pitch, roll tracking  -Higher efficiency by introducing “packet” |
| Line Feed (\n) definition | Undefined | Message ends |
| NUL terminator (\0) definition | Message ends | Packet ends |

# NOWAIT

In NOWAIT protocol, FGMS send messages to FGTracker one by one and every message is ended by NUL terminator. FGtracker is required to send “OK” to FGMS on every message reception in order to let FGMS to clear the sent buffer.

## NOWAIT handshaking sequence

|  |  |  |
| --- | --- | --- |
| Sequence | FGMS | FGTracker |
| 1 | Make TCP connection to FGTracker | Listen to TCP socket |
| 2 | Sends empty/dummy message | (Ignore Message from FGMS) |
| 3 | Sends “NOWAIT” | (Check Identity) |
| 4 | (Ignore Message from FGTracker) | Sends “IDENTIFIED XXXX” if FGMS is identified. Else close the TCP connection |
| 5 | Starts sending flight data (until TCP stream dies) | Start receiving flight data from FGMS |

## Types of messages exchanged

Every message between FGTracker and FGMS starts with message type and data follows. As the data separator is a white space, **no white space is allowed in any string data.**

## Message type under protocol NOWAIT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Message Type | Sender | Usage | Required Ack |
| During Handshaking | NOWAIT | FGMS | Define which Protocol version should be used |  |
| IDENTIFIED | FGTracker | Notify FGMS that it is identified (This message is not handled by FGMS) |  |
| During flight data transmission | CONNECT | FGMS | Notify FGTracker a new pilot has joined to MP Network | OK |
| DISCONNECT | FGMS | Notify FGTracker a pilot has left MP Network | OK |
| POSITION | FGMS | Position of a specific callsign | OK |
| OK | FGTracker | Acknowledge reception of a message (This message is not handled by FGMS V0.11.X) |  |
| PING | FGTracker | Ping FGMS and ask FGMS to return “PONG” (This message is not handled by FGMS V0.11.X) | PONG |
| PONG | FGMS | Notify FGTracker FGMS is still active (Missing in FGMS V0.11.X) |  |

* If “Required Ack” is empty – the reception party is not required to send back any acknowledgement message.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Message Type | NOWAIT  OK  PING  PONG | IDENTIFIED | CONNECT | DISCONNECT | POSITION |
| Data 1 |  | String <FGMS name> | String <callsign> | String <callsign> | String <callsign> |
| Data 2 |  |  | String <password> (hardcoded as “test”) | String <password> (hardcoded as “test”) | String <password> (hardcoded as “test”) |
| Data 3 |  |  | String <plane model> | String <plane model> | float <lat> |
| Data 4 |  |  | string <date> | string <date> | float <lon> |
| Data 5 |  |  | string <time> | string <time> | float <alt> |
| Data 6 |  |  |  |  | string <date> |
| Data 7 |  |  |  |  | string <time> |

## NOWAIT Message Example

|  |
| --- |
| NOWAIT |
| IDENTIFIED MPSERVER01 |
| CONNECT Vishne0 test 777-200LR 2015-12-24 08:41:41 |
| POSITION Penguin test 37.953096 139.115674 7.352262 2015-12-26 02:06:46 |
| DISCONNECT Vishne0 test 777-200LR 2015-12-24 09:08:50 |
| OK |
| PING |
| PONG |

# V20151207

In V20151207 protocol, FGMS is allowed to pack multiple messages into one packet and sends to FGTracker. Each message is ended by Line Feed (\n) and every packet is ended by NUL terminator. FGtracker is required to send “OK” to FGMS on every packet reception in order to let FGMS to clear the sent buffer.

## V20151207 handshaking sequence

|  |  |  |
| --- | --- | --- |
| Sequence | FGMS | FGTracker |
| 1 | Make TCP connection to FGTracker | Listen to TCP socket |
| 2 | Sends empty/dummy message | (Ignore Message from FGMS) |
| 3 | Sends “V20151207 VX.XX.X <Domain name>” | (Check Identity) |
| 4 | (Receive message from FGTracker) | Sends “IDENTIFIED XXXX” if FGMS is identified. Else close the TCP connection |
| 5 | Starts sending flight data (If TCP stream still active and “IDENTIFIED XXXX” is received) | Start receiving flight data from FGMS |

## Types of messages exchanged

Every message between FGTracker and FGMS starts with message type and data follows. As the data separator is a white space, **no white space is allowed in any string data.**

## Message type under protocol V20151207

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Message Type | Sender | Usage | Required Ack |
| During Handshaking | V20151207 | FGMS | Define which Protocol version should be used | IDENTIFIED |
| IDENTIFIED | FGTracker | Notify FGMS that it is identified (FGMS will only starts sending flight data after reception of this message) |  |
| During flight data transmission | CONNECT | FGMS | Notify FGTracker a new pilot has joined to MP Network | OK |
| DISCONNECT | FGMS | Notify FGTracker a pilot has left MP Network | OK |
| POSITION | FGMS | Position of a specific callsign | OK |
| OK | FGTracker | Acknowledge reception of a packet |  |
| PING | FGTracker | Ping FGMS and ask FGMS to return “PONG” | PONG |
| PONG | FGMS | Notify FGTracker FGMS is still active |  |
| Anytime | ERROR | FGMS  FGTracker | (Error) message to maintainer |  |

* If “Required Ack” is empty – the reception party is not required to send back any acknowledgement message.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Message Type | V20151207 | IDENTIFIED | CONNECT | DISCONNECT | POSITION | OK  PING  PONG | ERROR |
| Data 1 | String <FGMS version> | String <FGMS name> | String <callsign> | String <callsign> | String <callsign> |  | String <message to maintainer> |
| Data 2 | String <FGMS domain> |  | String <password> (hardcoded as “test”) | String <password> (hardcoded as “test”) | String <password> (hardcoded as “test”) |  |
| Data 3 |  |  | String <plane model> | String <plane model> | float <lat> |  |
| Data 4 |  |  | string <date> | string <date> | float <lon> |  |
| Data 5 |  |  | string <time> | string <time> | float <alt> |  |
| Data 6 |  |  |  |  | float <heading> |  |
| Data 7 |  |  |  |  | float <pitch> |  |
| Data 8 |  |  |  |  | float <roll> |  |
| Data 9 |  |  |  |  | string <date> |  |
| Data 10 |  |  |  |  | string <time> |  |

## V20151207 Message Example

|  |
| --- |
| V20151207 0.12.0 mpserver15.flightgear.org |
| IDENTIFIED MPSERVER15 |
| CONNECT Vishne0 test 777-200LR 2015-12-24 08:41:41 |
| POSITION Penguin test 37.953096 139.115674 7.352262 99.857086 2.138057 -0.002682 2015-12-26 02:06:46 |
| DISCONNECT Vishne0 test 777-200LR 2015-12-24 09:08:50 |
| OK |
| PING |
| PONG |
| ERROR FGTracker is closing your connection |

1. <http://fgms.freeflightsim.org/> [↑](#footnote-ref-1)
2. <http://fgms.freeflightsim.org/tracker.html> [↑](#footnote-ref-2)