2.4G Reader Communication

Protocol

V 1.4

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Contents

1 Scope of Manual

This manual describes data communication protocol between RF reader and host computer, include Two-way communication protocol and One-way communication protocol.

This manual suit for Marktrace 2.4G readers.

2 Definition

RFID：Radio Frequency Identification

Host：PC or other devices which communication with RF reader and control RF reader.

3 Technical request of Two-way communication protocol

3.1 Protocol description

3.2 Two-way communication protocol is host control RF reader, use Client-Server mode. RF reader is Server and host computer is Client. Communication use Answer-Reply type, communication process created by host computer.

3.3 Communication interface

RS232：Three-wire serial port, 1bit Start bit, 8bits Data bit, 1bit Stop bit, No CC. Baud rate is 115200bps;

RS485：Two-wire differential serial port, 1bit Start bit, 8bits Data bit, 1bit Stop bit, No CC. Baud rate is 19200bps

Ethernet：10M/100M adaptive, data transfer via TCP protocol, RF reader is TCP server.

3.4 Data format

3.4.1 Command frame format definition

The command frame is the data frame for the host to operate the reader. The format is shown in the following table：

Head	Addr	Len	Cmd	Parameter	…	Parameter	Check
0x0A	1 byte	n+2	1 byte	Byte 1		Byte n	cc

Head defined as 0x0A

Addr is reader address from 0～240,255（0xFF） is public address, 254（0xFE） is broadcast address. Reader receive its address, public address and broadcast address, but has no response to broadcast address.

Len is pack length area, it means the bytes on behind.

Cmd is command code area。

Parameter is parameters in command frame.

Check is check sum area. it defined check sum range from Head to Parameter（Adding all bytes, then choose NOT, last plus 1. The last byte is CC）。After receiving the command frame, the reader needs to calculate the checksum to check the error. Refer to Appendix A for checksum calculation.

3.4.2 Response frame format definition

The response frame is the data frame that the reader returns to the host, Response frame contains data that reader need to collect. The format is shown in the following table：

Head	Addr	Len	Status	Response	...	Response	Check
0x0B	1 byte	n+2	1 byte	Byte 1		Byte n	cc

Head is pack type area. Response frame pack type is 0x0B。

Addr is reader address。

Len is pack length area, it means the bytes on behind.

Status Indicates the result of the operation specified by the command. 0 is correct execution. The other indicates that an exception occurred during execution.

Response is The return data in the response frame

Check is check sum area， it defined check sum range from Head to Parameter. After receiving the command frame, PC needs to calculate the checksum to check the error.

Status value is shown in the following table:

S/N	Value	Definition	Description
1	0x00	ERR_NONE	The command completed successfully
2	0x01	ERR_ GENERAL_ERR	General errors
3	0x02	ERR_PAR_SET_FAILED	Parameter setting failed
4	0x03	ERR_PAR_GET_FAILED	Get Parameter failed
5	0x04	ERR_NO_TAG	No tag
6	0x05	ERR_READ_FAILED	Tag read failed
7	0x06	ERR_WRITE_FAILED	Tag writing failed
8	0x07	ERR_LOCK_FAILED	Tag lock failed
9	0x08	ERR_ERASE_FAILED	Tag erase failed
10	0xFE	ERR_CMD_ERR	Command not supported or parameter out of range
11	0xFF	ERR_UNDEFINED	Undefined error

3.5 Command & Return

3.4.1 System configuration command

3.4.1.1 Set Baud Rate

Set the RS232 communication baud rate of the reader. All readers that support RS232 or RS485 interface support this command.

Head	Addr	Len	Cmd	Parameter1	Parameter2	Check
0x0A		0x04	0x20		baudrate	cc

Parameterlis port type。Description：0x00，RS232；0x02，RS485：0x03,433Mhz。

Parameter2 is baudrate parameter need to set.Description：0x00，9600bps；0x01，19200bps；0x02，38400bps；0x03，57600bps；0x04，115200bps。

After receiving the command frame, original baudrate return no data response frame.The new baud rate takes effect immediately.

3.4.1.2 Reset Reader

Reset reader command frame. All reader support this command.

Head	Addr	Len	Cmd	Check
0x0A		0x02	0x21	cc

After receiving the command frame, the reader returns no data response frame and then reader is reset.

3.4.1.3 Get Firmware Version

Get firmware version,**All reader support this command.**

Head	Addr	Len	Cmd	Check
0x0A		0x02	0x22	cc

After receiving the command frame, Response frame will return. Command data in Response frame is BootLoader or reader firmware.The response frame format is shown in the following table：

Head	Addr	Len	Status	Response	Response	Check
0x0B		0x04	0x00	Major	Minor	cc

Major is Main firmware version。

Minor is Minor firmware version。

3.4.1.4 Set Reader Parameter

Set reader parameter.**All reader support this command.See Appendix B for parameter values.**

Head	Addr	Len	Cmd	Parameter	Parameter	Check
0x0A		0x04	0x23	Addr	Value	cc

When the reader receives the command frame, configure the parameters of the corresponding address, return no data response frame.

3.4.1.5 Get Reader Parameter

Get reader parameter, **All reader support this command.See Appendix B for parameter values.**

Head	Addr	Len	Cmd	Parameter	Check
0x0A		0x03	0x24	Addr	cc

When the reader receives the command frame, return parameter value of query address.

3.4.1.6 Set IP

Set IP, Reader has Ethernet port support this command.

Head	Addr	Len	Cmd	IP	Check
0x0A		0x10	0x2C		cc

IP is 4-bytes IP address:

   4-byte subnet mask

   4-byte gateway

The port is the high byte first and the low byte the last

3.4.1.7 Get IP

Get IP.Reader has Ethernet port support this command.

Head	Addr	Len	Cmd	Check
0x0A		0x02	0x2B	cc

Return as follow:

Head	Addr	Len	Status	IP	Check
0x0B		0x10	0x00		cc

3.4.2 Active operating command

3.4.2.1 Active Tags Inventory

This command makes reader into tag identify mode, all reader support this command.

Head	Addr	Len	Cmd	Check
0x0A		0x02	0x90	cc

After receiving the command frame, the reader returns a response frame indicating that the command has been received. The response frame is shown below:

Head	Addr	Len	Status	Check
0x0B		0x02	0x00	Cc

After receiving this command, reader on tag identify mode. Tag data store on

buffer. Reader will return tag data after received get data command.

3.4.2.2 Close RF

This command causes the reader to end the current operation(Including identification, call, read, write, settings and so on). The reader enters the standby state. All readers support this command.

Head	Addr	Len	Cmd	Check
0x0A		0x02	0x91	cc

After receiving the command frame, the reader returns a response frame indicating that the command has been received. The response frame is shown below:

Head	Addr	Len	Status	Check
0x0B		0x02	0x00	cc

3.4.2.3 Active Tags Read

This command is used to read the contents of active tag. After receiving this command reader enter read tag state. All readers can choose to support this command.

Head	Addr	Len	Cmd	Peremeters	Peremeters	Peremeters	Check
0x0A		0x07	0x93	4byte ID	Read address	Read Len n	cc

The range of read addresses and read lengths depends on the tag specification definition

The return frame after reading active tag is as follows:

Head	Addr	Len	Status	Response	Check
0x0B		XX	0x00	5+n byte data	cc

Returned data include 1 byte 'R', 4 bytes ID and data Length.

3.4.2.4 Active Tags Write

This command is used to write contents of tag. After receiving this command, reader enter write tag state. Write 1 byte every time. MR3104E can choose to support this command.

Head	Addr	Len	Cmd	Peremeters	Peremeters	Peremeters	Peremeters	Check
0x0A		0x0B	0x94	4 byte ID	Write address	Write Len	Write data	cc

The range of write address and write length depends on tag specification definition

After receiving this command, reader execute write tag operating. If write tag

success, it will return:

Head	Addr	Len	Status	Response	Check
0x0B		0x07	0x00	5byte data	cc

Returned data include 1 byte 'W', 4 byte ID.

3.4.2.5 Active Get Data

Get tag data by special format. All readers support this command.

Head	Addr	Len	Cmd	Check
0x0A		0x02	0x9A	cc

Reader enter read state, then send Get Data command, Tag ID was returned. Data frame format as follow:

Head	Addr	Len	Status	Tag count	Data	Check
0x0B		0x07	0x00		10byte*n	cc

Data:10 bytes tag data. See Appendix D.

Type	ID	Data
1Byte	4Byte	5Byte

The tag information is related to the tag specification definition

4 Technical request of One-way communication protocol

4.1 Protocol description

One-way communication protocol under timing work mode, reader transfer data to host automatically.

4.2 Communication interface

RS232：Three-wire serial port, 1bit Start bit, 8bits Data bit, 1bit Stop bit, No CC. Baud rate is 115200bps;

RS485：Two-wire differential serial port, 1bit Start bit, 8bits Data bit, 1bit Stop bit, No CC. Baud rate is 19200bps

Ethernet：10M/100M adaptive, data transfer via TCP protocol, RF reader is TCP server.

Wiegand：It has Wiegand26 and Wiegand34 two types.

4.3 Data format

4.3.1 Non-Wiegand data Active transfer format

SOF	Addr	Len	Data	Check	EOF
1 byte	2 bytes	2 bytes	10 bytes	2 bytes	2 bytes

SOF area is 0x02(HEX)，he other areas are ASCII codes of hexadecimal numbers
Len is Length of data.

Check is check sum of Data. Participation checksum calculation is the hexadecimal number（two ASCII code is one byte）。

EOF is End character, fixed to 0x0D 0x0A.

4.3.2 Wiegand data Active transfer format

Wiegand26 format

P0	First 12 bits	Last 12 bits	P1

P0 is the parity of the first 12 bits, P1 is the odd parity of the last 12 bits, the middle 24 bits of the data is a 3-byte hexadecimal number,The tag area corresponding to the data is configured by the reader parameters.

Wiegand34 format

P0	First 16bits	Last 16 bits	P1

P0 is the parity of the first 16 bits, P1 is the odd parity of the last 16 bits, the middle 32 bits of data is a 3-byte hexadecimal number,

The tag area corresponding to the data is configured by the reader parameters.

Appendix A Checksum Algorithm

（C language）Examples of tests and calculations

Appendix B (Command Index Tab)

Command Index Table

Index	Command code	Meaning	Reader	
		System command	ME3104	MR3102
1	0x20	Set RS232 baud rate	√	√
2	0x21	Reset the reader	√	√
3	0x22	Query Firmware Version	√	√
4	0x23	Set a single parameter value	√	√

5	0x24	Query a single parameter value	✓	✓
12	0x2B	Query IP	✓	✓
13	0x2C	Set IP	✓	✓
16	0x2F	Reader test instruction	✓	✓
Buffer management commands				
1	0x41	Get buffer data	✓	✓
2	0x43	Query buffer qty	✓	✓
3	0x44	Clean buffer	✓	✓
2.4G Active tag operation command				
1	0x90	Start inventory	✓	✓
2	0x91	Close RF	✓	✓
4	0x93	Read tag data	✓	**X**
5	0x94	Write tag data	✓	**X**
6	0x9A	Get data	✓	✓
7	0x9B	Set sensitivity	✓	✓
8	0x9C	Query sensitivity	✓	✓

Appendix C (Reader Parameter Configuration Address Index Tab)

Reader Parameter Configuration Address Index Tab

Address(HEX)	Length (Byte)	Parameter	Value
Reader Configuration			
10	10	Serial number	10 byte
1B	1	Buzzer & LED	Binary mask, the first bit indicates the LED, the second bit indicates the buzzer
A3	1	Reader address code	Same as the fourth byte of IP address
A0	4	Reader IP	4 Byte
A4	4	Subnet Mask	4 Byte
A8	4	Gateway	4 Byte
AC	2	Port	Default 100
Active reader Specific parameters			
70	1	Sensitivity	0~31 or 0~7,depends on reader spec
Reader Working mode and data output mode			
90	1	Working mode	First bit means timing work mode ON, the second bit means trigger work mode ON.
92	1	Trigger active	1~180, 1s as a unit, Max 180s

		time	
93	1	Filter	0 OFF, 1 ON
94	1	Filter time	S is a unit MAX 250s
96	1	Tag validation	1:encryption card,2,Non-encryption card,3:Both
97	1	Output interface	Binary mask, from low to high, respectively, RS485, WIEGAND, RS232, Ethernet and relays
98	1	Wiegand type	0 26 bit, 1 34 bit
99	1	Relay hold time	S is a unit, MAX 180s

Appendix D Tag Data

Description tag data.It is divided into general-purpose tag data format and extended use tag data format.

一、 General-purpose tag data.

Tag Model：MR3830，MR3832，MR3840，MR3847，MR3848

definition

item	Frame Type	TAG ID	Check Sum	Reverse	Alarm	Version
description	1byte length，value fixed to 0x20	4 byte length，MSB on fore	1byte CC, Refer to Appendix A.	2byte reverse	1byte length，Bit0： low battery alarm；Bit4：press button	

二、 Extended use tag data format (current monitoring tag)

Tag Model：MR3870C，MR3872C

Item	Frame Type	TAG ID	Check Sum	Private Data	Alarm	Ver
Description	1byte length，value fixed to 0x21	4byte length，MSB on fore	1byte CC, Refer to Appendix A.	2byte length，MSB on fore	1byte length	

Frame Type   : 0x21 means tag with sensor

TAG ID   : Tag ID,MSB on fore

Check Sum   :   1byte CC, Refer to Appendix A.

Private Data : Here means the value of current, MSB on fore, mA is the unit

Alarm   : different bit site mean different alarm info. Alarm details

             bit0: low battery alarm

             bit1:Indicates AC power-on state, 0 means AC power is on, and 1 means AC power is off

             bit2:Indicates tag fault

             bit3: Indicates that the current is overloaded and the overload threshold is 6A

             bit4: Remove alarm

Private Data : Here means the value of current, MSB on fore, mA is the unit

Ver   :

三、   Extended use tag data format(locating tag)

Tag model：MR3862L，MR3863L

Item	Frame Type	TAG ID	Check Sum	Locator ID	Alarm	Version
Description	1byte length, value fixed to 0x20	4byte length，MSB on fore	1byte CC, Refer to Appendix A.	2byte	1byte length，Bit0：low battery alarm；Bit4：press button	