Lock Communication protocol

2019.1.24

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| --- | --- | --- | --- |
| Rev | Date | Author | Comments |
| V0.0 | 2019 |  | Draft |
| V1.0 | 2019.1.24 |  | 修改命令码和CRC算法 |
| V1.1 | 2019.3.28 |  | 总结测试项目 |
| V1.2 | 2019.4.26 |  | 读取设备信息 |
| V1.3 | 2019.4.28 |  | 修改错误码 |
| V1.4 | 2019.5.8 |  | 修改错误码 |
| V2.0 | 2019.6.24 |  | 修改SN码编码规则 |
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# Summary

本文档定义了机柜后门智能锁的RS485通信协议，该锁可通过RS485协议和蓝牙钥匙打开。代表锁身份的唯一ID，可通过RS485协议和蓝牙钥匙读取。

# Serial port setup

Baud rate: 19200

Data: 8bit

Parity: Even

Stop: 1bit

Flow control: None

# Link Layer packet format

Table lists the link layer packet format defined by this document.

定义链路层的数据包格式如下表所示。

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **LSB MSB** | | | | | | |
| **Header** | **Payload** | | | | | **Tail** |
| 0x7E | **ADDR** | **CMD/RSP** | **Data L** | **Data** | **CRC** | 0xFF |
| 1 octet | 1 octet | 1 octet | 1 octet | Variable | 2 octets | 1 octet |

All parameters have a little-endian format, i.e. the least significant byte is transferred first.

所有数据域以小端格式表示，即低字节先发送，高字节后发送。

* Header: 0x7E, indicate that there is a packet coming, the following is payload.

帧头：0x7E，表示一帧数据的开始，后面是被传数据。

* Tail: 0XFF, indicate that a complete packet has been received.

帧尾：0XFF，表示一帧数据的结束。

* Payload

1. CMD/RSP: Command from smart board and response from CTRL board, they are described in detail in following section.

命令/响应：来自智能板的为指令，来自控制板的为响应。

1. Data L: The length of the Data field, vary with CMD/RSP.

数据长度：Data域的数据长度，具体长度与CMD/RSP相关。

1. Data: Information payload, vary with CMD/RSP.

数据： 数据信息，具体含义与CMD/RSP相关。

1. CRC: It is equal to the accumulation of all the data from TxAdd to Data field, discard the overflow.

数据校验：它等于从**ADDR**到Data域所有数据的累加和，保留低2个字节。

**Note:** If there are 0x7E, 0XFF, 0x8C in the Payload field, they must be replaced by 0x8C 0x81, 0x8C 0x00, 0x8C 0x73 respectively when being transmitted over the physical layer. Upon receiving, make sure that 0x8C 0x81, 0x8C 0x00, 0x8C 0x73 are recovered to 0x7E, 0XFF, 0x8C respectively before processing the packet data.

Payload域的0x7E, 0XFF, 0x8C在收发送之时，分别用0x8C 0x81, 0x8C 0x00, 0x8C 0x73代替。

**ADDR**为RS485通信地址，固定为0x81。

智能锁为RS485从机，从机收到命令后必须在100ms内发送完所有应答数据包，超过100ms不能再驱动RS485总线。波特率误差小于5%。

# CMD/EVENT/RSP

Following Tables lists the codes for the command/event and corresponding response defined by this document.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Command  names | CMD Code | Description  (from HUB board) | RSP Code | Description  (CMD’s response, from PMS board) |
| UNLOCK | 0x01 | 开锁命令 | 0x01 | 应答命令执行结果 |
| LOCK | 0x02 | 关锁命令 | 0x02 | 应答命令执行结果 |
| RD\_LOCK\_STA | 0x03 | 查询锁状态 | 0x03 | 应答命令执行结果 |
| INT\_CLR | 0x04 | 清中断命令 | 0x04 | 应答命令执行结果 |
| RD\_CHIP\_ID | 0x05 | 读取芯片ID | 0x05 | 应答命令执行结果 |
| WR\_DEV\_ID | 0x06 | 写设备ID命令 | 0x06 | 应答当前有效参数 |
| RD\_DEV\_ID | 0x07 | 读设备ID命令 | 0x07 | 应答当前有效参数 |
| WR\_DEV\_SN | 0x28 | 配置设备SN | 0x28 | 目标设备应答 |
| RD\_DEV\_VER\_SN | 0x20 | 读取设备信息 | 0x20 | 目标设备应答 |

Command/response

## UNLOCK command

开锁命令。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x01 |  |
| **DATA L** | 1 | Unsigned char | 0x01 |  |
| **DATA** | 1 | Unsigned char | 开锁延时时长1字节 | 秒 |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

UNLOCK CMD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x01 |  |
| **DATA L** | 1 | Unsigned char | 0x01 |  |
| **DATA** | 1 | Unsigned char | 0x00:成功 0x01:失败 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

UNLOCK RSP

## LOCK command

关锁命令。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x02 |  |
| **DATA L** | 1 | Unsigned char | 0x00 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

LOCK CMD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x02 |  |
| **DATA L** | 1 | Unsigned char | 0x01 |  |
| **DATA** | 1 | Unsigned char | 0x00:成功 0x01:失败 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

LOCK RSP

## RD\_LOCK\_STA command

读锁状态命令。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x03 |  |
| **DATA L** | 1 | Unsigned char | 0x00 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

RD\_LOCK\_STA CMD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x03 |  |
| **DATA L** | 1 | Unsigned char | 0x01 |  |
| **DATA** | 1 | Unsigned char | 0x01:锁柄开启0x00:锁柄关闭 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

RD\_LOCK\_STA RSP

## INT\_CLR command

清中断命令。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x04 |  |
| **DATA L** | 1 | Unsigned char | 0x00 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

INT\_CLR CMD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x04 |  |
| **DATA L** | 1 | Unsigned char | 0x01 |  |
| **DATA** | 1 | Unsigned char | 0x00:成功 0x01:失败 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

INT\_CLR RSP

## RD\_CHIP\_ID command

读芯片ID命令。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x05 |  |
| **DATA L** | 1 | Unsigned char | 0x00 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

RD\_CHIP\_ID CMD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x05 |  |
| **DATA L** | 1 | Unsigned char | 0x04 |  |
| **DATA** | 4 | Unsigned int | 芯片序列号 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

RD\_CHIP\_ID RSP

## WR\_DEV\_ID command

写设备ID命令。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x06 |  |
| **DATA L** | 1 | Unsigned char | 0x04 |  |
| **DATA** | 4 | Unsigned int | 设备ID |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

WR\_DEV\_ID CMD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x06 |  |
| **DATA L** | 1 | Unsigned char | 0x01 |  |
| **DATA** | 1 | Unsigned char | 0x00:成功 0x01:失败 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

WR\_DEV\_ID RSP

## RD\_DEV\_ID command

读设备ID命令。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x07 |  |
| **DATA L** | 1 | Unsigned char | 0x00 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | **0xFF** |  |

RD\_DEV\_ID CMD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x07 |  |
| **DATA L** | 1 | Unsigned char | 0x04 |  |
| **DATA** | 4 | Unsigned int | 设备ID |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

RD\_DEV\_ID RSP

## RD\_DEV\_VER\_SN command

读取设备信息。主机发送：

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x20 |  |
| **DATA L** | 1 | Unsigned char | 0x02 |  |
| **DATA1** | 1 | Unsigned char | 0x05 |  |
| **DATA2** | 1 | Unsigned char | 0x00 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

RD\_DEV\_VER\_SN CMD

设备应答：

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x20 |  |
| **DATA L** | 1 | Unsigned char | 0x1A |  |
| **DATA1** | 1 | Unsigned char | 0x05 |  |
| **DATA2** | 1 | Unsigned char | 0x00 |  |
| **DATA3** | 1 | Unsigned char | 0x00:成功 0x01:失败 |  |
| **DATA4** | 1 | Unsigned char | 硬件主版本号 |  |
| **DATA5** | 1 | Unsigned char | 硬件子版本号 |  |
| **DATA6** | 1 | Unsigned char | App主版本号 |  |
| **DATA7** | 1 | Unsigned char | App子版本号 |  |
| **DATA8** | 1 | Unsigned char | App修订版本号 |  |
| **DATA9~12** | 4 | Unsigned int | App build号 |  |
| **DATA13~26** | 14 | string | SN码，参考附录B | 字符串 |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

RD\_DEV\_VER\_SN RSP

例如：

TX：7E 01 20 02 00 00 23 00 FF

RX：7E 81 20 1A 05 00 00 01 02 01 02 03 45 67 89 AB 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 12 03 FF

## WR\_DEV\_SN command

配置设备SN。主机发送：

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x28 |  |
| **DATA L** | 1 | Unsigned char | 0x10 |  |
| **DATA1** | 1 | Unsigned char | 0x05 |  |
| **DATA2** | 1 | Unsigned char | 0x00 |  |
| **DATA3-16** | 14 | string | SN码，参考附录B | 字符串 |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

WR\_DEV\_SN CMD

设备应答：

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Payload field** | **Length (byte)** | **data type** | **Value** | **Unit** |
| **HEAD** | 1 | Unsigned char | 0x7E |  |
| **ADDR** | 1 | Unsigned char | 0x81 |  |
| **CMD** | 1 | Unsigned char | 0x28 |  |
| **DATA L** | 1 | Unsigned char | 0x03 |  |
| **DATA1** | 1 | Unsigned char | 0x05 |  |
| **DATA2** | 1 | Unsigned char | 0x00 |  |
| **DATA3** | 1 | Unsigned char | 0x00:成功 0x01:失败 |  |
| **CRC** | 2 | Unsigned short | 从ADDR到Data域的累加和 |  |
| **TAIL** | 1 | Unsigned char | 0xFF |  |

WR\_DEV\_SN RSP

注意：设备信息有厂商在生产是通过命令写入。如果没有设置SN码，默认返回全0。

# 附录A

厂家提供送样时提供测试报告，测试报告包含厂家自身的测试项目，以及以下测试项目，并列出测试步骤、测试方法和测试结果。

测试项目：

1. 多字节数据，先发送低字节，再发送高字节，确认此功能正常。
2. 从机收到命令后必须在100ms内发送完所有应答数据包，超过100ms不能再驱动RS485总线，确认此功能正常。
3. Payload域的0x7E, 0XFF, 0x8C在收发送之时，分别用0x8C 0x81, 0x8C 0x00, 0x8C 0x73代替，确认此功能正常。
4. 确认配置设备ID的功能正常。
5. 确认中断信号功能正常，确认中断标志清除功能正常。
6. 确认波特率误差小于5%。
7. 确认所有命令都能正常应答。

**附录B:**

SN码定义参考《配置设备SN》。