53IQ电控通信协议

V1.1

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修改记录

|  |  |  |
| --- | --- | --- |
| 修改时间 | 修改内容 | 修改人 |
| 2016-10-08 | 协议初次制定 | Zhujian |
| 2017-08-19 | 增加0F单功能心跳帧 | Rendy |
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# 名词定义

产品功能清单: 功能映射文档，该文档中定义具体设备的所有功能列表，并对每个功能定义了序号、占用的位数、取值范围等，例如油烟机功能清单（下方具体指令数据示例都按这份功能清单为例，具体设备对接时请参考对应设备的功能清单）：

|  |  |  |  |
| --- | --- | --- | --- |
| **属性名称** | **属性描述** | **长度(bit)** | **备注** |
| POWER | 电源 | **1\*8** | 0关1开 |
| FAN | 风机档位 | **1\*8** | 1-4档 |
| LIGHT | 照明灯 | **1\*8** | 0关1开 |

通过这个表可以按规则顺序解析出通信数据中每个功能状态的值，解析的规则有两种

1. 全指令解析：**[功能状态1|功能状态2|……|功能状态N]**，即按产品功能清单中的功能顺序和功能占用的位长度依次解析
2. 单指令解析（组合指令）解析：**[功能序号1|功能状态1|……|功能序号N|功能状态N]**，即按序号+状态组合对的规则解析，序号占一个字节，功能状态长度不足8的整数倍时需要补足

**以上两种解析规则可以只实现其中一种**

# 规则

1. 对于功能清单中不可控的功能（如当前温度），电控端应不予以处理
2. 电控端状态改变时应主动发送心跳帧，以便智能彩屏产品及时更新屏端的界面呈现，WiFi产品及时通知服务器更新手机APP界面
3. 智能彩屏产品需保持和屏端的心跳通信，30秒内没有任何通信则认为是通信故障
4. 除心跳帧外，其它数据帧都需要有配合流水号进行反馈检查重发的机制，即每个帧都需要应答，应答时流水号保持不变，指定时间内没有收到应答则再次发送，直至超时或超出次数限制，确保通信无误，重发频率为60ms，次数上限5次，超过次数上限后则认为本次通信失败，丢弃该数据帧
5. 智能屏端目前只负责对协议进行解析并作对应状态效果呈现，即提供界面API给电控端使用，不参杂控制业务逻辑处理，建议业务逻辑在电控板端处理

# 通信方式

|  |  |
| --- | --- |
| 内容 | 说明 |
| 传输方式 | TTL |
| 通信模式 | 主从全双工应答模式 |
| 通信比特率 | 9600bps 8bit 1stop 无效验位 |
| 通讯类型 | 串口（TTL） |

# 数据格式

## 基本格式

### 请求帧（命令帧|上行控制帧|上行状态帧）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 帧头 | 流水号 | 数据类型 | 长度 | **数据域** | 校验码 |
| A5 5A | 8-Bits | 8-Bits | 8-Bits | 8\*N-Bits | 8-Bits |

### 应答帧（比请求帧多了一个结果码）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 帧头 | 流水号 | 数据类型 | 长度 | 结果码 | **数据域** | 校验码 |
| 5A A5 | 8-Bits | 8-Bits | 8-Bits | 8-Bits | 8\*N-Bits | 8-Bits |

### 帧头

请求帧为A5 5A，应答帧为5A A5

### 流水号

主动发起方各自累加，应答时或命令重发时流水号不变

### 长度

数据域和结果码的长度

### 校验码

8-Bits，默认为**全帧加和校验，取最低字节**

### 结果码

0成功，1失败，其他待定

### 数据类型（下面表格为数据域结构说明）

0x00: 全功能心跳帧

数据域：全状态数据

|  |  |  |  |
| --- | --- | --- | --- |
| 功能1 | 功能2 | … | 功能N |
|  |  |  |  |

0F : 多功能心跳帧

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 功能序号1 | 功能设定值1 | 功能序号2 | 功能设定值2 | … |
| 8-Bits | 8\*N-Bits | 8-Bits | 8\*N-Bits | … |

0x01: 握手命令帧

数据域无数据

示例: 服务器发送握手帧

A5 5A 01 01 00 01

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A5 | | | | | | | | 5A | | | | | | | | 01 | | | | | | | | 01 | | | | | | | | 00 | | | | | | | | 01 | | | | | | | |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 165 | | | | | | | | 90 | | | | | | | | 1 | | | | | | | | 1 | | | | | | | | 0 | | | | | | | | 1 | | | | | | | |
| 帧头 | | | | | | | | | | | | | | | | 流水号 | | | | | | | | 数据类型 | | | | | | | | 帧长度 | | | | | | | | 校验 | | | | | | | |

0x01握手应答帧(查询设备基本参数，原则上只有互相握手成功后才允许通信)

|  |  |  |  |
| --- | --- | --- | --- |
| 结果码 | 版本号 | 设备唯一编号(mac) | 型号（云端注册） |
| 8-Bits | 2\*8-Bits | 12\*8-Bits | 8\*8Bits |

**如何**获取mac，通过指令查询 wifi模块 mac

**如何**获取key 平台统一生成，创建完产品，可以直接从网站上查询到

示例: 电控应答(Mac地址:F0FE6B15EC63，型号: nyjYyfE6)

5A A5 01 01 17 00 00 01 46 30 46 45 36 42 31 35 45 43 36 33 6E 79 6A 59 79 66 45 36 ED

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5A | | | | | | | | A5 | | | | | | | | 01 | | | | | | | | 01 | | | | | | | | 17 | | | | | | | | 00 | | | | | | | | 0001 | 46...33 | 6E...36 | ED |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | ... | ... | ... |
| 90 | | | | | | | | 165 | | | | | | | | 1 | | | | | | | | 1 | | | | | | | | 23 | | | | | | | | 0 | | | | | | | | ... | ... | ... | ... |
| 帧头 | | | | | | | | | | | | | | | | 流水号 | | | | | | | | 数据类型 | | | | | | | | 帧长度 | | | | | | | | 结果码 | | | | | | | | 协议版本 | 设备mac | 产品key | 校验码 |

0x20: 查询帧

无数据

示例: 服务器发送查询帧查询设备状态

A5 5A 02 20 00 21

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A5 | | | | | | | | 5A | | | | | | | | 02 | | | | | | | | 20 | | | | | | | | 00 | | | | | | | | 21 | | | | | | | |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 165 | | | | | | | | 90 | | | | | | | | 2 | | | | | | | | 32 | | | | | | | | 0 | | | | | | | | 33 | | | | | | | |
| 帧头 | | | | | | | | | | | | | | | | 流水号 | | | | | | | | 数据类型 | | | | | | | | 帧长度 | | | | | | | | 校验 | | | | | | | |

0x20: 查询应答帧

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 结果码 | 功能1 | 功能2 | … | 功能N |
| 8-Bits |  |  |  |  |

示例: 设备应答查询帧(电源打开，2档风力，照明打开)

5A A5 02 20 04 00 01 02 01 29

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5A | | | | | | | | A5 | | | | | | | | 02 | | | | | | | | 20 | | | | | | | | 04 | | | | | | | | 00 | | | | | | | | 01 | 02 | 01 | 29 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | ... | ... | ... |
| 90 | | | | | | | | 165 | | | | | | | | 2 | | | | | | | | 32 | | | | | | | | 4 | | | | | | | | 0 | | | | | | | | ... | ... | ... | ... |
| 帧头 | | | | | | | | | | | | | | | | 流水号 | | | | | | | | 数据类型 | | | | | | | | 帧长度 | | | | | | | | 结果码 | | | | | | | | 电源 | 风机 | 灯 | 校验码 |

0x21: 控制命令帧

|  |  |  |  |
| --- | --- | --- | --- |
| 功能1 | 功能2 | … | 功能N |
|  |  |  |  |

示例: 服务器发送控制帧，开启风机3档

A5 5A 03 21 03 01 03 00 2A

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A5 | | | | | | | | 5A | | | | | | | | 03 | | | | | | | | 21 | | | | | | | | 03 | | | | | | | | 01 | 03 | 00 | 2A |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | ... | ... | ... | ... |
| 90 | | | | | | | | 165 | | | | | | | | 3 | | | | | | | | 33 | | | | | | | | 3 | | | | | | | | ... | ... | ... | ... |
| 帧头 | | | | | | | | | | | | | | | | 流水号 | | | | | | | | 数据类型 | | | | | | | | 帧长度 | | | | | | | | 电源 | 风机 | 灯 | 校验码 |

0x21: 控制应答帧

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 结果码 | 功能1 | 功能2 | … | 功能N |
| 8-Bits |  |  |  |  |

示例: 设备端应答控制帧执行结果

5A A5 03 21 04 00 01 03 00 2B

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5A | | | | | | | | A5 | | | | | | | | 03 | | | | | | | | 21 | | | | | | | | 04 | | | | | | | | 00 | | | | | | | | 01 | 03 | 00 | 2B |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | ... | ... | ... |
| 90 | | | | | | | | 165 | | | | | | | | 3 | | | | | | | | 33 | | | | | | | | 4 | | | | | | | | 0 | | | | | | | | ... | ... | ... | ... |
| 帧头 | | | | | | | | | | | | | | | | 流水号 | | | | | | | | 数据类型 | | | | | | | | 帧长度 | | | | | | | | 结果码 | | | | | | | | 电源 | 风机 | 灯 | 校验码 |

0x31: 控制命令帧(多功能)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 功能序号1 | 功能设定值1 | 功能序号2 | 功能设定值2 | … |
| 8-Bits | 8\*N-Bits | 8-Bits | 8\*N-Bits | … |

示例: 服务器发送打开照明控制帧

A5 5A 04 31 02 03 01 3A

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A5 | | | | | | | | 5A | | | | | | | | 04 | | | | | | | | 31 | | | | | | | | 02 | | | | | | | | 03 | 01 | 3A |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | ... | ... | ... |
| 90 | | | | | | | | 165 | | | | | | | | 4 | | | | | | | | 49 | | | | | | | | 2 | | | | | | | | ... | ... | ... |
| 帧头 | | | | | | | | | | | | | | | | 流水号 | | | | | | | | 数据类型 | | | | | | | | 帧长度 | | | | | | | | 功能序号 | 状态值 | 校验码 |

0x31: 控制应答帧(多功能)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 结果码 | 功能序号1 | 功能状态1 | 功能序号2 | 功能状态2 | … |
| 8-Bits | 8-Bits | 按TRD定义，最小8-Bits（不足高位补0） | 8-Bits | 按TRD定义，最小8-Bits（不足高位补0） | … |

示例: 设备端应答控制帧执行结果

5A A5 04 31 04 00 01 03 01 3D

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5A | | | | | | | | A5 | | | | | | | | 04 | | | | | | | | 31 | | | | | | | | 05 | | | | | | | | 00 | | | | | | | | 01 | 03 | 01 | 3D |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | ... | ... | ... |
| 90 | | | | | | | | 165 | | | | | | | | 4 | | | | | | | | 49 | | | | | | | | 5 | | | | | | | | 0 | | | | | | | | ... | ... | ... | ... |
| 帧头 | | | | | | | | | | | | | | | | 流水号 | | | | | | | | 数据类型 | | | | | | | | 帧长度 | | | | | | | | 结果码 | | | | | | | | 电源 | 风机 | 灯 | 校验码 |

0xFF: 故障报警帧

|  |  |  |
| --- | --- | --- |
| 故障码1 | 故障码2 | … |
| 8-Bits | 8-Bits | … |

# WIFI模块协议（WiFi类产品实现）

## 0x02: 重定向命令帧（WIFI模块实现）

数据: ip地址和端口

|  |  |
| --- | --- |
| Port | IP或域名（字符串编码） |
| 2\*8-Bits | N\*8-Bits |

## 0x03: 设备解绑命令

数据: Mac地址

|  |
| --- |
| 唯一编号MAC地址 |
| 12\*8-Bits |

示例: 长按风量键MCU发送解绑指令

A5 5A 01 03 12 46 30 46 45 36 42 31 35 45 43 36 33 E5

## 0x04: MCU设置WIFI模块网络模式命令帧

数据: 状态

|  |
| --- |
| 网络状态（默认进入一键配置）  0x01：STA模式；  0x02：一键配置模式；  0x03：AP模式；  0x04:解绑 |
| 1\*8-Bits |

示例: 长按照明键MCU发送配网指令使WiFi模块进入配网模式

A5 5A 01 04 01 02 07

## 0x05: 网络状态查询帧

无数据

示例: MCU查询WiFi模块当前网络状态

A5 5A 01 05 00 05

## 0x05: 网络状态查询应答帧

|  |  |  |
| --- | --- | --- |
| 结果码 | 网络模式  0x01：STA模式  0x02：已进 一键配置模式  0x03：AP模式  0x04：外部产测模式 | 网络状态  0x01：STA模式未连接路由器  0x02：STA模式已连接路由器但未连接平台  外部产测模式已连接路由器  0x03：STA模式已连接平台  外部产测模式已收到查询指令  0xFF：非STA模式而且非外部产测模式 |
| 8-Bits | 8-Bits | 8-Bits |

示例: WiFi模块应答网络查询帧或主动反馈网络状态

5A A5 01 05 03 00 02 02 0C

## 0x06: 设备锁定/解锁命令

数据: 锁定状态

|  |
| --- |
| 锁定状态，0x00: 锁定; 0x01: 解锁 |
| 1\*8-Bits |

示例: 服务器向电控发送解锁命令

A5 5A 01 06 01 01 08

## 0x06: 设备锁定/解锁应答帧

|  |  |
| --- | --- |
| 结果码 | 锁定状态，0x00: 已锁定; 0x01: 已解锁 |
| 1\*8-Bits | 1\*8-Bits |

示例: 电控应答服务器解锁命令

5A A5 01 06 02 00 01 09