RFID Fixed Reader

Model 2300

User's Manual

➢

1 Content

2 INTRODUCTION

2300 RFID reader is the 5th generation product of our company. It can reads / writes the electron labels or the tags which complies with EPC CLASS1 G2 standard, includes UCODE EPC G2 SL3 of Philips, RI-UHF-00C02-03 of TI, and XRAG2 of ST ,etc.(Remarks: " Electron Label " and "Tag" have the same significance in this manual.)

This reader can be widely applied to data collection systems in many scopes ,such as Vehicle Access Control, ETC, Personnel Access Control, Electronic Anti-counterfeiting, Logistics Control, Auto-production Management, etc.

2.1 Figure & Port

The figure of 2300 reader, please see the picture shown on the manual cover. The reader's crust adopts aluminum alloy, and it can be fixed in indoor case, or safe box of outdoor. (Please note: Outdoor safe box must be with good aeration, dustproof, rainproof conditions.)

2300 has 2 panels from its appearance: Antenna Connection Port Panel, and Communications Port Panel.

（1） Antenna Connections Port Panel:

2312 Antenna Connection Ports (shown on Figure 2-1-1): ANT1 and ANT2 (Total: 2 SMA ports)

Figure 2-1-1 Antenna Connection Ports Panel

2314 Antenna Connection Ports (Shown on Figure 2-1-2): ANT1, ANT2, ANT3, ANT4 (Total: 4 SMA ports)

Figure 2-1-2 Antenna Connection Ports Panel

（2） Communications Port Panel (shown on Figure 2-1-3):

Figure 2-1-3 Communications Port Panel

Features for Communications Port Panel shown on Figure 2-1-3:

A. Power Port : +12V DC socket

B. RJ45 (TCP/IP) Communications Port:

1 RJ45 communications port to be connected direct with network by cable

C. 3 diagnostic LEDs provide external indications for various conditions:

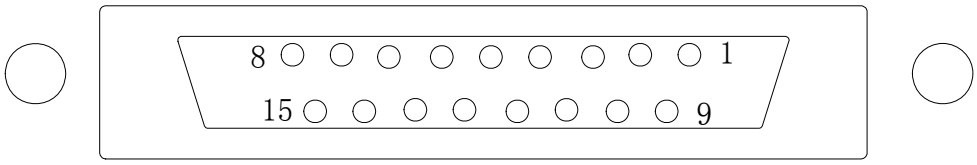
Red Light -- Power Indication. It shows that power goes through reader if the red light is on.

Yellow Light --- Antenna Indication. It shows that the selected antenna is being connected very well and is receiving / emitting radio frequency signals, if the yellow light is on.

Green Light--Communications Indication. It shows that RJ45/RS232 port is receiving or sending data commands.

D. BUZZER: Buzzer is set in the inner, it sounds while Tag is read by Reader.

E. GP I/O Port (DB15 Female)



I/O PORT (DB15 FEMALE) –Looking at reader port panel from frontispiece of Reader

15-pin DB female I/O connector(Female DB-15)	
Pin1	GND
Pin2	RS232 RX
Pin3	Relay1
Pin4	Output4 (TTL Level)
Pin5	Output2 (TTL Level)
Pin6	Output7 (TTL Level)
Pin7	Output5 (TTL Level)
Pin8	Input1 (TTL Level)
Pin9	RS232 TX
Pin10	Relay2
Pin11	GND
Pin12	Output3 (TTL Level)
Pin13	Output1 (TTL Level)

Pin14	Output6 (TTL Level)
Pin15	Input2 (TTL Level)

2.2 Performance Indexes

（1） Operation Frequency:902～928MHz(Can be adjusted with different country or different area)

（2） Working Ways: Active, command

（3） Hopping Channels:63

（4） RF Power:20dBm

（5） Communications Speed: serial port speed 9600～115200bps, RJ45 speed 10Mbps

（6） Reading / writing Range: reading range>5m; writing range>1m (Actual reading / writing range is also influenced by tag, antenna, cable, surroundings)

（7） Power supply: 110~220V AC, +12V DC

（8） Power: Power (even) <20W

（9） Weight: <1Kg

（10）Operating Temperature:-10℃～+55℃.

（11）Buzzer: Buzzer in the inner，and it rings when reader reads tag.

2.3 Functions

（1） Can read / write tag. (Tag protocol: EPC CLASS1 Gen 2)

（2） Can read a lot of pieces of EPC Tags (96bits) at one time.

（3） Can read EPC data of selected tag

（4） Can read data in user memory of selected tag

（5） Can read data in TID memory of selected tag

（6） Can read access password and kill password of tag (access password, kill password , both of them are 32bits)

（7） Can write EPC (96bits) in tag.

（8） Can write data in user memory

（9） Can modify access password and kill password of tag (access password, kill password , both of them are 32bits)

（10）EPC、TID、User memory can be set to be writing –protection.

（11）Can set reading-protection and writing-protection with password memory

（12）Can kill tag

3 Installation

3.1 Connection

In application system, the connection relationship among Reader, Antenna, Tag, and Controller (or PC) as follows:

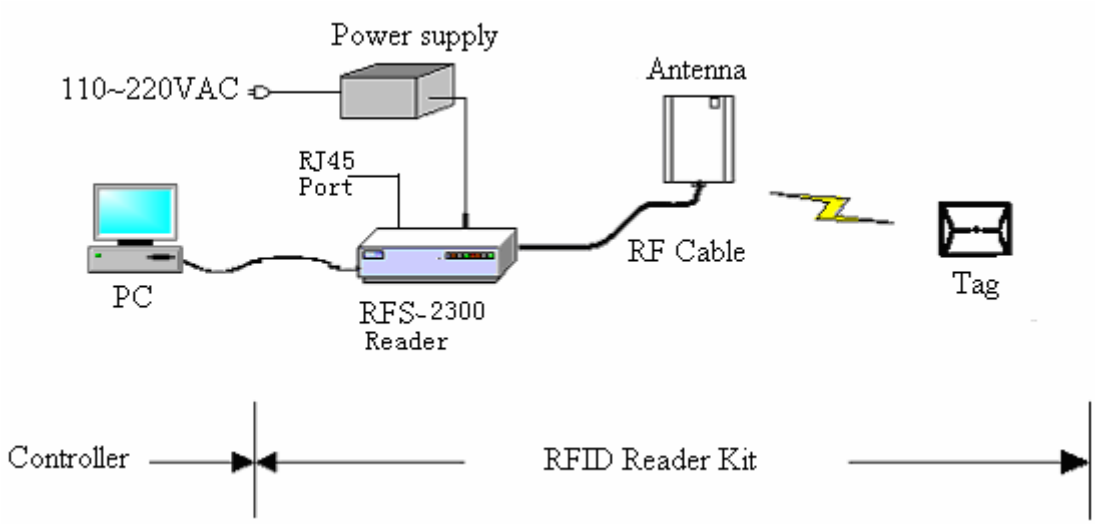
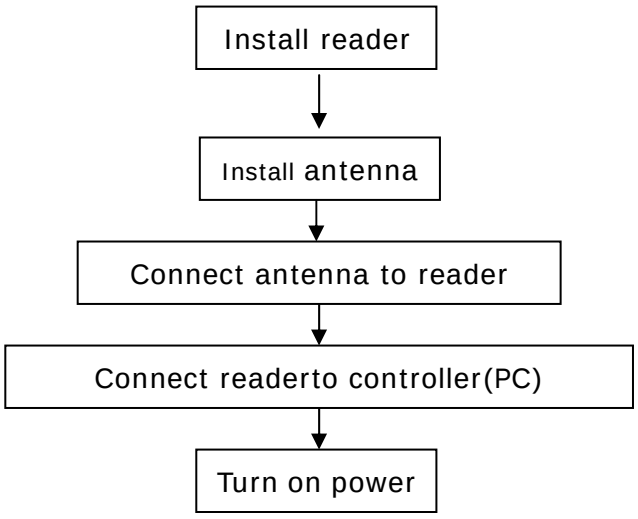
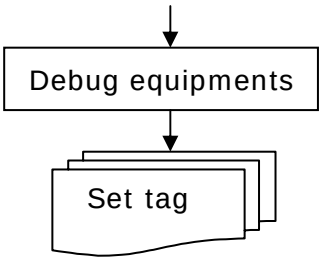


Figure3-1-1: Typical connection about the relevant equipments

3.2 Steps For Installation

Follow below steps for Installation:





3.3 Install Reader

Note below points while installing reader:

（1） As 2300 reader is with no disposal of special waterproof and dustproof, the operating temperature for 2300 reader is -10℃～+55℃. In this case, it's better to work indoor.

If it's hoped to be fixed outdoor, 2300 reader and Power transformer must be put into a safe box. (The safe box must be waterproof, dustproof, heat preservation，and heat insulation , so as to offer a good operation surroundings for reader.)

（2） The length of cable which is used for connecting reader and antenna, should not exceed 10m(best within 3m)

（3） The maximum distance of reliability communications between reader and controller varies with different data ports:

RS232:10m, RJ45 100m

In other words, cable length for RS232 to Controller is max.10m; cable length for RJ45 to Controller is max.100m.

3.4 Install Antenna

Antenna installation, it needs to consider some factors like position, height, angle, etc., so as to satisfy below application requirements:

(1) To ensure that the beam range of antenna can cover the reliability range for reading tag. Place the antenna(s) at a height

approximately midway between the highest and lowest expected tag position.

(2) To ensure cable length which is used for connecting antenna and reader, not to exceed 10m(best within 3m)

(3) According to specific application situations, antenna installation can adopt different methods. Whatever antenna installation method to be adopted, please ensure that antenna polarization direction is in accordance with tag polarization direction.

Please note that: Follow the specified antenna quantity with reader. Otherwise you must add coaxial terminals on the position where antennas originally should be put, and each coaxial terminal should equals to 50 ohm

3.5 Connect Antenna to Reader

2300 Reader offers 2 (or 4) SMA RF ports, which requests for low-waste coaxial-cables to be used for connecting antenna to reader. . As the longer the cable length is, the lager the attenuation of high frequency signals is, it's better trying to adopt the most possible short cable length. The length increase of coaxial-cable or adopt common cable, both of them will influence reader's reading distance.

Suggest to use –7 soft cable,if the connection distance is within 3m between antenna and reader; and that if the connection distance exceeds 3m, use 1/2'' cable.

While connect cable with antenna / reader, screw down the cable connector. And after that, seal the cable connector with pyrocondensation pipe, or tie the cable connector firmly with rubber band, in order to protect cable connector.

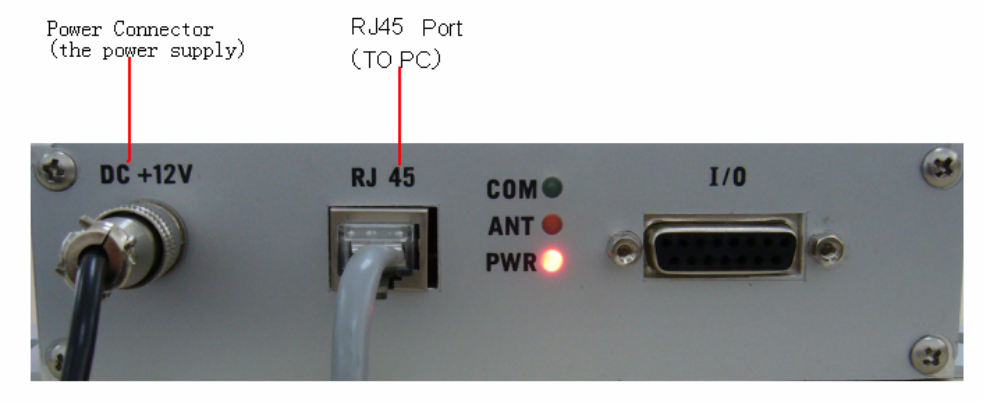
Remarks: Suggest that don't use common cable for antenna

connection, and that don't install cable connector randomly.

3.6 Connect Reader to Pc

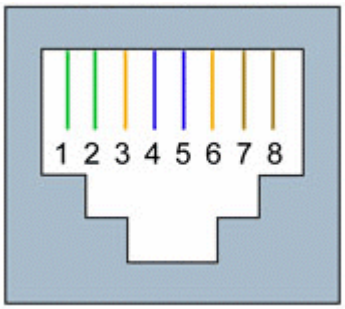
2300 reader is connected with PC by RS232 or RJ45 to receive commands / send data.

（1） Connected by RJ45



Reader connects direct with PC, please see above figure. And the distribution of cable，please see the following figure:

Foot 1 of reader's RJ45 to be connected with foot 3 of PC's RJ45, foot 3 of reader's RJ45 to be connected with foot 1 of PC's RJ45, foot 2 of reader's RJ45 to be connected with foot 6 of PC's RJ45, foot 6 of reader's RJ45 to be connected with foot 2 of PC's RJ45. Other feet to be connected correspondingly.



If reader is connected with PC by HUB, should use straight connection cable

（2） Connected by RS232

RS232 can be connected with PC directly by supporting cable and, the cable length should be less than 10m in the project. See the following figure 3-6-3

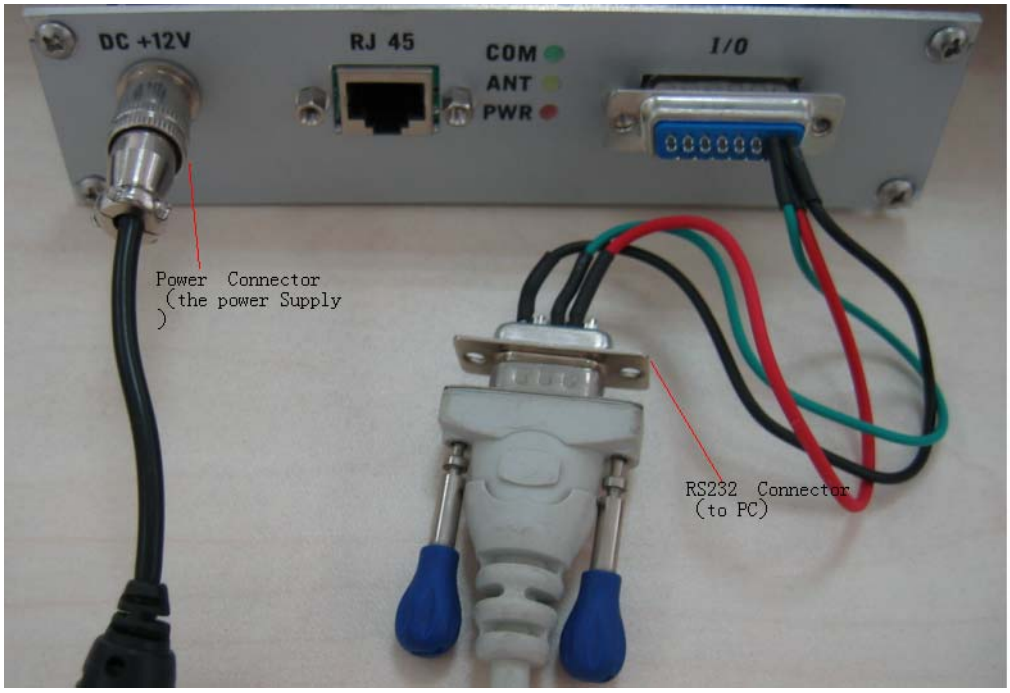


Figure3-6-3

3.7 Connect Power Supply

2300 reader adopts +12V DC/3.75A. We supply the supporting AC/DC transformer for the reader. Below is the connection method:

（1） Confirm voltage/power: AC100～240V/50Hz

（2） Put DC outlet on transformer into ＋12Vdc inlet port on reader

（3） Put 220V AC input on transformer into the AC power

（4） If Power LED lights: power normal

3.8 Debug Equipments

The key of Debugging equipments is to adjust the height, angle, and obliquity of antenna, so as to make reader read the tags in the expected reading range. Adjustment Method as follows:

（1） Turn on reader, and set reader to be on timing mode (Parameter setting please refers to Section 4.3). Close parameter setting program, and cut off the connection between reader and PC.

（2） Turn off reader power; then turn it on again. Automatically reader goes into timing state;

（3） The tag what is requested varies with the material of the different identified objects. So, when debug equipments, to stick tag to the object which the surface material is as same as the identified object; and move the object back and forth in the expected reading range for tag to be read. Inner buzzer rings and LED (green) light if reader reads tag correctly.

（4） Adjust the height ,angle, etc. of antenna carefully, so as to make reading range best

Notice: Reader radiates microwave power only when reading / writing tag is in process. And at this time, installation person should keep a distance no less than 30cm away from the antenna. (According to U.S.A FCC)

3.9 Place Tag

Notices for stick tags:

（1） Use the glue recommended by manufacturer. It's better to use the specially glue when place tag to metal surface

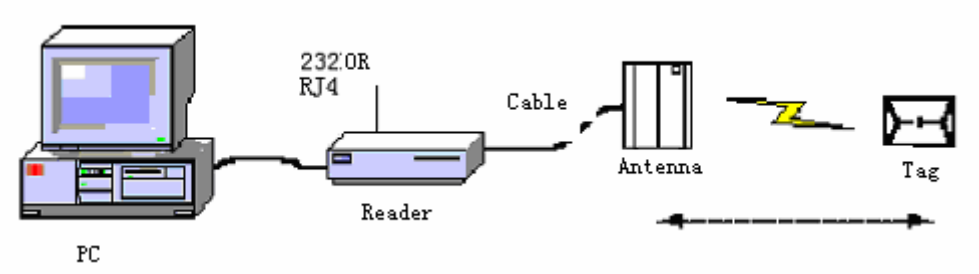
（2） Test the specific position on the object where the tag will be paste, to

ensure the best reading/writing effect.

4 SOFTWARE

4.1 Install Test System

Connect equipments according to below figure, to set up a simple reader testing system in the studio:



（1） Connect reader to PC by RS232 or RJ45.

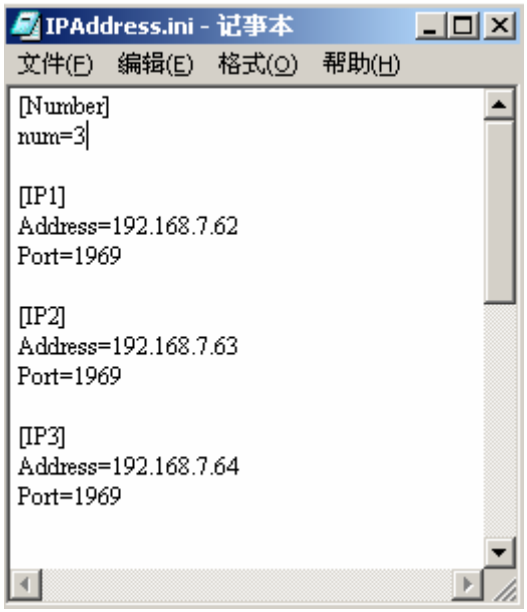
（2） Connect each port of reader with antenna by a 50Ω coaxial terminations or by a RF cable

（3） To supply reader power with supporting power transformer (+12V).

（4） On PC, run 2300User.exe software from reader's supporting disk, and set reader operating parameters according to below directions.

4.2 Edit IP Information of Reader

Open『IPAddress.ini』by double-clicking it, please see below figure. Enter each IP for all readers which are asked to be connected, into this file， then save and close this file.



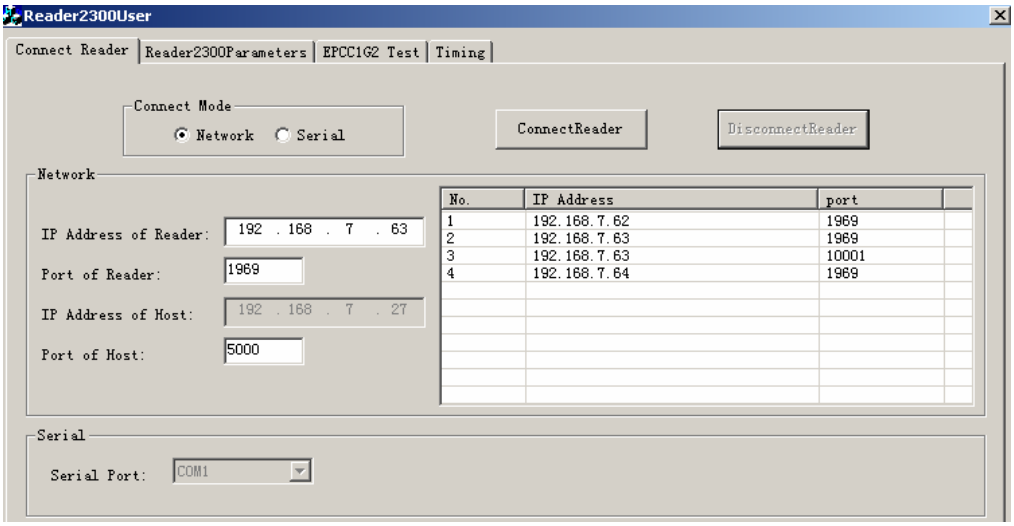
4.3 Startup of User Software

In the supporting disk for 2300 reader, there's a program 2300User.exe. This program needs to be used under the surroundings of IMB PC, which runs the operating system of Window 95 or more super versions from Microsoft Corporation.

Running 2300User.exe program, that means the startup of this demo software.

Once you have installed the RFID application software, you are ready to run your own demos. NOTE TO PROGRAMMERS ONLY: You must log off Hyper-Terminal or any other current connection with the reader prior to launch the application software

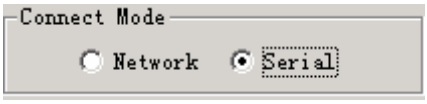
Launch 『2300User.exe』by double-clicking on its icon.



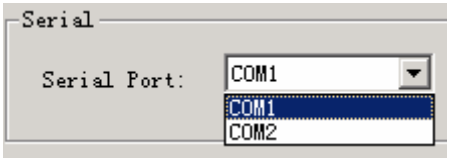
（1） Via the serial communication

PC can commutate data to reader via serial port (RS232). User needs to do formatting setting for a new reader via RS232 (e.g. IP address), then the network communication can be used

Choose serial port connect mode, shown as follows:



Choose one of COM's:



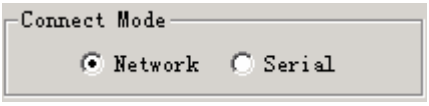
Press the button of『ConnectReader』. If the connection is successful, will display below dialogue box on the screen:

The connection will fail, if no reader is connected to host via the RS 232, or if the selected serial port is incorrect. On the screen, shown as follows:

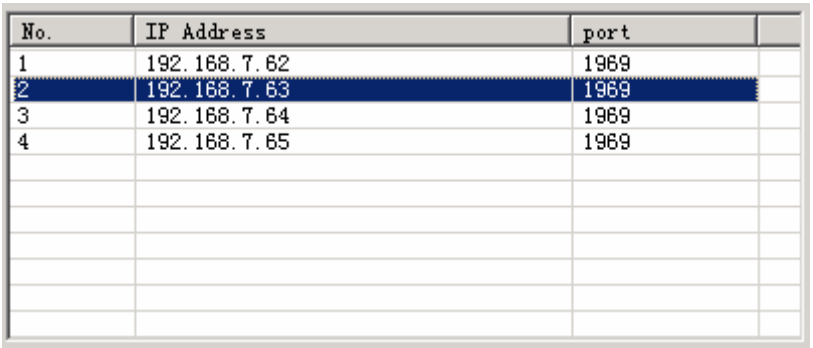
（2） Via Network communication

PC can exchange data with reader via TCP/IP.

Choose network connection mode, shown as follows.

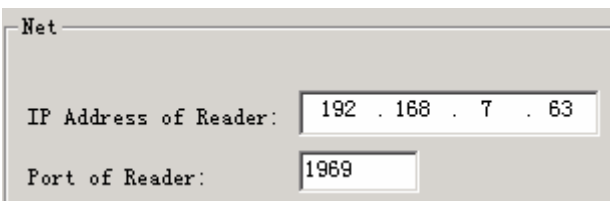


Choose the IP address of this reader from below dialogue box.



No.	IP Address	port
1	192.168.7.62	1969
2	192.168.7.63	1969
3	192.168.7.64	1969
4	192.168.7.65	1969

Or enter IP address of this reader port of reader direct into below dialogue box:

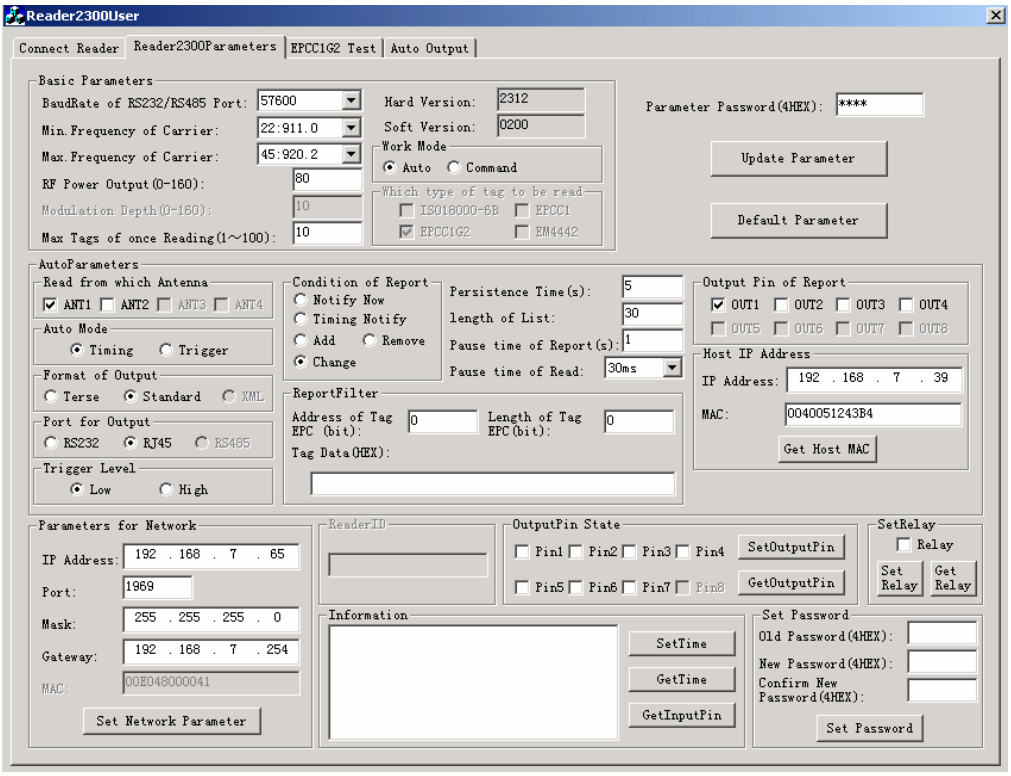


Press the button of 『ConnectReader』. If the connection is successful, it's shown as follows on the screen.

If no reader is connected with host via RJ45, or the entered IP address of the reader is incorrect, the connection will fail. On the screen, it's shown as follows:

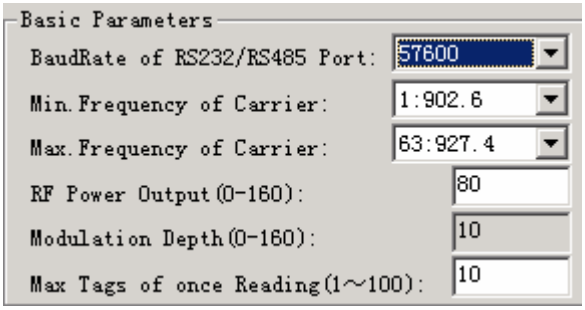
4.4 Setting Reader Parameters

Set reader operating parameters after user software startup. Press 『2300Parameter』page layout, then operating parameters setting figure for reader is shown as follows:



（1） Set basic parameters

Must set all of below 5 parameters, no matter what operation mode the reader is on:



- Baud rate of RS232/485 port: Set communications speed for RS232 port. Five communication speed types for choice: 9600,19200,38400,57600,115200bps

- Maximum tags of once reading: The number should be comparatively big when many tags are read once; but it's better to set a comparative

small value for improving reading speed. For example, if at most 10 tags in some application surroundings appear, 10 is to be set for this parameter.

- Reader RF Power Output: Set reader's transmission power output. This parameter is always very well set before reader is delivered to client. Don't change this set value for this parameter, if there's no special need. More the value is, greater the RF power is. Value range: 30~160.

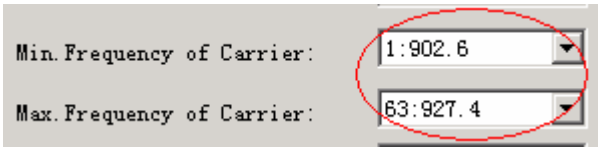
- Min. Frequency of Carrier: Set Min. Operation Frequency of reader

- Max. Frequency of Carrier: Set Max.Operation Frequency of reader

For different countries or different areas, the listed operation frequency of reader should have a relevant choice range according to local radio rules. So, the user should choose the comparative sensitive frequency range for reading tags. If only need a fixed frequency channel, just set the same values for both Min Frequency of Carrier and Max.Frequency of Carrier. If need skipping frequency, choose fmin. For Min.Frequency of Carrier, and choose fmax. For Max.Frequency of Carrier, just make fmax> fmin, that's ok. The frequency spectrum may be any of segments from 902.6MHz ~ 927.4MHz. Min. Frequency of Carrier decides the low end of segment, Max. Frequency of Carrier decides the high end of segment.

Please refer to below figure:

NOTE: Max. Frequency of Carrier must be greater than (or equal to) Min. Frequency of Carrier.



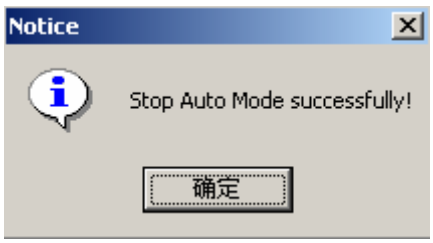
（2） Work Mode

2300 has two working modes:

- Command mode---Under this mode, only when the reader receives the valid commands from host via RS232 or RJ45, reader works accordingly and returns the result of the performed command to host via original port.

- Auto mode--- Reader can voluntarily reads tags，and notify PC according to requests set on reader itself. Tag ID acquired in response to reading can be transmitted to the host in ASCII formats.

Note:Need to work with command when reader is on auto work status,test reader or go into auto work interface,press Stop Auto buttom until display 『Stop Auto Mode successfully』(as below picture),otherwise reader will ignore.



（3） Auto mode parameter

- Auto work process

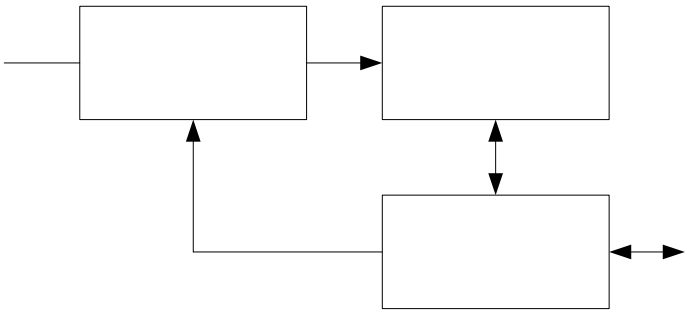
Reader Auto work is finished by 3 modules. Shown as below figure:

The module reads tag: It's just responsible to read data of tag. And can read

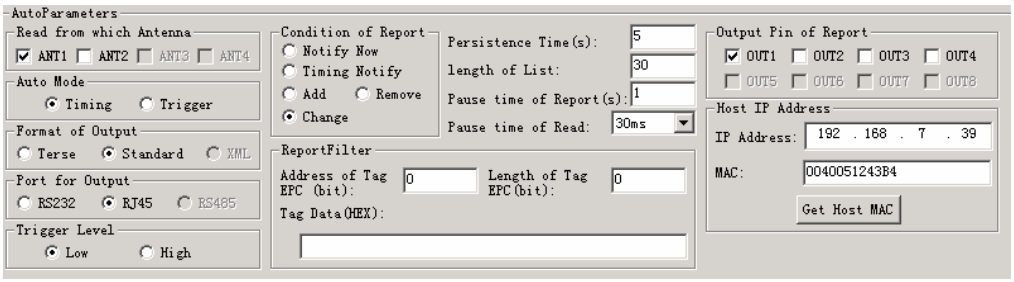
data of tag by timing model or triggering model. Reading interval, reading from which antennas, triggering level, and reading conditions, all these can be set by the user.

Tag data storage module: only to be responsible for storing the acquired tag data by reading tags. Tag storage time, storage capacity for this module, both can be set by the user.

Control and port module: to manage the whole process for reader working and, manage how to exchange data with PC. Informing intervals, reporting conditions, reporting formats, reporting interface, report ports, all can be set by the user.



Below parameters go into effect only after selecting Auto mode:



◆ Choose Antenna

This parameter is to determine that, from which antennas; the reader will read tag data voluntarily.

Antenna

Reading Tag Module

 Shows antenna 1 is selected

 Shows antenna 2 is elected

 Shows antenna 3 is selected

 Shows antenna 4 is selected

You can choose any one or more from reader's all antennas, for example, to select Antenna1 and Antenna2 like below:

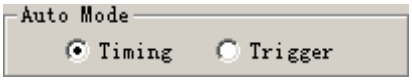
 .

◆ Auto Mode

There are two types for Auto mode: Timing and Triggering.

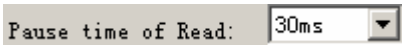
Timing mode: Reader reads tag automatically at intervals.

Triggering Mode: when Trigger level is high (or low), reader reads tag automatically at intervals.



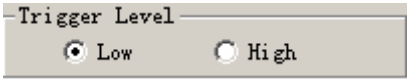
◆ Pause Time of Reading

There are 5 kinds of interval time for reader to read tag automatically :10ms、20ms、30ms、50ms、100ms. The reader's lifetime will be shortened if the selected read interval time is too short. This parameter control reading tag module



◆ Trigger Level

This parameter works only when the reader is on triggering mode. At present , our reader just supports low level Triggering for reading tags.



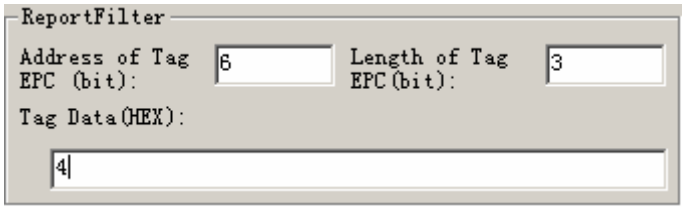
◆ Report Filter

Reader only reads the selected tags. Report filter is shown on the following figure. Report filter is determined according to special part and special value of tag's EPC. This parameter controls reading tag module.

Step 1: select 『Address of Tag EPC(bit)』, unit is bit. For example, select 6 (Please see below figure)

Step 2: select 『Length of Tag EPC(bit)』, unit is bit. For example, select 3 (Please see below figure)

Step 3: select 『Tag Data(HEX)』, unit is HEX,. For example, select 4(Please see below figure). All tags which comply with the conditions will be read. (Remarks: the conditions here, it contra poses a lot of seriate bits in some area data of tag. When the length of condition value, is not integer times to 4 bits, fill 0 in low digit. For example, the tags ， whose EPC are 053000000000000000000000 and FD700000000000000000000 separately , accords with the condition and will be read.



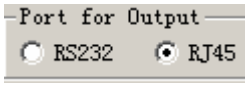
◆ Format of Output

The output formats for reader reporting the tag data to PC ,have 3 kinds:

Terse , standard or XML(Remarks : XML is not realized yet at present. (The specific formats please refer to Attachment 1)

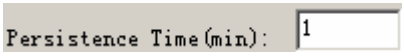
◆ Port of Output

Choose port from which the reader will report to PC . On RFS2312/RFS2314, both of them have 2 ports: RJ45 and RS232.



◆ Persistence Time

It's the persistence time for the tag's data stored in reader storage module, unit is minute. This parameter controls the work mode of reader storage module.



◆ Length of List

The maximum quantity of the tags stored in reader storage module. If the actual read tag quantity is above this parameter, the earlier tags in storage module, will be deleted. This parameter controls the work mode of storage module.

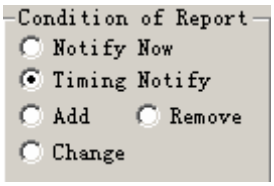
◆ Pause Time of Report

When Choose timing report mode, this parameter determines the interval

time for reader reporting to PC.

◆ Condition of Report

To report tag data which is already read， to PC, it can chooses one of the following five conditions:



Notify Now: The reader transmits all the data of tag stored in storage module to PC, only when the reader receives the Notify Now command from PC.

Timing Notify: The reader transmits the data of tag, which is read by reader during every interval, to PC at intervals.

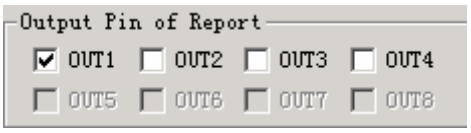
Add Notify: When reader reads the tags which originally don't exist in storage module, the reader will transmit data of these tags to PC and, store these tag data in reader.

Remove Notify: when the time for some tag data stored in the reader's storage module, expires, reader will transmit these tag data to PC and delete them from reader.

Change Notify: when adding or deleting some tag data in reader's storage module, reader will transmit these tag data to PC

◆ Output Pin of Report

2300 reader has 7 TTL level output pins. At present, only 4 output pins can be used.



OUT1 It shows: The reader will transmit out 1 piece of 2ms low level signal from Out1, while it reads tags from Antenna 1.

OUT2 It shows: The reader will transmit out 1 piece of 2ms low level signal from Out 2, while it reads tags from Antenna 2.

OUT3 It shows: The reader will transmit out 1 piece of 2ms low level signal from Out 3, while it reads tags from Antenna 3.

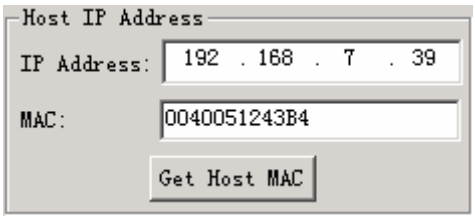
OUT4 It shows: The reader will transmit out 1 piece of 2ms low level signal from Out 4, while it reads tags from Antenna 4.

OUT1 It shows: No signal is transmitted out from Out 1, while reader reads tags from Antenna 1. The same conclusions for" blank square +Out2, Out3, or Out 4 " by analogy.

◆ **Set IP address for PC**

Notice: The PC which is with this setting, must be the PC to be reported by reader in future. Otherwise, the setting of MAC address shown on below figure, will get into trouble.

While reader works on Auto mode, the tag data read by reader, needs to be reported to PC. So, it needs designate IP address of PC in advance. Setting processes as follows:



Step 1: Input IP Address of PC

Step 2: Press the button of 『Get Host MAC』, the MAC address of this PC , will be added to『MAC』dialogue box in above figure automatically. No need to input MAC address with manual work.

（4） Set Parameters

◆ Set Password of Parameter

Before set reader operation parameters, User must know the password for parameter setting. Otherwise, the operating parameters can't be set.

Passwords of reader parameter setting are two: one is default password 8421; the other one is the password set by user. The processes for User setting password shown as below figure:

Step 1: Input 4 HEX user old password. (For new reader. this said user old password is reader's default password 8421)

Step 2: Input 4 HEX user new password

Step 3: input 4 HEX users confirm new password once again.

Step 4: press button of 『Set Password』, 3 circs will appear :

If setting is successful, will appear the following dialogue box

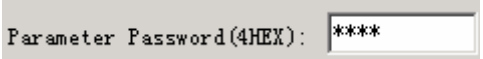
If the new password of above step 2 is different from that of above step 3, it will appear the following dialogue box:

If setting fails, the following dialogue box will appear:

◆ Setting Parameter

Once parameters are set, update parameters according to the following processes:

Step 1: Input reader parameter setting password to below dialogue box:



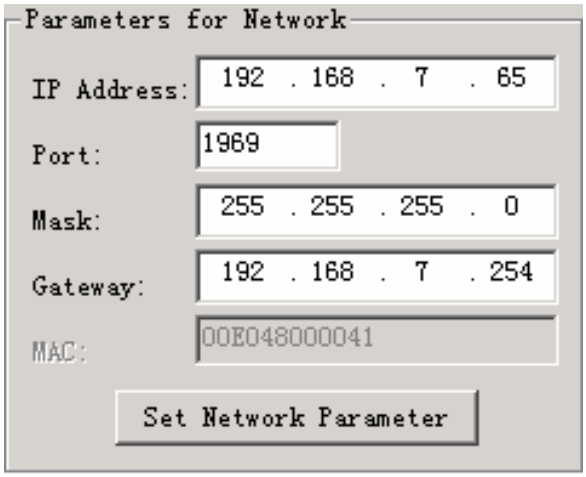
Step 2: Press button of 『Update Parameter』, PC will write operation parameters to the memory of reader. Then, 3 circs will appear:

If setting is successful, the following dialogue box will appear:

If setting fails, the following dialogue box will appear:

If the parameter setting password is error, the following dialogue box will appear:

（5） Set reader IP parameter



IP Address: IP address of reader

Port: Port code of reader's IP address

Mask: Mask of reader

Gateway: Gateway of reader

MAC: MAC of reader. It's set by manufacturer

Press button of 『Set Network Parameter』after parameter setting is finished completely. If setting is successful, the following dialogue box will appear:

If setting fails, the following dialogue box will appear:

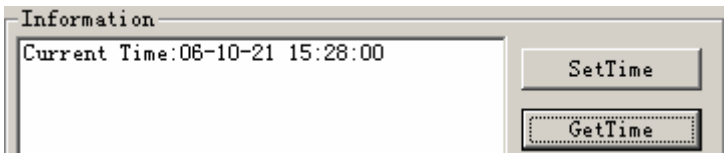
Notice: Please go back to the interface Connect Reader for re-connection of reader, after the finish of amending IP info.

（6） Set time of reader

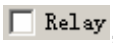
Verify clock of reader:

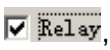
Step 1: Press the button of 『GetTime』,PC will obtain the reader's current time. Format of time is 『yy-mm-dd hh:mm:ss』

Step 2: Press the button of『SetTime』, PC will verify reader's time according PC's own time.



（7） Control Relay

Test the control function of relay. Select 

, press the button of 『SetRelay』, then relay will be cut off; select 

, press the button of 『SetRelay』, relay will be turned on.

（8） Get input Pin state

Press the button of 『GetInputPin』, 2 input pins' states (TTL Level)of reader will be shown in the following figure.

4.5 Reading and Writing Test

The memory of EPC-C1 G2 tag is divided into 4 banks.

（1） EPC Bank: It's for EPC code storage. At most it can store 96Bits EPC code. And this bank can be read & written.

（2） TID Bank: To store ID code set by Tag manufacturer. Currently, there are 2 types of ID code: 32 or 64Bits. This bank can be read, but can't be written.

（3） User Bank: It's different for different manufacturer. G2 tag from Impinj has no user bank, but 96Bits for this bank of the tags from Philips. This bank can be read & written.

（4） Password Bank: it has access password (32bits) and kill password (32bits). This bank is readable and writable.

Above 4 memory banks, all can be set to be writing-protection. Writing-protection means this bank can't never be written, or can't be written under unsafe state. Reading-protection just means that password memory can't be read.

The processes of reading & writing EPCC1G2 have 3 steps as follows:

（1） Step 1: Firstly, select one of the 4 banks, and then choose a group of tags according to the nominated data segment in this bank.

（2） Inventory: The process by which a reader identifies each one in the tag group.

（3） Access: Access an identified tag, for example, to read/write data in

these 4 banks, to set reading / writing –protections, to amend password, etc.

Information's returned by this program:

- 『No Tag』:It shows that reader doesn't detect out any tag.
- 『The memory isn't exist』: The whole or part of tag's memory cells that is read (or written), don't exist.
- 『The memory has been protected』: This storage bank of a tag has been set with reading-protection/writing protection.
- 『Power is not enough』:The RF power of reader isn't enough for writing operation.
- 『Password is error』: Password is error.
- 『Write Fail!』:The operation of writting data to a tag is failure.
- 『Write Successfully』:The operation of writting data to a tag is successful.

Below dialog box is the interface for reading /writing test:

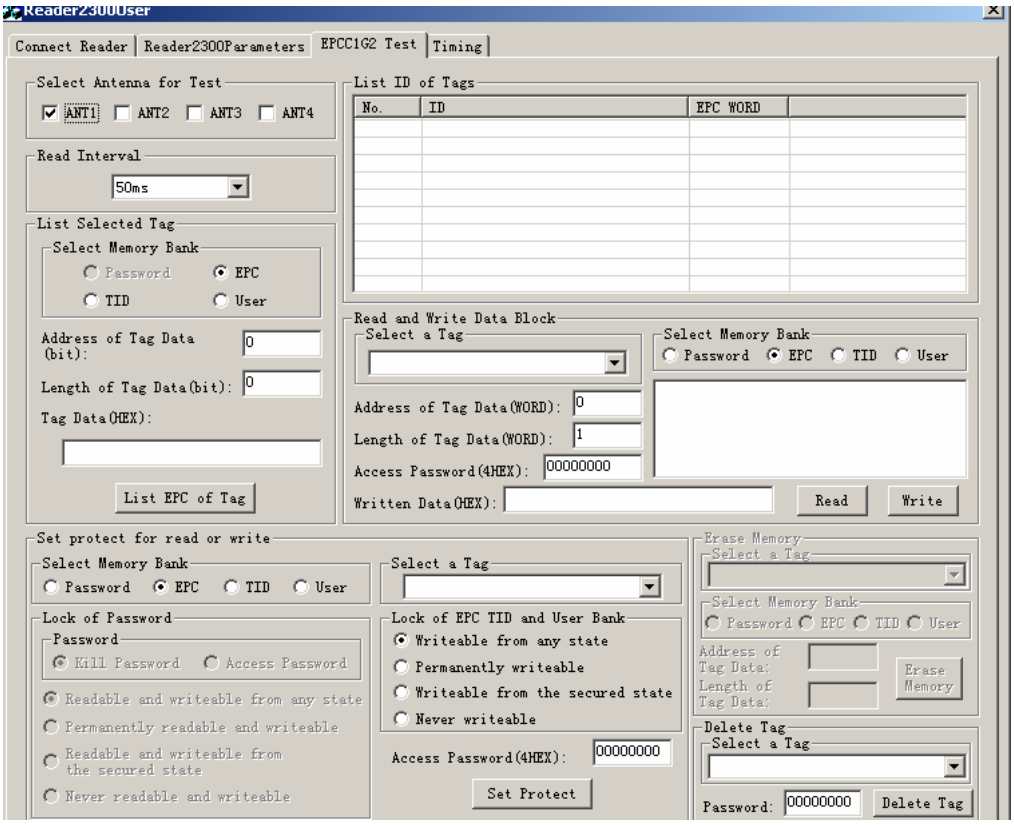


Figure 4-5-1

（1） Select Antenna

Can select only one from 4 antennas to work. Or select two, three, or four antennas to work.

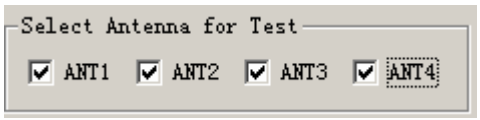


Figure4-5-2

（2） Select Reading Interval

Select reading interval: there are 10,20,30,50,100,200 or 500ms for choice. Default is 50ms.

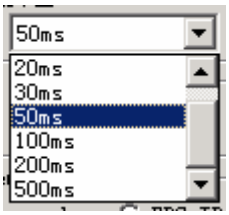


Figure 4-5-3

（3） Read EPC of Tags Unconditionally

Operation Steps as follows:

Step 1: Select any one of the three memory banks, except password memory bank. For example, to select EPC memory bank (Please see the below figure)

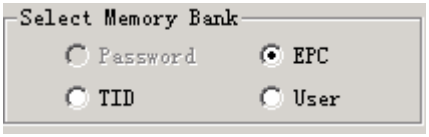


图4-5-4 Figure4-5-4

Step 2: Set the value of "Length of Tag Data" to be 0. 0 means that, reader identifies all tags in the RF field unconditionally. See the figure as follows:

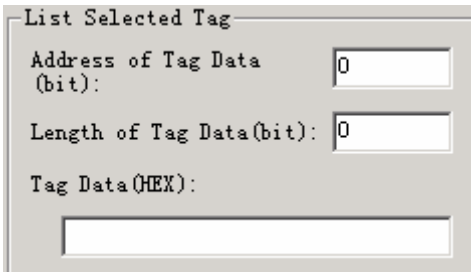


Figure4-5-5

Step 3: Press the button of "List EPC of Tag", then the host send the command to reader, reader executes the command. The reader starts to

read EPC of tag， according to above step 2. The identified EPC codes of the tags are listed in "List ID of Tags", See the figure4-5-6

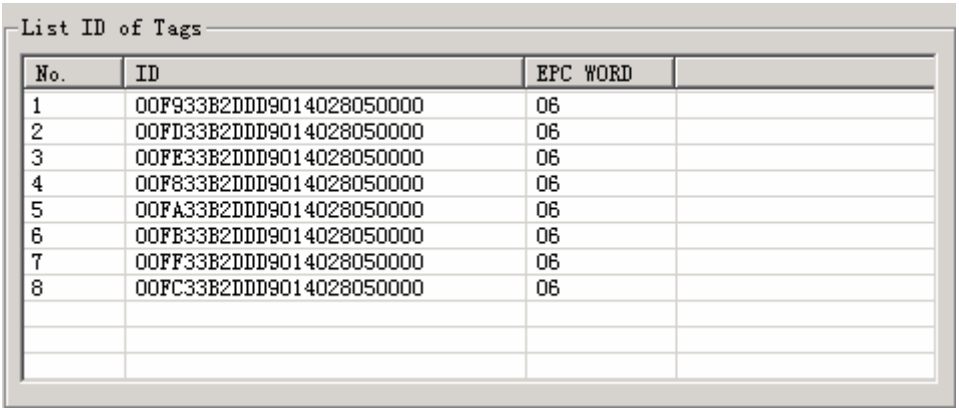


Figure4-5-6

（4） Read EPC Code According to EPC Data Conditionally

According to specific data segments in EPC momery bank, a reader can read the EPC of the tags which make condition.

Operation Steps as follows:

Step 1: Select any one of the three memory banks (except password memory bank). For example, to select EPC memory bank (Please see below figure):

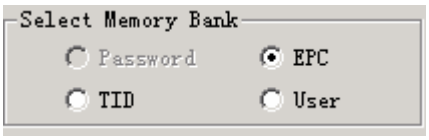


Figure4-5-7

Step 2: Set the value of 『Address of Tag Data(bit)』. This value must be an integer (e.g. 12). See the following figure 4-5-8.

Step 3: Set the value of『Length of Tag Data(bit)』, unite is Bit. For example,

set 3. Please see below Figure 4-5-8.

Step 4: Fill the data of 『Tag Data(HEX)』as Mask, e.g. C. See the following figure. .All tags which accord with conditions will be read. (Remarks : here, conditions contra poses a lot of serial bits in some memory data of tag.) When the length for condition value, is not integer times to 4 Bits, add 0 for low digit.

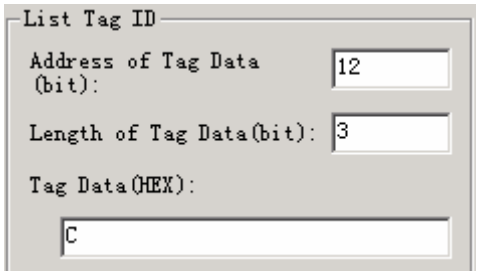


Figure4-5-8

Step 5: Press the button of 『List EPC of Tag』, then the host send the command to reader based on above criteria, reader executes the command. For example, there are 8 tags in RF field, see figure 4-5-6. Pointer is selected to be 12, Length is selected to be 3 (i.e. to compare 3 bits), and Mask is filled with C. Only two tags (ID are 00FC33B2DDD9014028050000 and 00FD33B2DDD9014028050000 separately) that match above criteria, are identified and listed in the dialog box of 『List ID of Tags』, see Figure 4-5-9.

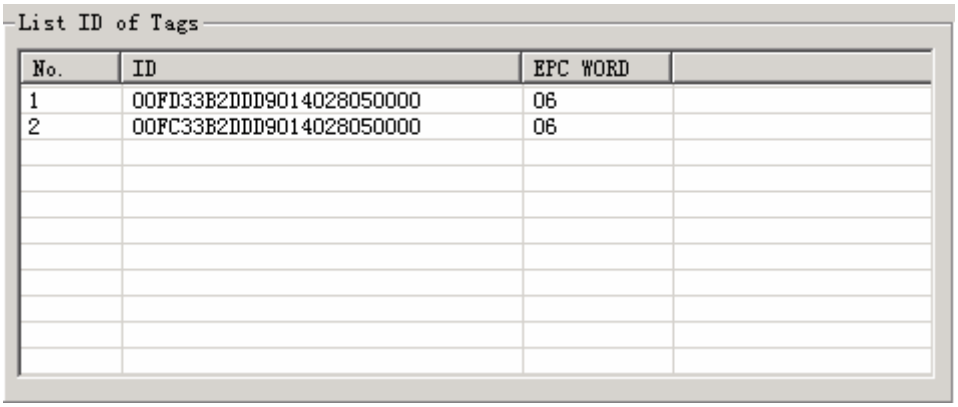


Figure4-5-9

（5） Read EPC Code of Tag Conditionally , According to TID Data

According to special data segments in TID memory bank, identify these tags which make conditions, and read EPC codes of these tags.

Operating processes as follows:

Step 1: Select TID memory bank, see the figure as below:

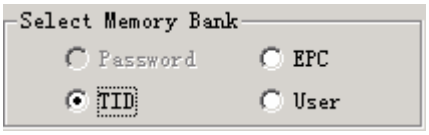


Figure4-5-10

Step 2: Set the value of『Address of Tag Data(bit)』as Pointer, e.g. 60. And the value is ok if it's an integer which is no more than 64.See the figure as below.

Step 3: Set the value of『Length of Tag Data(bit)』as data length, e.g. 4. See the figure 4-5-11 as below.

Step 4: Fill the data of 『Tag Data(HEX)』as Mask, e.g. 2. See the figure as Figure 4-5-11. All tags which make conditions， will be read. (Remarks: Here, conditions contra poses a lot of serial bits in some memory data of tag.) When the length for condition value, is not integer times to 4 Bits, add 0 for low digits.

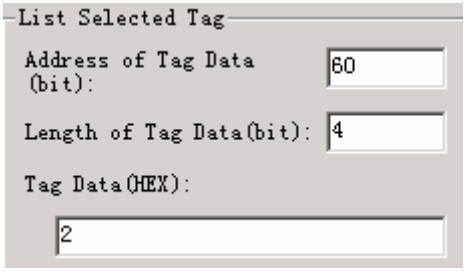


Figure4-5-11

Step 5: Press the button of『List EPC of Tag』, then the host send the command to reader based on above criteria, reader executes the command. For example, there are 8 tags in RF field, see figure 4-5-6. Pointer is selected to be 60, Length is selected to be 4, and Mask is filled with 2. Only the tag (EPC code is 051000000000000000000000, TID is E2006001002E7002) that matches above criteria, is identified and listed in the dialog box of 『List ID of Tags』, see Figure4-5-12

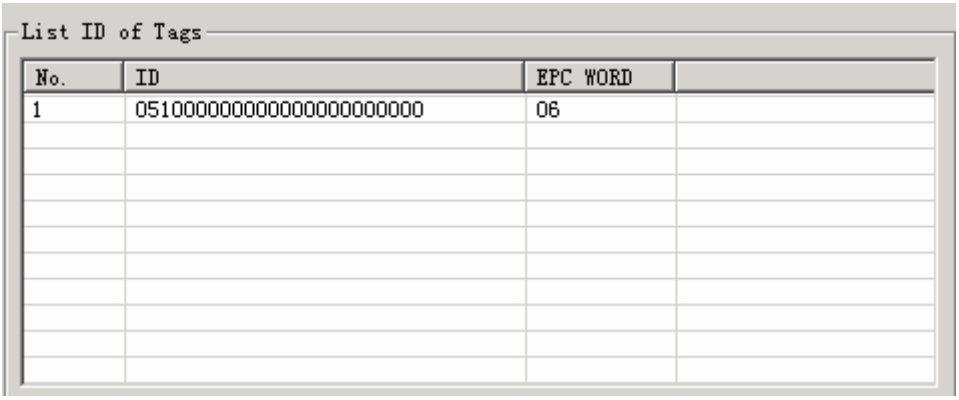


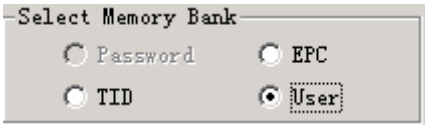
Figure4-5-12

（6） Read EPC Code of the tags conditionally , According to Data in User Memory

According to special data segments in user memory, identify tags which make conditions, and read their EPC codes.

Processes as follows:

Step 1: Select User memory, see the figure as below.



Ffigure4-5-13

Step 2: Set the value of 『Address of Tag Data(bit)』as Pointer, e.g. 7. See the figure 4-5-14。(The value must be an integer no more than 32.)

Step 3: Set the value of 『Length of Tag Data(bit)』as data Length, e.g. 3. See the figure 4-5-14.

Step 4: Fill the data of 『Tag Data(HEX)』as Mask, e.g. 2. See the figure 4-5-14. All tags which make conditions will be read. (Remarks : Here, conditions contra poses a lot of serial bits in some memory datas of tag.) When the length for condition value is not integer times to 4 Bits, add 0 for Low digit.

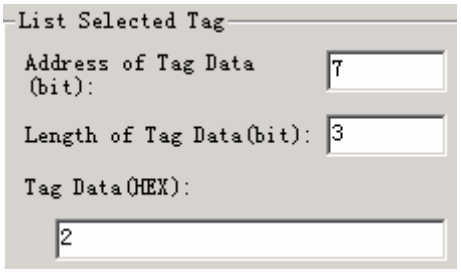


Figure 4-5-14

Step 5: Press the button of『List EPC of Tag』, then the host send the command to reader based on above criteria, reader executes the command. The EPC code of the tags identified are listed in the dialog box of 『List ID of Tags』, See the figure as below. For example, there are 8 tags in RF field, see Figure4-5-6. Pointer is selected to be 7, Length is selected to be 3, and Mask is filled with 2. The tag (ID code is 53000000000000000000000, data in

user memory bank is 32454DAE) that matches above criteria, is identified and listed in the dialog box of 『List ID of Tags』, see Figure 4-5-15.

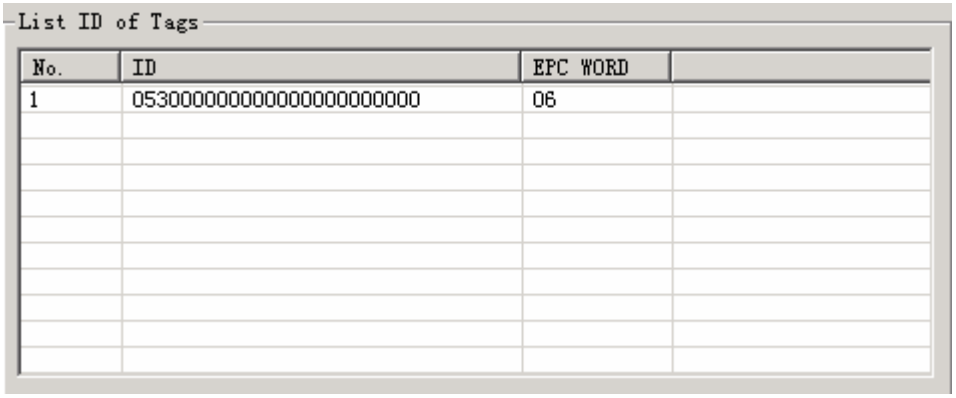


Figure4-5-15

（7） Read the Data in EPC Memory of a Selected Tag

There are 3 parts composed of the EPC tag, as follows:

CRC-16: It's the Cyclic Redundancy Check Code for PC Value and EPC Code

The length for CRC is 16Bits. See 2415H on Figure 4-5-17.

PC: It is composed of the length value and the application category code of EPC. The length for the value of EPC, is 16Bits. See 3000H on Figure 4-5-17

EPC: It's EPC Code. See 3014H on Figure 4-5-17.

Processes as follows:

Step 1: Choose EPC memory, see the figure as below:

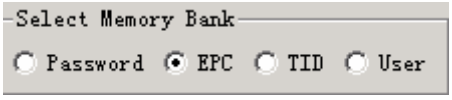


Figure4-5-16

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g. 『3014257BF461E2C000845DA7』See the figure as below.

Step 3: Input the value of『Address of Tag Data(WORD)』 as the start address of read memory, e.g. 0. See the figure as below.

Step 4: Fill the value of 『Length of Tag Data(WORD)』 as the length of read data, e.g. 3 words. See the figure as below.

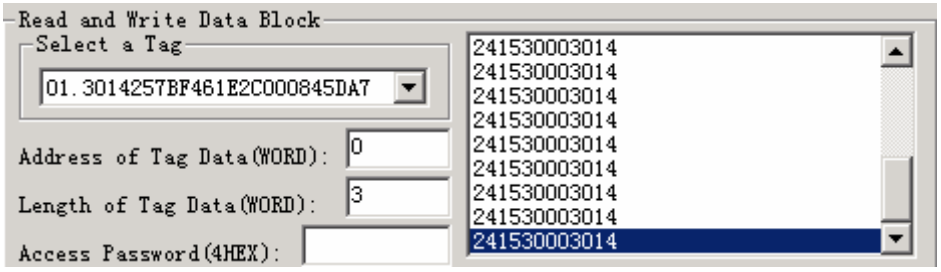


Figure4-5-17

Step 5: Press the button of 『Read』, then the host send reading command to reader with above criteria, the reader reads the data in the specified EPC memory range of an individual tag. The data is displayed in the dialog box on the right, see the figure as above.

（8） Read Data in TID Memory of a SELECTED Tag

Processes as follows:

Step 1: Choose TID memory, see the figure as below:

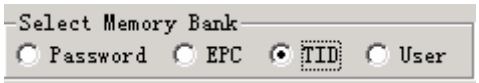


Figure4-5-18

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g. 『3014257BF461E2C000845DA7』. See the figure as below.

Step 3: Input the value of 『Address of Tag Data(WORD)』 as the start address of read memory, e.g. 0. See the figure as below.

Step 4: Fill the value of 『Length of Tag Data(WORD)』 as the length of read data, e.g. 3 words. See the figure as below.

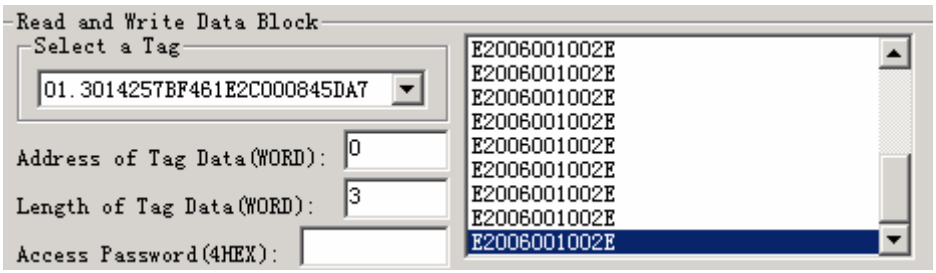


Figure4-5-19

Step 5: Press the button of 『Read』, then the host sends reading command to reader with above criteria, the reader reads the data in the specified TID memory range of an individual tag. The data which is read, is displayed in the dialog box on the right, see the figure as above.

（9） Read Data in User Memory of a Selected Tag

Processes as follows:

Step 1: Choose User memory, see the figure as below:

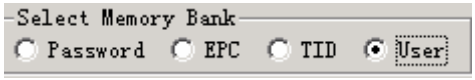


Figure4-5-20

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g.

『3014257BF461E2C000845DA7』. See the figure as below.

Step 3: Input the value of 『Address of Tag Data(WORD)』 as the start address of read memory e.g. 0. See the figure as below.

Step 4: Fill the value of 『Length of Tag Data(WORD)』 as the length of read data , e.g. 3 words. See the figure as below.

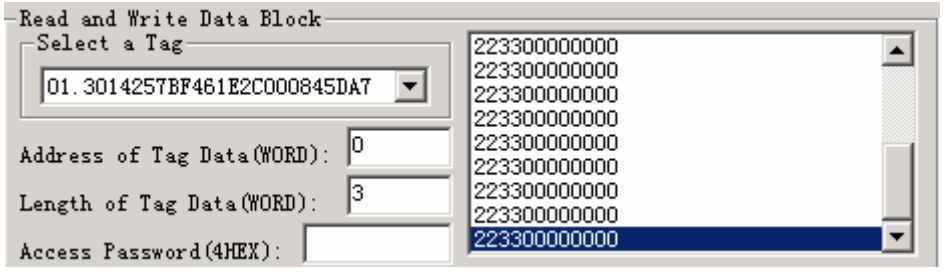


Figure4-5-21

Step 5: Press the button of 『Read』, then the host sends reading command to reader with above criteria, the reader reads the data in the specified User memory range of an individual tag. The data which is read, is displayed in the dialog box on the right, see the figure as below.

（10）Read Data in Password Memory of a Selected Tag

If password memory bank isn't set to be reading –protection, data in any one of the selected segments in password memory bank, can be read. The password memory bank is composed of 2 parts as follows:

Kill password: 32Bits

Access password: 32Bits

Processes as follows:

Step 1: Choose Password memory, see the figure as below:

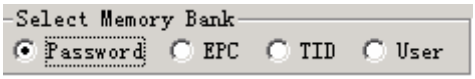


Figure4-5-22

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g. 『3014257BF461E2C000845DA7』. See the figure as below.

Step 3: Input the value of 『Address of Tag Data(WORD)』 as the start address of read memory e.g. 0. See the figure as below.

Step 4: Fill the value of 『Length of Tag Data(WORD)』 as the length of read data, e.g. 4 words. See the figure as below. (

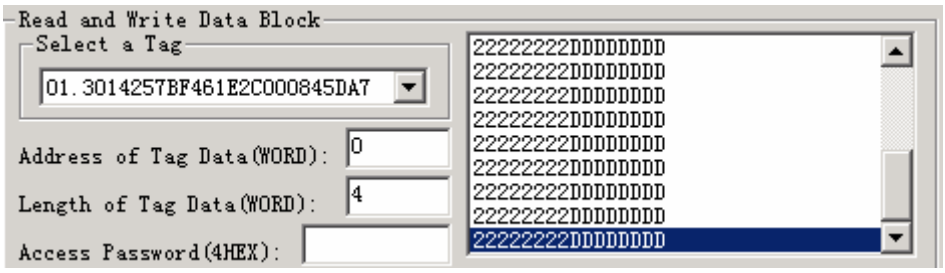


Figure4-5-23

Step 5: Press the button of 『Read』, then the host send reading command to reader with above criteria, the reader reads the data in the specified password memory range of a selected tag. The read datas are displayed in the dialog box, see the Figure as above. High 32bits (22222222) are kill password, and low 32 bits (DDDDDDDD) are access password.

（11）Write Data to EPC Memory Bank of Tag

At present, a EPC code that is written to EPC memory bank of tag, can be 16bits, 32bits, 48bits, 64bits, 80bits or 96bits. CRC-16 and PC will generate automatically according to EPC code. Operation processes as follows:

Step 1: Choose EPC memory, see the figure as below:

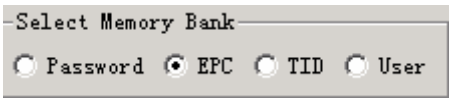


Figure4-5-24

Step 2: Fill the value of 『Length of Tag Data(WORD)』 as the length of EPC code, e.g. 6 words, namely 96bits. See the figure as below.

Step 3: If EPC memory is locked by access password, please input the access password to 『Access Password』, e.g. DDDDDDDD. See the figure as below.

Step 4:Fill the EPC code to 『Written Data(HEX)』, e.g. 『3114647BF4955876009B34F2』. See the figure as below.

Figure4-5-25

Step 5: Press the button of『Write』, then the host sends writing command to reader with above criteria, the reader writes the EPC code to the specified EPC memory of an individual tag. If writing is successful, the 『write successfully』is displayed in the dialog box as above.

Step 6: Verify whether the written EPC code is correct or not, according to the standard operation of reading EPC.

Notice： only one tag can be in RF field, otherwise all tags in RF field may be written with the same EPC code, as writing EPC code doesn't select a special tag. So, needn't choose tags from 『Select a Tag』

EPC Code is written from Address 0. So, reader don't care about the content of 『Address of Tag Data(WORD)』.

（12）Write data in user Memory of a selected tag

Operation Processed as follows:

Step 1: Choose User memory, see the figure as below:

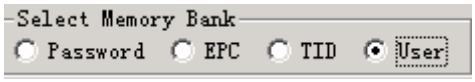


Figure4-5-26

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g. 『3114647BF4955876009B34F2』. See the figure as below.

Step 3: Input the value of『Address of Tag Data(WORD)』 as the start address of written memory, e.g. 0. See the figure as below.

Step 4: Fill the value of 『Length of Tag Data(WORD)』 as the length of data, e.g. 4 words, namely 64bits. See the figure as below.

Step 5: If User memory is locked by access password, then input the access password to 『Access Password』, e.g. DDDDDDDD. See the figure as below.

Step 6: Fill the data to 『Written Data(HEX)』, e.g. 『1234567890123456』. See the figure as below.

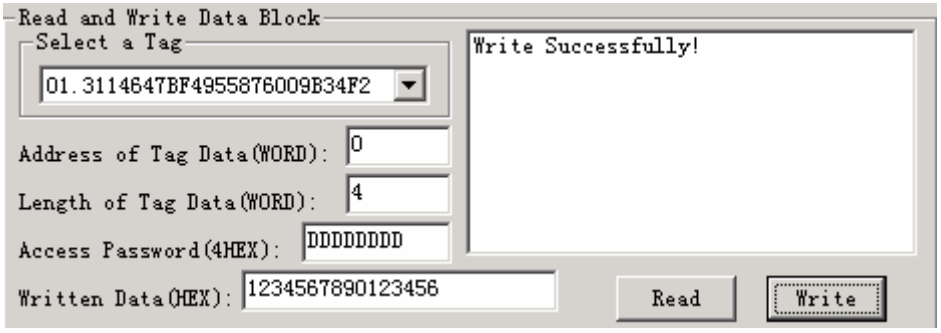


Figure4-5-27

Step 7: Press the button of 『Write』, then the host send writing command to reader with above criteria, the reader writes the data to the specified User memory of an individual tag. If writing is successful, the 『write successfully』is display in the dialog box as above.

Step 8: Verify whether the written data is correct, according to the operation of reading user memory.

（13）Write Data to TID Memory of a Selected tag

Processes as follows:

Step 1: Choose TID memory, see the figure as below:

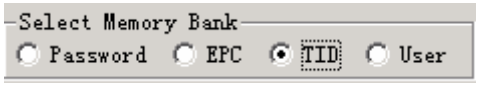


Figure4-5-28

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g. 『05100000000000000000000』. See the figure as below.

Step 3: Input the value of『Address of Tag Data(WORD)』 as the start address of written memory, e.g. 0. See the figure as below.

Step 4: Fill the value of 『Length of Tag Data(WORD)』 as the length of TID,

e.g. 4 words, namely 64bits. See the figure as below.

Step 5: If TID memory is locked by access password, then input the access password to 『Access Password』, e.g. DDDDDDDD. See the figure as below

Step 6: Fill the data to 『Written Data(HEX)』, e.g. 『E2006001002E7002』. See the figure as below.

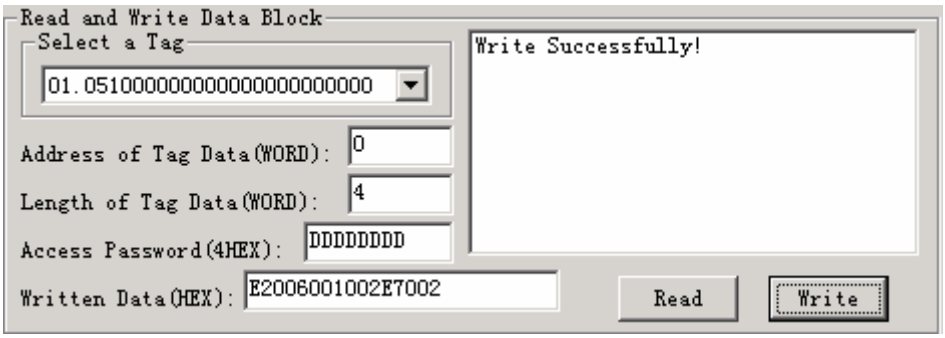


Figure4-5-29

Step 7: Press the button of 『Write』, then the host send writing command to reader with above criteria, the reader writes the data to the specified TID memory of an individual tag. If writing is successful, the 『write successfully』is displayed in the dialog box as above.

Step 8: Verify whether the written data is correct, according to the standard operation of reading datas in TID memory bank.

（14）Change the Passwords of an Individual tag

Processes as follows:

Step 1: Choose password memory, see the figure as below:

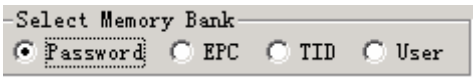


Figure4-5-29

Step 2: Select an individual tag from the box of『Select a Tag』, e.g. 『3114647BF4955876009B34F2』. See the figure as below.

Step 3: Input the value of 『Address of Tag Data(WORD)』as the start address of written memory, e.g. 0. See the figure as below.

Step 4: Fill the value of 『Length of Tag Data(WORD)』 as the length of password， e.g. 2 words, namely 32bits. See the figure as below.

Step 5: If password memory is locked by access password, then input the last access password to 『Access Password』, e.g. DDDDDDDD. See the figure as below.

Step 6: Fill new password to 『Written Data』, e.g. 『ABCDEF12』. See the figure as below.

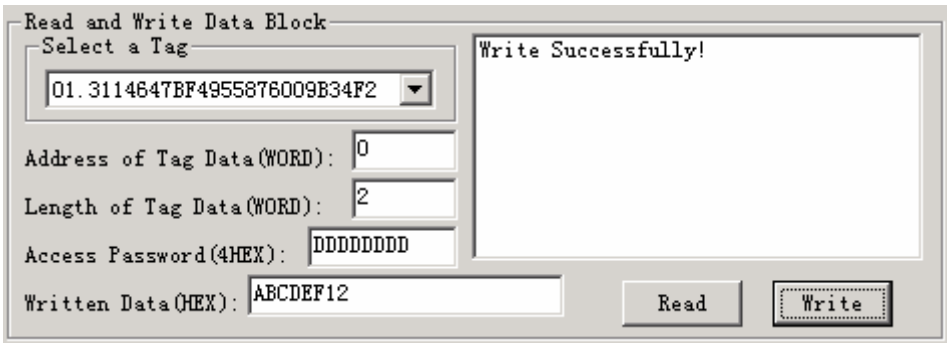


Figure4-5-30

Step 7: Press the button of 『Write』, then the host sends writing command to reader with above criteria, the reader writes the kill password to the specified password memory of an individual tag. If writing is successful, the 『write successfully』is displayed in the dialog box as above.

Step 8: Verify whether the written data is correct, according to the standard operation

4.6 Setting Read-write Protection

（1） Types for Read / Write Protection

◆ EPC, TID, User Memory Banks For Tag

These 3 memory banks are readable from any state, but they are all set with write-protection.

Wrriteable from any state--- Can write without access password. And later, it can be set to be "Writable from secured state", "Permanently Writable" , " Never Writdable".

Permanently Writable---Can write without access password. Later, it can't be set to be "Writable from secured state", "Never writeable".

Writable from secured state--- Can write only when know access password. Later, it can be set to be "Never Writeable", "Writeable from any state", "Permanently Writable".

Never Writeable--- Can't be written even if know access password. (i.e. can't be written permanently .). And it couldn't be changed to any one of other 3 types.

◆ Password Momery Bank of Tag

The Password Memory Bank of Tag can be set to be reading –protection / writing protection. The reading-protection/writing protection state with password memory bank will not influence password's use.

Readable and Writeable from any state—can read / write without access password. Later, it can be set to be "Readable and Writable from secured state", "Permanently Readable and writable" , "Never readable and

writable".

Permanently Readable and Writable—can read and write without access password. Later, it can't be set to be "Readable and Writable from secured state" , " Never Readable and Writable".

Readable and Writable from secured state—Can read password and amend password only when know access password. Later, it can be set to be "Never Readable and Writable" , " Readable and Writeable from any state" , " Permanently Readable and Writable" .

Never Readable and Writable-- Can't be read and written even if know access password. In another word, can't read password and amend password permanently.

Notice: Setting read-write protection of tag subject needs to know access password of tag in advance.

（2） Writing- protection for EPC Memory

Step 1: Choose EPC memory, see the figure as below:

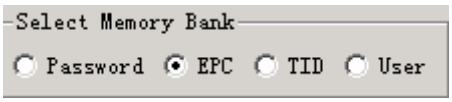


Figure4-6-1

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g. 『3114647BF4955876009B34F2』. See the figure as below.

Step 3: Select one of below locks (a, b, c and d), e.g. c. See the figure as below. (a=writable from any state, b=permanently writable, c=writable from the secured state, d=never writable)

Step 4: Fill the access password to 『Access Password(4HEX)』, e.g. "ABCDEF12" of the tag 『3114647BF4955876009B34F2』. See the figure as below.

Figure4.6-2

Step 5: Press the button of "Set Protect", then below dialog box appears:

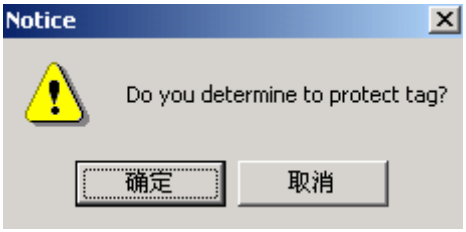


Figure4-6-3

Step 6: Press the button of 『cancel』, then above operations are useless. Press the button of 『OK』, then the host sends lock command to reader with above criteria, the reader locks EPC memory of the tag. On PC Screen, appears below dialogue box:

Figure4-6-4

Step 7: Verify whether the lock is successful, according to the operation of writing data to EPC memory bank.

（3） Writing-protection of TID memory bank

Step 1: Choose TID memory, see the figure as below:

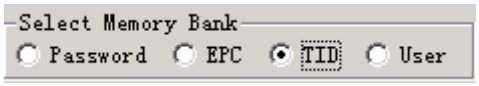


Figure4-6-5

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g. 『3114647BF4955876009B34F2』. See the figure as below.

Step 3: Select one of below locks (a, b, c and d), e.g. c. See the figure as below.

Step 4: Fill the access password to 『Access Password(4HEX)』, e.g. "ABCDEF12" of the tag 『3114647BF4955876009B34F2』. See the figure as below.

Figure4-6-6

Step 5: Press the button of 『Set Protect』, then below dialog box appears:

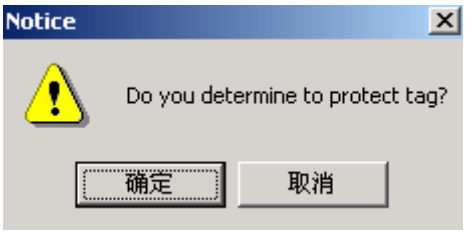


Figure4-6-7

Step 6: Press the button of 『cancel』, then above operations are useless. Press the button of 『OK』, then the host sends lock command to reader with above criteria, the reader locks TID memory of the tag. On screen, appears below dialogue box for successful lock:

Figure4-6-8

Step 7: Verify whether the lock is successful, according to the standard operation of writing data to TID memory bank.

（4） Write-protection for User memory

Step 1: Choose User memory, see the figure as below:

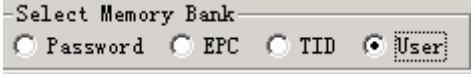


Figure4-6-9

Step 2: Select an individual tag from the box of 『Select a Tag』, e.g.

『3114647BF4955876009B34F2』. See the figure as below.

Step 3: Select one of below locks (a, b, c and d), e.g. c. See the figure as below.

Step 4: Fill the access password to 『Access Password(4HEX)』, e.g. "ABCDEF12" of the tag 『3114647BF4955876009B34F2』. See the figure as below:

Figure4-6-10

Step 5: Press the button of "Set Protect", then below dialog box appears:

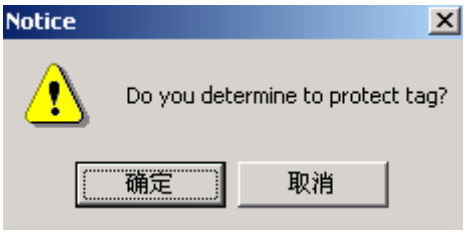


Figure4-6-11

Step 6: Press the button of 『cancel』, then above operations are useless. Press the button of 『OK』, then the host sends lock command to reader with above criteria, the reader locks User memory of the tag. On PC screen, appears below dialogue box:

Figure4-6-12

Step 7: Verify whether the lock is successful, according to the standard operation of writing data to User memory bank.

（5） Read-write Protection for Password Memory

Step 1: Choose password memory, see the figure as below:

Figure4-6-13

Step 2: Fill the access password (or kill password), See the figure as below.

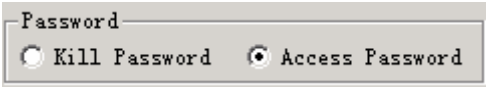


Figure4-6-14

Step 3: Select an individual tag from the box of 『Select a Tag』, e.g. 『3114647BF4955876009B34F2』. See the figure as below.

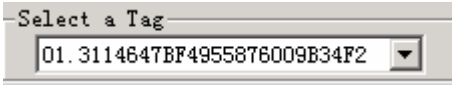


Figure4-6-15

Step 4: Select one of below locks (a, b, c and d), e.g. c. See the figure as below:

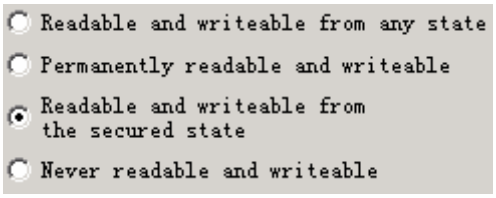


Figure4-6-16

Step 5:Fill the access password to 『Access Password(4HEX)』, e.g. "ABCDEF12" of the tag 『3114647BF4955876009B34F2』. See the figure as below:

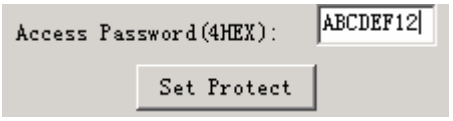


Figure4-6-17

Step 6: Press the button of 『Set Protect』, then below dialog box appears:

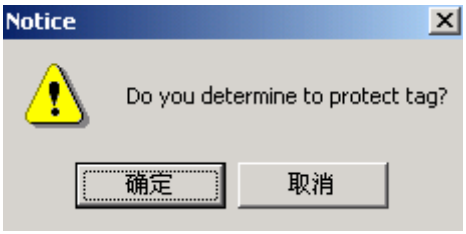


Figure4-6-18

Step 7: Press the button of 『cancel』, then above operations are useless. Press the button of 『OK』, then the host sends lock command to reader with above criteria, the reader locks password memory of the tag. Below dialogue box will appear if the lock setting is successful:

Figure4-6-19

Step 8: Verify whether the lock is successful, according to the standard operation of amending password.

4.7 Kill Tag

When a tag is killed, the tag will never respond to any command of the reader. So, this functions to be used with prudence!

Step 1: Select an individual tag from the box of 『Select a Tag』, e.g. 『1234567890ABCDEF12345678』. See the figure as below.

Step 2: Fill the kill password to 『Password』, e.g. "EEEE0000" of the tag 『1234567890ABCDEF12345678』. Unit for kill password is Hex. See the figure as below:

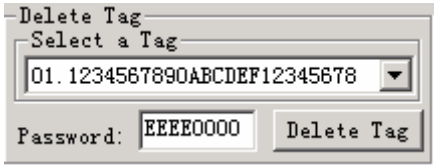


Figure4-7-1

Step 3: Press the button of 『Delete Tag』, then below dialog box appears:

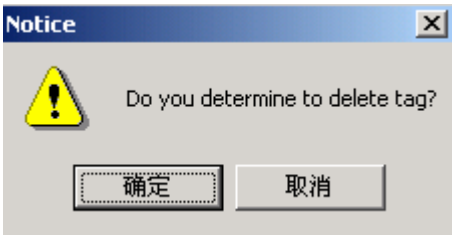


Figure4-7-2

Step 4: Press the button of 『cancel』, then above operations are useless. Press the button of 『OK』, then the host sends kill command to reader with above criteria, the reader destroy the tag.

Figure4-7-3

Step 5: Verify whether destroy is successful, according to the standard operation of reading EPC code.

4.8 Alarm

Select a tag,select 『Set』in Eas State frame(below figure) to set alarm tag,select 『Reset』if need cancel.

Click 『Set Alarm』

Bound Set Eas Alarm successfully dialog frame:

If OK,click 『Eas Alarm』,program will check whether there is set alarm condition tag in radia area, a red mark will indicate if have.

Close Relay for four seconds when alarms,and postpone four seconds when alarm again.

4.9 Test of Auto-Mode

Note: Only the commands from PC of Host IP Address on Parameter interface , can be accepted by reader.

Below are the above said commands:

- Command for Entering / Exiting from Auto-work mode
- Order reader to notify tag data in storage module immediately.
- Reboot of reader.

Notice: Every time when entering auto-work mode, reader will clear up all tag data in storage module automatically.

Before test auto mode, set operation parameters of auto mode according to demand, then press 『Auto Output』, See the figure as below:

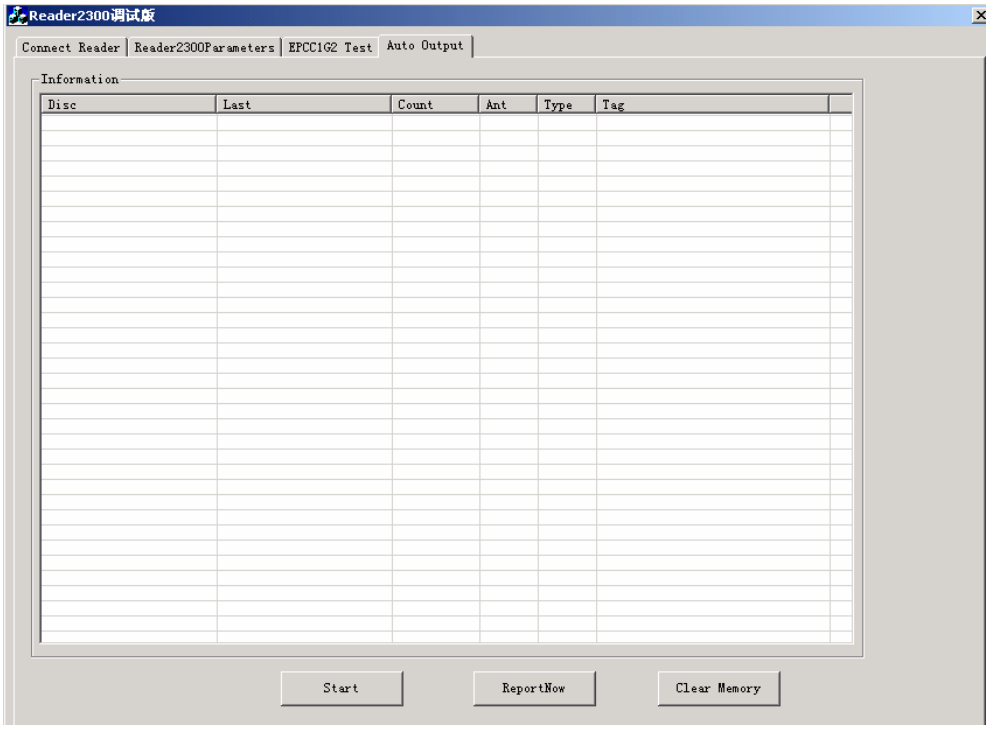


Figure4-8-1

（1） Timing Notify

Step 1: Choose Timing Notify.

Step 2:press the button of 『Start』, reader starts to read EPC of tag. Information is shown on 『Information』, see below figure:

Information

Disc	Last	Count	Ant	Tag
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00F9 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:42	2006/10/22 17:14:43	00013	09	00FA 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00FE 33B2 DDD9 0140 2805 0000

Figure4-8-2

『Disc』: Shows the time of reading tag for the 1st time.

『Last』: Shows the time of reading tag for the last time.

『Count』: shows the times of reading tag during the period between 『Disc』

and『Last』

『Ant』： Shows the antennas which identify this tag. For example, 09, namely antenna 1 and antenna 4 , both of them read the tag.

『Tag』： Shows the EPC of tag.

Reader reports the tag data which is read , to PC on timing mode, the information displays in above figure.

Step 3: Press the button of 『Stop』, then the reader stops reading and reporting.

Step 4(Optional):press the button of 『ReportNow』, reader will report all the tag data in reader storage module to PC.

Step 5(Optional): press button of 『Clear Memory』, reader will clear up all the tag data in reader storage module.

（2） Add Notify

Step 1: must select the Add Notify

Step 2:press button of 『Start』, reader starts to read EPC of tag. Information is displayed in box of 『Information』, See the figure as below

Information

Disc	Last	Count	Ant	Tag
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00F9 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:42	2006/10/22 17:14:43	00013	09	00FA 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00FE 33B2 DDD9 0140 2805 0000

Figure4-8-3

When reader reads the tags which originally don't exist in reader storage module, will report these tag data to PC. Please see the above figure.

Step 3: press button of 『Stop』,will stop reading and reporting

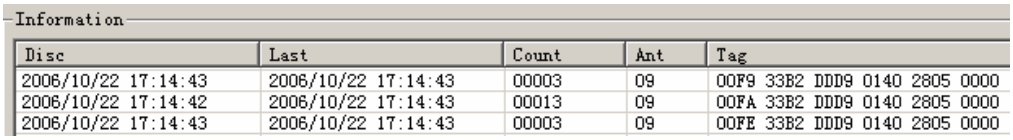
Step 4(optional): press the button of『ReportNow』, reader will report all the tag data in storage module to PC.

Step 5(optional): press button of 『Clear Memory』, reader will clear up all the tag data in storage module.

（3） Remove Notify

Step 1: must select the Remove Notify.

step 2: press button of 『Start』, reader starts reading EPC of tag. Will display below info in box of 『Information』, see figure as below:


Information

Disc	Last	Count	Ant	Tag
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00F9 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:42	2006/10/22 17:14:43	00013	09	00FA 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00FE 33B2 DDD9 0140 2805 0000

Figure4-8-4

When the time for some tags stored in storage module is out, reader will report these tag data to PC. And the display is shown in above figure.

Step 3: press button of 『Stop』,reader will stop reading and reporting.

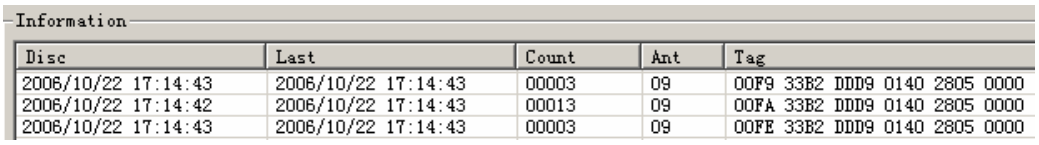
Step 4(optional): press button of 『ReportNow』,reader will report all tag data in storage module to PC

Step 5(optional): press button of 『Clear Memory』, reader will clear up all tag data in storage module.

（4） Change Notify

Step 1: must select the change notify.

Step 2: press button of 『Start』,reader starts reading EPC of tag. It will display below info in box of 『Information』see figure as below


Information

Disc	Last	Count	Ant	Tag
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00F9 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:42	2006/10/22 17:14:43	00013	09	00FA 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00FE 33B2 DDD9 0140 2805 0000

Figure4-8-5

When add or remove some tags in storage module, reader will report these tag data to PC. And it'll be displayed in above figure.

Step 3: press button of 『Stop』, reader will stop reading and reporting.

Step 4(optional):press button of 『ReportNow』,reader will report all tag data in storage module to PC

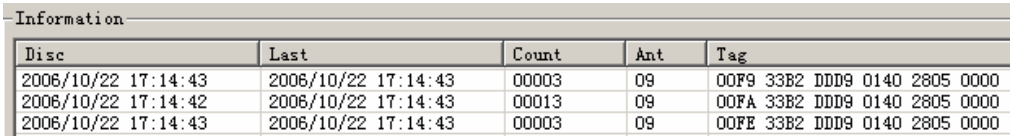
Step 5(optional): press button of 『Clear Memory』, reader will clear up all tag data in storage module

（5） Notify Now

Step 1: must select the Notify Now

Step 2:press button of 『Start』reader starts reading EPC of tag.

Step 3:press button of 『Notify Now』, reader will report all tag data in storage module to PC. And it'll Display info in box of 『Information』, see figure as below:


Information

Disc	Last	Count	Ant	Tag
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00F9 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:42	2006/10/22 17:14:43	00013	09	00FA 33B2 DDD9 0140 2805 0000
2006/10/22 17:14:43	2006/10/22 17:14:43	00003	09	00FE 33B2 DDD9 0140 2805 0000

Figure4-8-6

Step 4:press button of 『Stop』,reader will stop reading.

Step 5(optional): press button of 『ReportNow』, reader will report all tag datas in storage module to PC

Step 6(optional): press button of 『Clear Memory』, reader will clear up all tag data in storage module

5 Application Development

5.1 Distributions for Tag Memory

Memorizer of EPCC1G2 tag is divided into 4 Memory Banks:

- EPC Memory Bank: the bank for storage of EPC codes. At present, it can stores 96 bits EPC codes at most. And it can be written/read.
- TID Memory Bank: the bank for storage of tag's ID code which is set by manufacturer. At present, there are 2 types of ID code: 32bits or 64bits. It can be Read but can't be written.
- User Memory Bank: This memory bank varies for different manufacturers. No user memory bank for tag from Impinj, user memory bank of tag in Philips is 96bits. It can be read and written.
- Password Memory Bank: both access password and kill password are 32bits. It can be read and written.

5.2 SDK

There are 2 methods for 2300 application development:

（1） Host operates reader direct by using control code of serial port communications protocol.

（2） By the calls of API function from SDK, host operates reader.

5.2.1 Communications Protocol

2300 has two data communications ports: RS232, RJ45. Both of them adopt the same protocol. The description about this protocol as follows:

（1） Summarizing

In RFID application system, 2300 reader is connected with communication control (or PC) in application system by RS232 port; receives commands from control, and returns the result that the commands are performed, to control. So we call the data communication packet which sends data from control to reader, as Command Packet. And we call the data communication packet which sends data for the said executed commands from reader to control, as Return Packet.

Format for Command Packet

BootCode	Length	Command	*Command Param*	CheckSum

As shown on above figure, Command Packet is composed of five parts:

A. BootCode:

Pilot code, one byte, it is fixed to be 40H.

B. Length:

The valid length of Command Packet, one byte. And this length is the sum of all bytes for the last three segments (Command, Command Param, and CheckSum)

C. Command:

Command code, one byte

D. Command Param:

Command parameter, and its length varies with commands.

E. CheckSum:

CheckSum, 1 byte. And it's a result that the bytes (from BootCode to Command Param) are summed up acco
rding to bitwise-exclusive-OR .

Format for Return Packet

BootCode	Length	Command	*Return Data*	CheckSum

As shown on above figure, Return Packet is also composed of five parts:

A. BootCode:

Pilot code, one byte. When the command is executed successfully, the BootCode is F0H. When the execution of command fails, the BootCode is F4H.

B. Length:

The valid length of Return Packet, one byte. This length is the sum of all bytes for last three segments (Command, Return Data, and CheckSum)

C. Command:

Command Code, one byte. It's the same as the received command code from Command Packet, and this means that Return Packet is the response to this command

D. Return Data:

Return Data: To return the result that commands are executed. And Length of Return Data varies with commands.

E. CheckSum:

CheckSum, 1 byte. And it's a result that the bytes (from BootCode to Return Data) are summed up according to bitwise-exclusive-OR.

Error Code

When the execution of commands fails, BootCode of Return Packet is F4H and Return Data of is 1 Error Code (1 byte)

Error Codes which is often to be used:

00(00H)--Command is executed successfully, or checking is correct.

01(01H)--Antenna connection fails.

02(02H)--Fail to detect tag

03(03H)—the tag is not authorized.

04(04H)--RF power is not enough for reading or writing

05(05H)--The memory is with write-protection.

06(06H)--Checksum error

07 (07H) --Parameter error

08 (08H) –The memory doesn't exist.

09 (09H) -- The password is incorrect

10 (0AH) -- Kill Password of EPC C1G2 is full zero

11(0BH)-- When reader is in Auto-work mode, it only receives Auto Mode

command and Reboot command, and other commands are illegal.

12(0CH)-- Illegal user whose password doesn't match.

……

30(1EH)--Incognizance command

31(1FH)--Other errors

Notice: As the error return packets for all commands are same, we won't discuss about error return any more when describe commands in next contents.

For Example:

Set the baud rate of the reader to be 9600bps, Command Packet『40H 03H 01H 04H B8H』

And:

1)40H -- Boot code

2)03H -- The valid length of command packet is 3 bytes

3)01H -- Command code for setting reader's baud rate.

4)04H -- Represents 9600bps

5)B8H -- CheckSum

If the command is executed correctly, the return packet is: 『F0H 02H 01H 0DH』

If the executing is wrong, the return packet maybe is : 『F4H 03H 01H

1FH E9H』

（2） Command Formats which are often used.

A. Set Baud rate

Function: When the reader receives this command, it changes the baud rate of RS232 port according to this command parameter. Function : Set the operating baundrate for RS232 port. Every time after reader downloads new program, the start communication rate of RS232 port is 9600bps. When reader receives this command (i.e. Set Baudrate Command),it will re-set the baudrate for reader' serial port according to command parameter. No matter whether the power supply for reader is on or off, this operating rate will be kept till it is re-set next time.

Command Code: 01H

*Command Parameter:*1 byte, The value range: 00H~08H. 00H - 600bps;01H - 1200bps;02H - 2400bps;03H - 4800bps;04H - 9600bps;05H - 19200bps;06H - 38400bps;07H - 57600bps;08H - 115200bps

Command Packet: 『40H 03H 01H BPS sumcheck』

Return Data: if the command is executed successfully, Return Data of return packet is null. Response Packet:『F0H 02H 01H 0DH』

B. Get Reader Version

Function: Get Reader Version (software, hardware)

Command Code: 02H

Command Parameter: None

Command Packet: 『40H 02H 02H BCH』

*Return Data: I*f the command is executed successfully, Return Data in return packet is 4 Bytes version: Byte0-hardware main Version; Byte1-hardware lesser Version; Byte2-software main Version Byte3- software lesser Version. (Hardware version represents reader's mode)

For example: reader mode is RFS-2022，software version is V1.0， So, Return Packet:

F0H 06H 02H 14H 16H 01H 00H DDH

C. Set RF Output Power of Reader

Function: Once the new RF output power of reader is set, it goes into effect immediately till re-set reader's RF output power, even if the power supply is off.

Command Code: 04H

Command Parameter:1 byte ，represents RF power value; The value range is: 0 to 160.

Command Packet: 『40H 03H 04H Pow CheckSum』

Return Data: if the command is executed successfully, Return Data in return packet is null. Response Packet:『F0H 02H 04H 0AH』

D. Set Operating Frequency

Set channel numbers for reader transmits out microwave signals. Once operating frequency is set, it'll keep itself till it's re-set next time and won't be influenced by the state of reader's power supply (on / off)

Command Code: 05H

Command Parameter: 2 bytes. Byte1 --- start frequency (fmin), and its value range: 1 ~63; Byte2 --- end frequency (fmax),its value range:1~63 .

If end frequency is bigger than start frequency, it shows that reader works on skipping frequency mode. If end frequency equals to start frequency, it shows that reader works on a fixed channel mode.

Command Packet: 『40H 04H 05H fmin fmax sumcheck』

Return Data: if the command is executed successfully, Return Data in return packet is null. Response Packet:『F0H 02H 05H 09H』

Table 2 Relation of RF Frequency and Frequency Channel

Channel number	Frequency in MHz	Channel number	Frequency in MHz	Channel number	Frequency in MHz
1	902.6	22	911.0	43	919.4
2	903.0	23	911.4	44	919.8
3	903.4	24	911.8	45	920.2
4	903.8	25	912.2	46	920.6
5	904.2	26	912.6	47	921.0
6	904.6	27	913.0	48	921.4
7	905.0	28	913.4	49	921.8
8	905.4	29	913.8	50	922.2
9	905.8	30	914.2	51	922.6
10	906.2	31	914.6	52	923.0
11	906.6	32	915.0	53	923.4
12	907.0	33	915.4	54	923.8
13	907.4	34	915.8	55	924.2
14	907.8	35	916.2	56	924.6
15	908.2	36	916.6	57	925.0

16	908.6	37	917.0	58	925.4
17	909.0	38	917.4	59	925.8
18	909.4	39	917.8	60	926.2
19	909.8	40	918.2	61	926.6
20	910.2	41	918.6	62	927.0
21	910.6	42	919.0	63	927.4

E. Choose Antenna

Function: Choose the antennas from which to receive/send signals.

Command Code: 0AH

*Command Param:*1 byte (Ant), it indicates the serial number of antenna. 1 --- select Antenna No.1; 2 --- select Antenna No.2; 4 --- select Antenna No.3;8 --- select Antenna No.4;3 --- select Antennas No.1 and Antenna No.2

Command Packet: 『40H 03H 0AH No sumcheck』

Return Data: if the command is executed successfully, Return Data is null.

Response Packet:『F0H 02H 0AH 04H』

F. Reboot of Reader

Function: The reboot of reader. That means turn on reader after it 's turned off..

Command Code: 0EH

Command Param: none

Command Packet: 『40H 02H 0EH B0H』

Return Data: if the command is executed successfully, Return Data in return packet is null. Response Packet:『F0H 02H 0EH 00H』

（3） Network Command

A. Set Network Address for Reader

Function: Set network address of reader.

Command Code: 30H

*Command Param:*14 bytes。
IP(4Bytes)+PORT(2Bytes)+MASK(4Bytes)+Getway(4Bytes)

Command Packet: 『40H 10H 30H IP PORT MASK Getway sumcheck』

Return Data: if the command is executed successfully, Return Data in return packet is null. Response Packet: 『F0H 02H 30H DEH』

B. Get Network

Function: Get network address of reader.

Command Code: 31H

Command Parameter: None

Command Packet: 『40H 02H 31H 8DH』

Return Data: If the command is executed successfully, Return Data = IP(4Bytes) + PORT(2Bytes) + MASK(4Bytes) + Getway(4Bytes). Response Packet: 『F0H 10H 31H IP PORT MASK Getway sumcheck』

（4） I/O

A. Set Relay State of Reader

*Function: S*ets the state of relay.

Command Code: 03H

*Command Parameter:*1 byte (Rel)。

Bit0=1: Indicates the close of Relay No.1,

Bit0=0: indicates the open of Relay No.1;

Bit1=1: indicates the close of Relay No.2;

Bit1=0 indicates the open of Relay No.2

To reason by above method.

Command Packet: 『40H 03H 03H K sumcheck』

Return Data: If command is executed successfully, Return Data in return packet is null. Response Packet :『F0H 02H 03H 0BH』

（5） Auto-Work Commands

The commands relating to auto-work model, as follows:

A. AutoMode

Function: Once reader receives this command, it goes into auto-work mode immediately.

Command Code: 55H

*Command Param:*1 byte (OP). 0--- stop auto-work; 1--- start auto-work

Command Packet: 『40H 03H 55H OP sumcheck』

Return Data: If command is executed successfully, Return Data in return packet is null. Response Packet: 『F0H 22H 55H 99H』

Note: If a reader is in auto-mode, only AutoMode command can let it stop auto-work and go into command-work state. Any other command can't make reader stop auto-work.

（6） Reading/writing Commands for Data of Tag

A. EPC1G2_ListTagID

Function: According to mask, identify the ID of the tags which are in RF field of antenna and can be identified.

Command Code: EEH

Command Parameter1:1 byte (Mem). It's to be used for choosing data memory: 0—password memory, 1—EPC memory, 2—TID memory, 3—User memory.

Command Parameter2: 2 bytes (Addr). It's used to show the start address of mask (unit: bit)

Command Parameter3: 1 byte (LEN). It's used to show the length of mask (unit: bit)

Command Parameter4: m bytes, mask; If LEN%8＝0，then m＝LEN/8。If LEN%8≠0，then m＝⌊LEN/8⌋＋1。m bytes (Mask)--- If LEN%8=0，then m=LEN/8. If LEN%8≠0，then m=⌊LEN/8⌋+1

Command Packet:『40H m+6 EEH mem addr LEN Mask sum』

Return Data: If the reader identifies those tags successfully, Return Data xx = M + N*(L+EPC)] ;M(1 byte):the total number of identified tags ;N(1 byte):the number of tags in this Return Data (N<=8) ;L(1 byte):the word length of EPC code in a tag ;EPC(L words): EPC code of a tag

Note: LEN=0 indicates that reader identifies all tags in the RF field.

EPC digit:00H--0Word，01H--1Word，02H--2Word，……，FFH--256Word

Response Packet :『F0H 3+L*N EEH M L*N sumcheck』

B. EPCC1G2_GetIDList

Function: Get ID of the tag, which originally has been listed via rfs_ListTagID command and is stored in reader memory.

Command Code: EDH

Command Parameter: 2 bytes. Byte 1: The serial number of Tag, from which to start reading tag ID.; Byte2: the number (M) of tags to be get, (M<=8)

Command Packet: 『40H 04H ECH no m sum』

Return Data: If the reader retrieves those tags successfully, Return Data xx = M*(L+EPC). M(1 byte): the number of tags to be retrieved;L(1 byte): the word length of EPC code in a tag;EPC(L words): EPC code of a tag 。
Response Data:『F0H 2+L*8 EDH L*M sumcheck』

C. EPC1G2_ReadWordBlock

Function: Read a block of data in the specified address' beginning position, which is in specified data memory of specified tag. Unit for the length of

Command Code: ECH

Command Parameter1: 1 bytes (L). It's used to show the word quantity of EPC code.

Command Parameter2: L*2 bytes (EPC). It shows which tag to be read.

Command Parameter 3: 1 byte (Mem). It's used for choosing data memory banks,: 0-- password, 1-- EPC, 2-- TID, 3--User

Command Parameter 4: 1 byte (Addr) --- start address of tag memory, unit: Word

Command Parameter 5: 1 byte (Len) --- the length of tag data, unit: Word

Command Parameter 6: 4 bytes (AccessPassword) --- the access password of tag

Command Packet: 『40H 15H ECH EPC mem addr len AccessPassword sum』

Return Data: if the command is executed successfully, Return Data xx is bytes (len*2)

Response Packet: 『F0H len*2＋2 ECH xx …… xx sum』

Note: AccessPassword works only when password memory bank is in the state of "Readable and Writable from secured state"

D. EPC1G2_WriteWordBlock

Function: Write data in specified address cell of specified tag memory. Unit for the length of written data: Word.

Command Code: EBH

Command Parameter 1: 1 bytes (L) --- the word quantity of EPC code in this tag.

Command Parameter 2: L*2 bytes (EPC). It indicates: Which tag will be written with data.

Command Parameter 3: 1 byte (Mem). It's used for choosing data memory bank: 0-- password, 1-- EPC, 2-- TID, 3--User

Command Parameter 4: 1 byte (Addr) --- start address of tag memory, unit: Word

Command Parameter 5: 1 byte (Len) --- the length of tag data, unit: Word

Command Parameter 6: Len*2 bytes (Data) --- the data to be written

Command Parameter 7: 4 bytes (AccessPassword) --- the access password of this tag

Command Packet : : 『40H 21＋len*2 EBH EPC mem addr len data AccessPassword sum』

Return Data: if the command is executed successfully, Return Data in return packet is null. Response Packet: 『F0H 02H EBH 23H』

Note: AccessPassword works only when data memory is in the sate of "Readable and Writable from secured sate". When data memory is in the state of non-lock, it's writable without password; when data memory is in the state of "Permanently lock", it's no use even if know password.

E. EPC1G2_SetLock

Function: Set the specified data memory of a tag to be in write –protection state.

Command Code: EAH

Command Parameter 1: 1 bytes (L) --- the word quantity of EPC code in this tag.

Command Paramter 2: L*2 bytes (EPC) --- EPC code of this tag shows to set read/write protect with which tag

Command Parameter 3: 1 byte (Mem). It's used for choosing the data memory bank to be protected: 0—Kill Password, 1--Access Password, 2--EPC, 3--TID, 4--User

Command Parameter 4: 1 byte (Lock). 0--writable, 1--permanently writable, 2--writable from the secured state, 3--never writable, 4--readable and writable, 5--permanently readable and writable, 6-- readable and writable from the secured state, 7—never readable and writable. 0~3 : only suitable for EPC, TID, USER (3 memory banks); 4~7: only suitable for Kill Password and Access Password.

Command Parameter 5: 4 bytes (AccessPassword) --- the access password of this tag

Command Packet: 『40H 14H EAH EPC mem Lock AccessPassword sum』

Return Data: if the command is executed successfully, for return packet, BootCode is F0H, and Return Data is null. Response Packet: 『F0H 02H EAH 24H』

F. EPC1G2_EraseBlock

Function: Host erases a block of data in the specified address cell of a specified tag memory. Unit: Word

Command Code: E9H

Command Parameter1: 1 bytes (L) --- the word quantity of EPC code in this tag.

Command Parameter 2: L*2 bytes (EPC) --- EPC code of this tag shows that : To erase which tag data.

Command Parameter 3: 1 byte (Mem). It's used for choosing data memory bank: 0-- password, 1--EPC, 2--TID, 3—User.

Command Parameter 4: 1 byte (Addr) --- start address of tag memory, unit: Word

Command Parameter 5: 1 byte (Len) --- the length of tag data, unit: Word

Command Packet: 『40H 11H EBH EPC mem addr len sumcheck』

Return Data: if the command is executed successfully, Return Data is null.
Response Packet: 『F0H 02H E9H 25H』

G. EPC1G2_KillTag

Function: Host kills a specified tag.

Command Code: E8H

Command Parameter1: 1 bytes (L) --- the word quantity of EPC code in this tag

Command Parameter 2: L*2 bytes (EPC) --- EPC code of this tag shows that which tag will be killed.

Command Parameter 2: 4 bytes (KillPassword) --- the kill password of this tag

Command Packet: 『40H 12H E8H EPC KillPassword sum』

Return Data: if the command is executed successfully, in return packet, BootCode is F0H, Return Data is null. Response Packet: 『F0H 02H E8H 26H』

H. EPC1G2_WriteEPC

Function: Host writes EPC data to EPC cell of tag. And the length of the written data is: Word

Command Code: E7H

Command Parameter1: 1 bytes (L) --- the word quantity of EPC code in this tag

Command Parameter 2: L*2 bytes (EPC) --- EPC code of this tag

Command Parameter 3: 4 bytes (AccessPassword) --- the access password of this tag

Command Packet: 『40H 7+L*2 E7H L EPC AccessPassword sum』

Return Data: if the command is executed successfully, Return Data is null. Response Packet: 『F0H 02H E7H 27H』

Note: AccessPassword works only when data memory is in the state of "Readable and Writable from secured state". When data memory is

in the state of non-lock, it's writable without password; when data memory is in the state of permanent-lock, it's no use even if know password.

5.2.2 SDK

（1） Constitution of SDK

We offer SDK (Application Software Development Kit) together with 2300 Reader Products. The main files which constitute SDK, as follows:

A. Reader2300DLL.dll --- Dynamic Link Library

B. Reader2300DLL.Lib --- Static Link Library

C. Reader2300API.h --- the head file of API

D. Reader2300SDK Demo contents --- sound code file using SDK

（2） The specification of SDK

Basic Constants & Their Constitutions.

A. Definition of Constant

```
#define ID_MAX_SIZE_96BIT   13      // ID of Tag is 96 bits

#define MAX_LABELS          100     // At most 100 tags to be read
/written for one time
```

B. Response Code of API

```
#define_OK                 0x00    // operation successfully

// error code of communications:

#define _init_rs232_err     0x81    // fail to initialize RS232 port
```

```
#define _no_scanner             0x82    // can't find out reader

#define _comm_error             0x83    // error of communications

#define _baudrate_error         0x84  // error baud rate of RS232 port

// Information about wrong operation returned by reader.

#define _no_antenna             0x01    // fail to connect antenna

#define _no_label               0x02    //    fail to detect tag

#define _invalid_label          0x03    //    the tag is without authorization

#define _less_power             0x04    // RF power is not enough for
reading or writing

#define _write_prot_error  0x05    // the memory is with write- protection.

#define _check_sum_error 0x06    // error check sum

#define _parameter_error  0x07    // error parameters

#define _memory_error           0x08    // the memory doesn't exist

#define _password_error         0x09    // password is incorrect

#define _killpassword_error     0x0a    // the kill password of G2 tag is all
zero

#define _nonlicet_command     0x0b    // illegal operation command

#define _nonlicet_command     0x0c    // illegal user

#define _unbeknown_command     0x1e    //   unknown command
```

#define _other_error 0x1f // other error

C. Define Data Type

typedef USHORT apiReturn; // The return data type of function.

After a API function is executed, there will be a return value which type is apiReturn. According this return value, We can determine below info : if the function executing is successful or not; If the function executing fails, what's the reason for this fail; and so on.

Specification of API Function

A. Connect Reader

connected by serial port

apiReturn _stdcall ConnectScanner(HANDLE *hScanner, char *szPort, int nBaudRate);

Function: Host connects a reader via RS232 port. And set communication speed

Input Parameters:

szPort : the character pointer of RS232 port, for example, 『COM1』、『COM2.....

nBaudRate: the baud rate of RS232 port, may be:9600, 19200, 38400, 57600 or 115200bps

Note: If NbaudRate=0, then host automatically search for the baud rate which matches the reader.

Output Parameter:

*hSacnner:*the handle of the serial communication

Return Data: If the return value of function is _ok, it shows that connection is successful, otherwise connection fails.

connect by RJ45

apiReturn _stdcall Net_ConnectScanner(SOCKET *hSocket,CString nTargetAddress,UINT nTargetPort,CString nHostAddress,UINT nHostPort);

Function: Host connects a reader via a RJ45 port. And sets communication speed

Input Parameters:

nTargetAddress: Target Address，for example:『192.168.0.1』……

nTargetPort: Target Port，for example『1969』

nHostAddress: Host Address，for example:『192.168.0.2』……

nHostPort:Host Port，for example『5000』

Output Parameter:

hSacnner:the handle of network communication

Return data: If the return value of function is _ok, it shows that the connection is successful, otherwise the connection fails.

B. Disconnect reader

apiReturn _stdcall DisconnectScanner(HANDLE hScanner);

apiReturn _stdcall Net_DisconnectScanner(SOCKET hSocket);

Function: Host disconnects a reader , so as to release serial port.

Input Parameter:

hSacnner/ hSocket : The handle of a reader.

C. Set the baud rate of serial communication

apiReturn _stdcall SetBaudRate(HANDLE hScanner, int nBaudRate);

Function: Set the baud rate of the serial communication port(RS232) of a reader.

Input Parameter:

hScanner:The handle of a reader

nBaudRate: the value range is:9600，19200，38400，57600，115200

Return Data : If the return data of function is _ok, it shows the setting is successful, otherwise setting fails.

D. reading Ver

apiReturn _stdcall GetReaderVersion(HANDLE hScanner, WORD *wHardVer, WORD *wSoftVer);

apiReturn _stdcall Net_GetReaderVersion(SOCKET hSocket, WORD *wHardVer, WORD *wSoftVer);

*Function :*reading hardware / software Ver of reader

Input Parameter:

hScanner/ hSocket: the handle of reader

output:

wHardVer: Reader hardware Ver

WSoftVer: Reader software Ver

Return Data: If the return value of function is _ok, it shows the reading is successful, otherwise the reading fails.

E. Set the state of reader's relay (open or close)

apiReturn _stdcall SetRelay(HANDLE hScanner, int Relay);

apiReturn _stdcall Net_SetRelay(SOCKET hSocket, int Relay);

功能: Set relay's state (open or close)

Input Parameter:

hSacnner / hSocket: the handle of reader

Relay:1 Byte. Bit0=1 (Relay No.1 is on), Bit0=0 (Relay No.1 is off) , Bit1=1 (Relay No.2 is on), Bit 1=0 (Relay No.2 is off), and so on.

Return Data: If the return value of function is _ok, it shows setting is successful; otherwise the setting fails.

F. Set RF Output Power

apiReturn _stdcall SetOutputPower(HANDLE hScanner, int nPower1);

apiReturn _stdcall Net_SetOutputPower(SOCKET hSocket, int nPower);

Function: Set the RF output power of a reader.

Input Parameter:

hScanner/ hSocket:The handle of reader.

nPower1: the value of RF output power

Return Data: If the return value of function is _ok, it shows the setting is successful, otherwise the setting fails.

G. Set Operating Frequency

apiReturn _stdcall SetFrequency(HANDLE hScanner, int Min_Frequency, int Max_Frequency);

apiReturn _stdcall Net_SetFrequency(SOCKET hSocket, int Min_Frequency, int Max_Frequency);

Function: Set the operating frequency of a reader.

Input Parameter:

hScanner/ hSocket: the handle of reader.

Min_Frequency: nFrequency_Start--- minimum frequency, it ranges from 1 to 63.

Max_Frequency: nFrequency_End--- mamximal frequency, it ranges from 1

to 63

When Min_Frequency = Max_Frequency，The reader is under the mode of a fixed frequency .

Return Data: If the return value of function is _ok, it shows setting is successful, otherwise the setting fails.

H. Select Antenna

apiReturn _stdcall SetAntenna(HANDLE hScanner, int Antenna);

apiReturn _stdcall Net_SetAntenna(SOCKET hSocket, int Antenna);

Function: Host chooses a or several antennas to work.

Input Parameter:

hScanner/ hSocket: the handle of the serial communication

Antenna: nNum--- 1 Byte, 0x01 choose Antenna No.1, 0x02 choose Antenna No.2, 0x04 choose Antenna No.3, 0x08 choose Antenna No.4, 0x03 choose antennas No.1 and Antenna No.2, and so on .

Return Data: If the return value of function is _ok, it shows the setting is successful, otherwise the setting is failure.

I. Restore Reader

apiReturn _stdcall Reboot(HANDLE hScanner);

apiReturn _stdcall Net_Reboot(SOCKET hSocket);

Function: Host reboots a reader.

Input Parameter :

hSacnner / hSocket: the handle of the serial communication

Return Data: If the return value of function is _ok, it shows the setting is successful, otherwise the setting is failure.

J. Set Reader's Network Address

apiReturn _stdcall SetNetwork(HANDLE hScanner, BYTE IP_Address[4], int Port, BYTE Mask[4], BYTE Gateway[4]);

apiReturn _stdcall Net_SetNetwork(SOCKET hSocket, BYTE IP_Address[4], int Port, BYTE Mask[4], BYTE Gateway[4]);

Function: Host sets the network address of a reader.

Input Parameter:

hSacnner / hSocket: the handle of the serial communication

IP_Address: the network IP of a reader

Port: the network port of a reader

Mask: the network mask of a reader

Gateway: the gateway IP of a reader

Return Data: If the return value of function is _ok, it shows the setting is successful. Otherwise the setting fails.

K. Get Reader's Network Address

apiReturn _stdcall GetNetwork(HANDLE hScanner, BYTE *IP_Address, int

*Port, BYTE *Mask, BYTE *Gateway);

apiReturn _stdcall Net_GetNetwork(SOCKET hSocket, BYTE *IP_Address, int *Port, BYTE *Mask, BYTE *Gateway);

Function: Host gets the IP information of reader.

Input Parameter:

hSacnner / hSocket: the handle of the serial communication

Output Parameter:

IP_Address: the network IP of a reader

Port: the network port of a reader

Mask: the network mask of a reader

Gateway: the gateway IP of a reader

Return Data: If the return value of function is _ok, it shows that the setting is successful, otherwise the setting fails.

L. Read EPC of a Tag

apiReturn _stdcall EPC1G2_ReadLabelID(HANDLE hScanner, BYTE mem, int ptr, BYTE len, BYTE *mask, BYTE *IDBuffer, int *nCounter);

apiReturn _stdcall Net_EPC1G2_ReadLabelID(SOCKET hSocket, BYTE mem, int ptr, BYTE len, BYTE *mask, BYTE *IDBuffer, int *nCounter);

Function: Read EPC of all tags which make conditions in the RF field of antenna.

Input Parameter:

hScanner/ hSocket: the handle of the serial communication

mem: Choose data memory bank; 0—password memory , 1—EPC memory, 2—TID memory , 3—User memory

ptr: start address of mask, unit:Bit

len: the length of mask, unit:Bit

mask: unit is byte. If LEN/8=integer (e.g.0), then Length (mask) =LEN/8. If LEN/8≠integer (e.g.0), then length (mask)=⌊LEN/8⌋+1, the least data of mask are put the most scale bits of least scale byte, the low bits of least scale byte is appended 0 bit.

Output Parameter:

IDBuffer: EPC of tag which is read.

NCounter: the quantity of tags which are read.

Return Data: If the return value of function is _ok, it shows that the reading is successful, otherwise the reading fails.

Note: len=0 it indicates that reader identifies all tags in the RF field of antenna which can be identified.

M. Read a block of data from a selected tag

apiReturn _stdcall EPC1G2_ReadWordBlock(HANDLE hScanner, BYTE EPC_WORD, BYTE *IDBuffer, BYTE mem, BYTE ptr, BYTE len, BYTE *Data, BYTE *AccessPassword);

apiReturn _stdcall Net_EPC1G2_ReadWordBlock(SOCKET hSocket, BYTE EPC_WORD, BYTE *IDBuffer, BYTE mem, BYTE ptr, BYTE len, BYTE *Data, BYTE *AccessPassword);

Function: Read data in memory of tag's serial addresses .

Input Parameter:

hScanner/ hSocket: the handle of the serial communication

EPC_WORD: the word length of EPC code of a tag;

IDBuffer: The selected EPC of tag

mem: Select data memory bank; 0-password, 1-EPC, 2-TID,3-USER.

ptr: start address of tag memory to be read, (unit:Word)

len: the length of tag data to be read, (unit:Word)

AccessPassword: the access password of this tag, 4 Bytes.

Output Parameter:

Data: the read data

Return Data: If the return value of function is _ok, it shows that the reading is successful, otherwise it fails.

Note: AccessPassword works only when password memory bank is under the state of "Readable and Writable from secured state".

N. Write a block of data to a selected tag

apiReturn _stdcall EPC1G2_WriteWordBlock(HANDLE hScanner, BYTE

EPC_WORD, BYTE *IDBuffer, BYTE mem, BYTE ptr, BYTE len, BYTE *Data, BYTE *AccessPassword);

apiReturn _stdcall Net_EPC1G2_WriteWordBlock(SOCKET hSocket, BYTE EPC_WORD, BYTE *IDBuffer, BYTE mem, BYTE ptr, BYTE len, BYTE *Data, BYTE *AccessPassword);

Function: Host writes a block of data to the specified address cell of a selected tag.

Input Parameter:

hScanner/ hSocket: the handle of the serial communication

EPC_WORD: the word length of EPC code of this tag

IDBuffer: the selected EPC of tag

mem: Select a data memory; 0--password, 1--EPC, 2--TID, 3--User.

ptr: start address of tag memory to be written, unit:Word

len: the length of tag data to be written, unit:Word

Data: the data to be written

AccessPassword: the access password of this tag, 4 bytes.

Return Data: If the return value of function is _ok, it shows the writing is successful, otherwise it fails.

Note: AccessPassword works only when data memory is under the state of "Readable and Writable from secured state". When data memory is under the state of non-lock, it's writable without

password; when data memory is under the state of permanent lock, it's no use even if know password.

O. Set the memory of a selected tag to be with read/write- protection

apiReturn _stdcall EPC1G2_SetLock(HANDLE hScanner, BYTE EPC_WORD, BYTE *IDBuffer, BYTE mem, BYTE Lock, BYTE *AccessPassword);

apiReturn _stdcall Net_EPC1G2_SetLock(SOCKET hSocket, BYTE EPC_WORD, BYTE *IDBuffer, BYTE mem, BYTE Lock, BYTE *AccessPassword);

Function: Host sets the specified memory of a tag to be with write -protection.

Input Parameter:

hScanner/ hSocket: the handle of the serial communication

EPC_WORD: the length of EPC code of this tag ， unit: Word

IDBuffer: the EPC of a selected tag

mem: Select data memory, 0--Kill Password, 1--Access Password, 2-- EPC, 3-- TID, 4—User

Lock: control word; 0--writable, 1--permanently writable, 2--writable from the secured state, 3--never writable, 4--readable and writable, 5--permanently readable and writable, 6-- readable and writable from the secured state, 7--never readable and writable

Note: 0~3 only suitable for EPC, TID, User (memory banks); 4~7 only suitable for Kill Password and Access Password.

AccessPassword: the access password of this tag , 4 bytes.

Return Data: If the return value of function is _ok, it shows the setting is successful, or the setting fails.

P. Kill a tag

apiReturn _stdcall EPC1G2_KillTag(HANDLE hScanner, BYTE EPC_WORD, BYTE *IDBuffer, BYTE *KillPassword);

apiReturn _stdcall Net_EPC1G2_KillTag(SOCKET hSocket, BYTE EPC_WORD, BYTE *IDBuffer, BYTE *KillPassword);

Function: Host kills a selected tag.

Input Parameter:

hSacnner / hSocket: the handle of the serial communication

EPC_WORD: the length of EPC code of this tag , unit is Word.

IDBuffer: The EPC code of the selected tag.

KillPassword: the kill password of this tag, 4 bytes.

Return Data: If the return value of function is _ok, it shows the setting is successful, otherwise the setting fails.

Q. Write a EPC code to a tag

apiReturn _stdcall EPC1G2_WriteEPC(HANDLE hScanner,BYTE len, BYTE *Data, BYTE *AccessPassword);

apiReturn _stdcall Net_EPC1G2_WriteEPC(SOCKET hSocket,BYTE len, BYTE

*Data, BYTE *AccessPassword);

Function: Host writes EPC data to a tag's EPC cell.

Input Parameter:

hScanner/ hSocket: the handle of the serial communication

len: the word length of EPC to be written

Data: the EPC code which is going to be written.

AccessPassword: the access password of the tag, 4 bytes.

Return Data: If the return value of function is _ok, it shows that the writing is successful, otherwise it fails.

Note: AccessPassword works only when data memory is under the state of "Readable and Writable from secured state". When data memory is under the state of non-lock, it's writable without password. When data memory is under the state of permanent-lock, it's no use even if know password.

R. Auto-work Mode

apiReturn _stdcall AutoMode(HANDLE hScanner,int Mode);

apiReturn _stdcall Net_AutoMode(SOCKET hSocket,int Mode);

Function: Once reader receives this command, it goes into auto-work state immediately.

Input Parameter:

hSacnner / hSocket: the handle of the serial communication

Mode: 0--stop auto mode, 1--start auto mode

Return Data: If the return value of function is _ok, it shows that the writing is successful, otherwise it fails.

Note: If a reader is in auto mode, it can not receive any command except AutoMode and Reboot commands.

6 Ordinary Malfunctions

Table 5-1 Ordinary Malfunctions & Solutions for Them:

Phenomena's for Malfunctions	Possible Reasons	Solutions
LED for power supply doesn't light , after reader's power supply is turned on	The connection of AC Socket is not good	Connect light or other things which use AC, insert into branch line socket, if the light or other things don't work, please check power supply or choose another branch line box.
	Possibly AC is controlled by a switch	get through the switch, or choose a branch line box which has switch.
LED for antenna doesn't light.	no antenna is connected with reader	connect antenna to reader ,and screw sdown the connector.
	The connector of antenna is loose	Screw down the connectors of antenna and reader
	Antenna type is incorrect	Choose the specified antenna type.)(choose short-circuit antenna for system setting)
	Damaged antenna	Change antenna
Fail to detect tag	Antenna wasn't connected	Check antenna's connection status
	no tag in reading distance of reader	Move the test tag closer to antenna
	Damaged tag	change a test tag for testing
	Direction of at doesn't match	turn the tag 90°

	polarization direction of reader's antenna.	
	The distance between tag and reader is too long	Move tag closer to antenna

7 Warning Statement

a) Marketing
The device cannot be sold retail, to the general public or by mail order. It must be sold to dealers or have strict marketing control.

b) Requires professional installation;

- installation must be controlled.
- installed by licensed professionals (EUT sold to dealer who hire installers)
- installation requires special training (special programming, access to keypad, field strength measurements made)

C) Application
The intended use is generally not for the general public. It is generally for industry/commercial use.

d) FCC Warning statement:

This device complies with part 15 of the FCC rules, Operation is subject to the following two conditions : (1) this device may not cause harmful interference , and (2) this device must accept any interference received, including interference that may cause undesired operation .

Note : Any changes or modifications to this device not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.