DOC#:01.13.005101

# YDLIDAR TIA-H DEVELOPMENT MANUAL BETA

www.ydlidar.com

Shenzhen EAI Technology Co.,Ltd.

## CONTENT

1 SYSTEM COMMUNICATION ..... 1

1.1 Communication Mechanism ..... 1

1.2 System Command ..... 1

2 DATA PROTOCOL ..... 2

2.1 Multi Echo Analysis ..... 2

2.2 Angle Analysis ..... 2

2.3 Intensity signal analysis ..... 3

2.4 Distance Analysis ..... 3

2.5 Timestamp ..... 4

3 REVISE ..... 4

Copyright 2023 EAI All Rights Reserved

# 1 SYSTEM COMMUNICATION

## 1.1 Communication Mechanism

TIA-H uses the network to interact with external devices for commands and data. When an external device sends a system command to TIA-H, TIA-H resolves the system command and returns a corresponding reply message. According to the command content, TIA-H switches the corresponding working status. According to the content of the message, the external system can parse the message and obtain the response data.

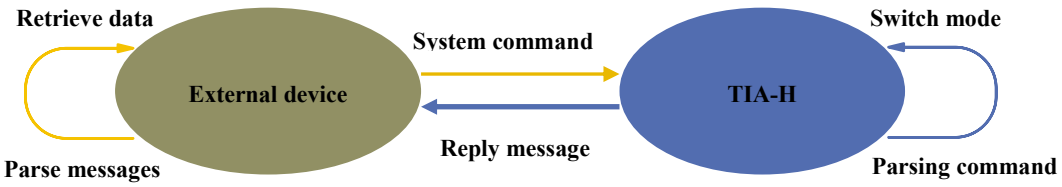



FIG 1 YDLIDAR TIA-H SYSTEM COMMUNICATION

## 1.2 System Command

The external system can set the corresponding working status of TIA-H and send corresponding data by sending related system commands. System commands can send JSON strings through TCP communication. The system commands issued by TIA-H are as follows:

CHART 1 YDLIDAR TIA-H SYSTEM COMMAND

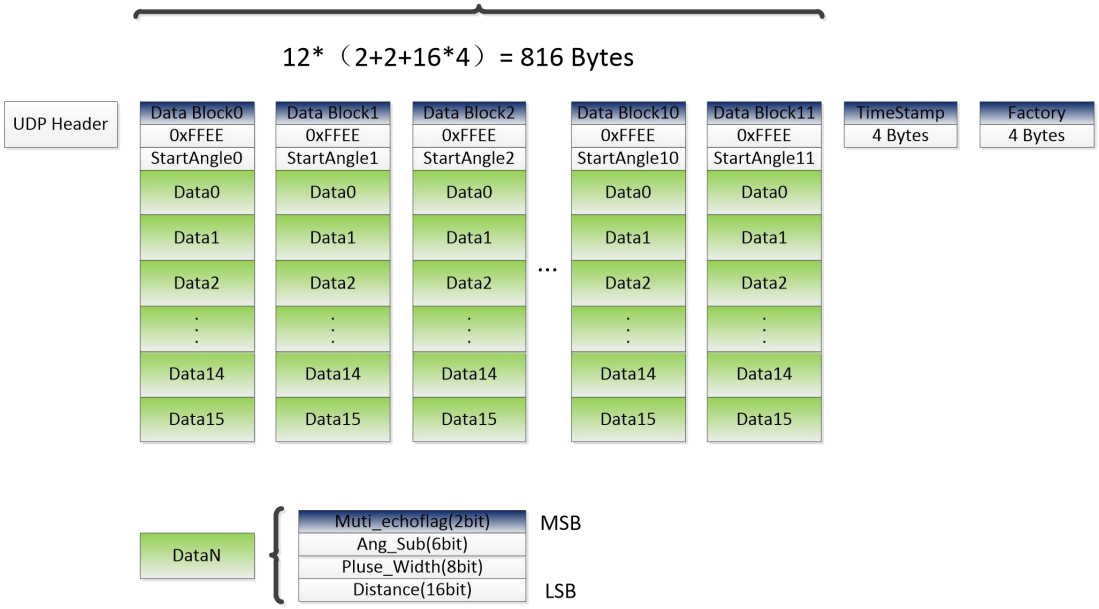
| System Command | Description | Mode Switching | Answer Mode |
|---|---|---|---|
| {"scanType":0} | Start scanning and export point cloud data | Scan mode | Sustained response |
| {"scanType":-1} | Stop and stop scanning | Stop mode | No response |
| {"Read":"Software"} | Read software version | No | Single response |
| {"Read":"Hardware"} | Read firmware version | No | Single response |
| {"Read":"MAC"} | Read MAC | No | Single response |
| {"Read":"SN"} | Read SN | No | Single response |
| {"SetIP":"192.168.111.11"} | Configure IP | No | Single response |
| {"SetUdpPort":"9000"} | Configure UDP port | No | Single response |
| {"restart":1} | Soft restart | No | No response |

Copyright 2023 EAI All Rights Reserved

# 2 DATA PROTOCOL

TIA-H point cloud data is transmitted based on UDP protocol packets over Ethernet. Each UDP packet has a total length of 832 Byte, including 8 UDP protocol information fields, 816 Byte point cloud information fields, 4 Byte reserved fields and 4 Byte factory-defined fields.

The 816 Byte point cloud information field is divided into 12 groups of 68 Byte each, including 2 Byte of data header (0xFFEE), 2 Byte of start Angle information and 64 Byte of point cloud information (16 points). The point cloud information of each point contains 1 Byte of multi-echo flag & Angle value increment information, 1 Byte of intensity signal and 2 Byte of distance value.




Set Data Block0 in the data packet be:

FF EE 26 25 22 30 01 92 23 31 01 7F 26 30 01 8B 25 30 01 85 23 30 01 90 25 30 01 80 25 31 01 7B 23 30 01 7B 26 2F 01 7B 25 30 01 84 23 34 01 80 23 34 01 80 25 31 01 94 25 31 01 94 23 30 00 00 26 2F 00 00

According to the Data protocol, in Data Block0, the starting Angle is 26, 25, and Data0 is 22, 30, 01, 92.

## 2.1 Multi Echo Analysis

TIA-H does not support multi-echo detection, so the Multi_echo_flag remains 0 at all times.

## 2.2 Angle Analysis

**Angle solution formula:** $Angle_i = StartAngle + \sum_{i=0}^{i+1} Ang_{sub_i}$ $(i = 0,1,2...15)$

Copyright 2023 EAI All Rights Reserved

**Starting angle solution formula：** $StarAngle = \frac{Si}{100}$

**Angle increment solution formula:** $Ang_Sub_i = \frac{DataN[24:29]}{100}$ $(i = n)$

In the data package, the starting angle is 26 25, and the Data0 is 22 30 01 92, which is substituted into the formula:

$StartAngle_0$ = 97.65°, $Ang_Sub_0$ = 0.34°

$Angle_0$ = 97.65°+ 0.34°= 97.99°

## 2.3 Intensity signal analysis

**Intensity calculation formula:** $Pluse_Width = DataN\,[16:23]$，the field is a reserved field and the value is for factory use only.

## 2.4 Distance Analysis

**Distance calculation formula:** $Distance = DataN\,[0:15]$

In the data package, Data0 is 22 30 01 92, which is substituted into the formula, Distance=402mm.

Copyright 2023 EAI All Rights Reserved

FIG 2 UDP PACKET PARSING INSTANCE

## 2.5 Timestamp

TIA-H does not support timestamp functionality, so the timestamp data remains 0 at all times.

# 3 REVISE

| Date | Version | Content |
|---|---|---|
| 2023-04-26 | 0.1.0 | The 1st release |
| 2023-07-19 | 0.1.1 | Update section 2.1 |
| 2023-10-27 | 0.1.2 | Add section 1.2 |
| 2025-03-26 | 0.1.3 | Revised Timestamp |
| 2025-1104 | 0.1.4 | Both the timestamp and the multi-echo flag are reserved fields and remain fixed at 0 |

Copyright 2023 EAI All Rights Reserved