

1. Before You Begin

1.1 Overview

- I Target client
The user who uses Invengo RFID handheld reader products
- I Software application
The RFID handheld reader demo software applies to multiple types of RFID handheld readers, demonstrating the function and parameters setting of the RFID handheld reader.
- I Features
The software applies to multiple types of RFID handheld reader products, integrating many functions including barcode reading and photographing.

1.2 Application Scope

The software applies to following types of Invengo RFID handheld readers:

- I XC2903
- I XC2901-FUF

1.3 Supported Operation Systems and Protocols

- I Supported Operation Systems
Windows CE 5.0
Windows CE 6.0
- I Supported protocols
ISO18000-6C
ISO18000-6B

1.4 Knowledge to prepare

- I Install or uninstall software in Windows CE system.
- I Basic concepts of the reader and the tag
- I Basic operations of the RFID handheld reader

1.5 Terms and Abbreviations

RFID: Radio Frequency Identification, also called electronic tag or wireless radio frequency identification, is a type of communication technique that could identify target object and read/write relevant data through radio signal.

TID: Tag Identification, referring to data stored within TID data memory section, as the unique identification of a tag, could be read but not be modified.

EPC: Electronic Product Code, the new generation of product coding system disclaimed by EPCglobal, allowing every product to have the unique code over the world, could be read and written.

UserData: User Data, referring to data stored within user data memory section, defined by user, could be reader and written.

1.6 FCC Compliance 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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC RF exposure Statement

The exposure standard for wireless devices employs a unit of measurement known as the Specific Absorption Rate(SAR). The SAR limit set by the FCC is 1.6 W/kg. The highest SAR level measured for this device is 1.06W/kg, so this device meets the FCC Requirement.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

2. Application Instruction

2.1 Open the Interface

Open the demo software, the main interface will show as below:



Figure 2-1 the main interface

- | Explorer: To open the explore in the system
 - | Control Panel: To open the control panel in the system.
 - | View process: To open the process viewer in the system.
- "PDA", "RFID", "Barcode", "TimeSync" and "Camera" will be described in detail below.

2.2 RFID

RFID module is used for demonstrating the function of radio frequency identification on the RFID handheld reader, including operations on the tag.

2.2.1 Read tag



Click the button , the RFID interface will come up as below:



Figure 2-2 RFID interface

- I Clear: To clear the scanning results in the table.
- I Read: To perform loop reading.
- I Option: To set reader parameters and tag operations.

Click the button “Scan” (the button will be transferred to “Stop” after clicking), the reader will perform loop scanning. That means a tag will be scanned for many times. Then, the data and scanning times of the tag will be listed in the table. The loop scanning will not be stopped until you click the button “Stop” (the button will be transferred to “Scan” after clicking). The example is shown as figure 2-3.

Note: scanning can also be performed by pressing the key [SCAN] on the RFID handheld reader.



Figure 2-3 read

As shown in the figures above, the scanning state (including reading time, reading rate and tag amount) will be displayed under the table.

If the data of the last time is not cleared, the current scanning data will be added to the previous data. In the same word, the scanning times will be added to the value displayed at the last stop instead of 0. If you would like to count the scanning times from 0, please click “Clear”. Then, the data of the last scanning will be cleared and could perform a new time of scanning.

The software is set to read TID of tags in default. The reading settings could be changed in “Read set”. Click “Option”, the interface is shown as figure 2-4.



Figure 2-4 RFID option

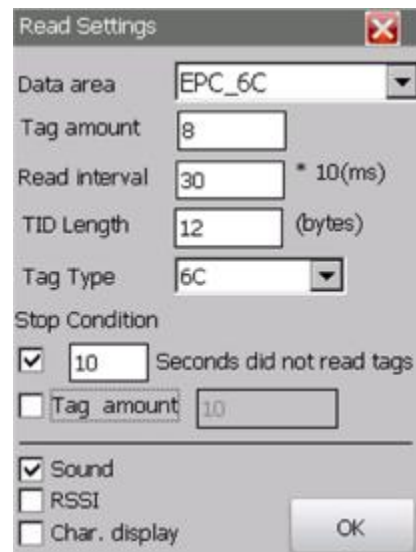
The read settings and other settings will be introduced in detail below.

2.2.2 Read Settings

Path: RFID --> Option --> Read Set

Settings: Data area, Tag amount, Read interval, TID Length, Tag Type, RSSI, Sound, Char. display.

The interface is shown as figure 2-5.

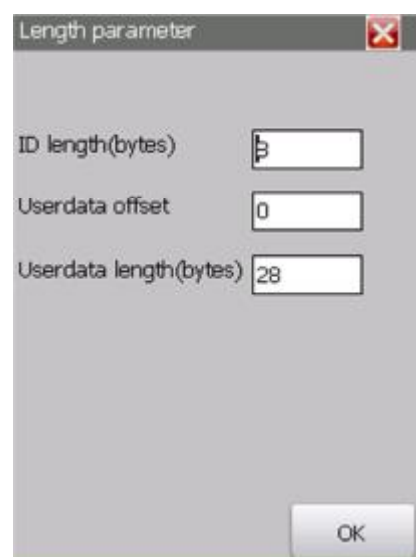


The 'Read Settings' dialog box contains the following fields and options:

- Data area:** A dropdown menu with 'EPC_6C' selected.
- Tag amount:** A text input field with the value '8'.
- Read interval:** A text input field with the value '30', followed by a multiplier '* 10(ms)'.
- TID Length:** A text input field with the value '12', followed by '(bytes)'.
- Tag Type:** A dropdown menu with '6C' selected.
- Stop Condition:**
 - ☒ **10** Seconds did not read tags
 - ☐ **Tag amount** 10
- Display Options:**
 - ☒ **Sound**
 - ☐ **RSSI**
 - ☐ **Char. display**
- OK** button.

Figure 2-5 Read Settings

- **Data area:**
 - **TID_6C:** TID data memory section of 6C tag. The default length is 8 bytes.
 - **EPC_6C:** EPC data memory section of 6C tag. The default length is 30 bytes.
 - **EPC_TID_UserData:** the data memory sections of 6C tag including EPC, TID and UserData. The default length of user data memory section is 28 bytes.
 - **EPC_TID_UserData2:** the data memory sections of 6C tag including EPC, TID and UserData. By selecting this option, another interface for setting length parameters will come up. You can set ID length, UserData offset and UserData length (the length of EPC could not be set, the length is 30 bytes). The interface is shown as figure 2-6.



The 'Length parameter' dialog box contains the following fields:

- ID length(bytes):** A text input field with the value '8'.
- Userdata offset:** A text input field with the value '0'.
- Userdata length(bytes):** A text input field with the value '28'.
- OK** button.

Figure 2-6 Length parameter

- ID length: The length of TID data memory section to be read, measured in bytes.
- Userdata offset: The offset address of user data memory section, measured in byte.
- Userdata length: The length of user data, measured in bytes.
- OK: perform the settings and return to the interface of read settings.
- | Tag Amount: to set the max amount of tags covered by the radio signal.
- | Read interval: to set the interval of reading tags, measured in 10 milliseconds.
- | TID Length: to set the length of TID data memory section that will be read.
- | Tag Type: to select the tag type (6C, 6B or 6C/6B).
- | Stop Condition:
 - Read Time: tick to set the reading time period (10 seconds to 300 seconds). If there are no tags to be read in the period, the reader will stop scanning afterward. Otherwise, scanning will not be stopped automatically.
 - Tag amount: tick to set how many tags to be scanned. The reader will stop after the same numbers of tags have been read.
 - You can click button “Stop” on the RFID interface to or press the key “SCAN” on the device to stop reading. You can also press the yellow key on the left side of the device to stop reading.
- | Sound: tick to open the prompt sound.
- | RSSI: tick to display RSSI.

- | Char. Display: tick to display read data in characters.
- | OK: to perform the settings.

2.2.3 Read/Write tag

Path: RFID --> Option --> Read/Write tag

Settings: If the RFID interface has got the read data of tags, you could set the tag reading or writing settings for each tag on this interface as shown in figure 2-7.



Figure 2-7 Read/Write tag

- | Drop-down list: to select a tag to operate.
- | Offset: to set the beginning address for operation.
- | Length: to set the data length for operation.
- | Access password: to enter the correct access password

- I Data memory section: to select the data memory section for operation from the drop-down list.
- I Text Area: to display or input data.
- I Read: to perform read operation.
- I Write: to perform write operation.
- I Option: click to jump into another interface shown as figure 2-8.

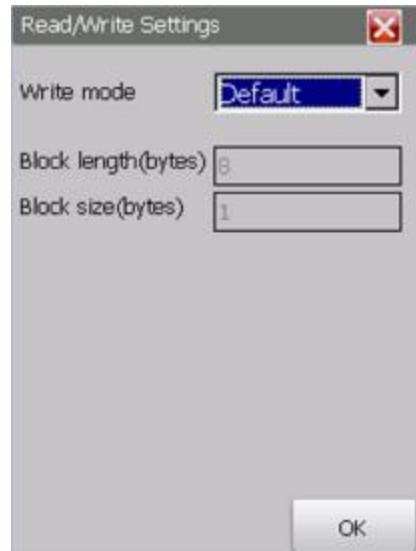


Figure 2-8 Read/Write tag

- o Write mode: Default, Block write or Block erase.
- o Block length: the length of block to be operated, measured in bytes. The setting works providing that the write mode is set to block write or block erase.
- o Block size: the number of blocks to be operated measured by bytes. The setting only works if the write mode is block erase.
- o OK: to perform the settings.

2.2.4 Power

Path: RFID --> Option --> Power

Settings: You could view or set the value of the antenna power on the interface shown as figure 2-9.

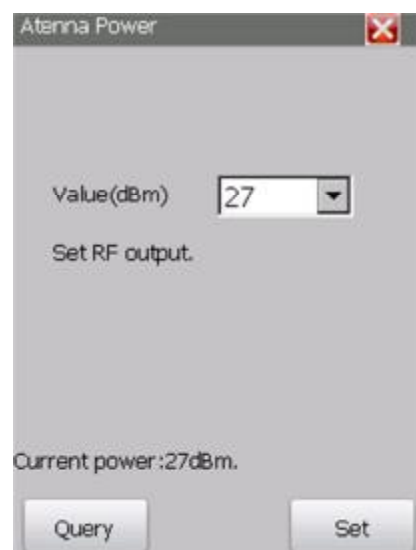


Figure 2-9 Antenna Power

- I Value: To display or set the value of the antenna power, measured by dBm. The selection is 21,

24, 27 or 30dBm.

- | Query: to query current antenna power.
- | Set: to set new antenna power.

2.2.5 Tag operation

Path: RFID --> Option --> Tag Opt

Settings: If the RFID interface has got the read data of tags, you could set access password, kill password, EAS Bits, locking or unlocking of memory sections for each tag. The interface is as shown in figure 2-10.



Figure 2-10 Tag Operating

- | Drop-down list: to select a tag for operation.
- | Access password: to enter the correct current access password.
- | New access password: tick to set new access password. Please enter new password in the text box beside.
- | Kill password: tick to set the new Kill password. Please enter new password in the text box beside.
- | EAS Bits: tick to set or cancel EAS Bits.
- | Lock/Unlock: tick to perform locking or unlocking operation on the tag.
- | Drop-Down list1: to select "Unlock" or "Lock".
- | Drop-Down list2: to select "All Memories", "TID memory", "EPC memory", "User data memory", "Access password" or "Kill password memory".
- | Set: perform the settings. (Note: the default password of the tag is 8 hexadecimal zero, which may still work after the new access password is set. However, if you lock the data memory sections using new password, the default access password will not work on the data memory sections.)

2.2.6 Kill Tag

Path: RFID --> Option --> Kill Tag

Settings: the killed tag will not be available so please be careful on this operation. The EPC and kill password should be provided when doing this operation, as shown in figure 2-11. Therefore, please make sure that the EPC of the tag has been read. The read data memory section could be changed referring to chapter 2.2.2 Read Settings.



Figure 2-11 Kill tag

- | EPC: to select EPC of the tag to be killed.
- | Kill Password: to enter the correct kill password.
- | Kill: to kill the tag.

2.2.7 Read Protect



Figure 2-12 Tag read protection setting

Drop-down list: to select the tag to be operated.

Password: to set the tag access password.

2.2.8 EAS

EAS is available on tags with NXP tag chips. An EAS flag bit is provided on an EAS tag. After enabling EAS flag bit, EAS will be on. If tags with enabled EAS flag bits are located in reader field, data of tags with configured EAS flag bit (alarm information) will be returned. EAS can be disabled by power off operation instruction.



Figure 2-13 EAS Alarm start

Path: RFID --> Option --> EAS



Click button , the EAS Alarm starts. The opening status of EAS alarm will be displayed on the RFID interface as shown in figure 2-14. Then, you can click the button “Stop” (the button will transfer to “Scan” when EAS alarm is stopped) to stop EAS alarm, as shown as figure 2-14.

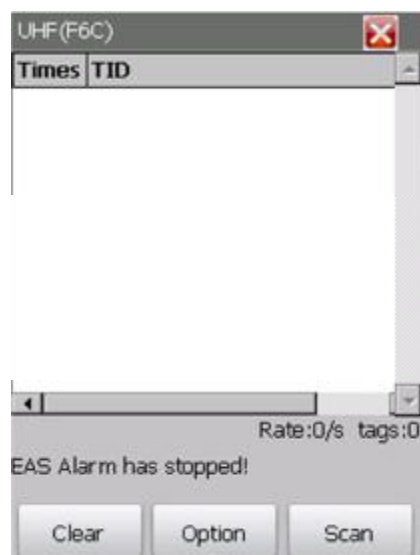


Figure 2-14 EAS Alarm stop

2.2.9 Filter

Path: RFID --> Option --> Filter

Settings: set or cancel filtering overlap tags by time. In other word, a tag will be read for once in specified time. The interface is as shown in figure 2-15.

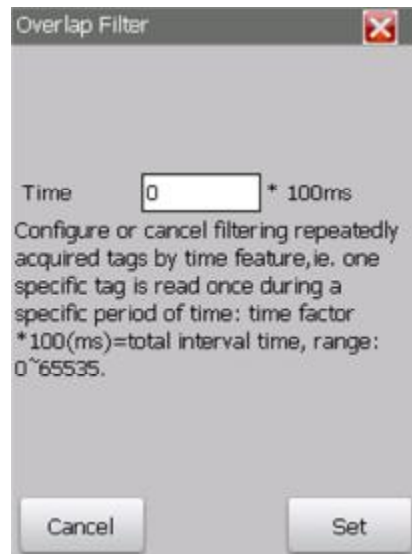


Figure 2-15 Overlap Filter

- | Time: set the overlap filtering time, measured by milliseconds. The value is limited from 0 to 65535.
- | Cancel: cancel overlap filtering.
- | Set: perform the settings.

2.2.10 Find Tags

Path: RFID --> Option --> Find Tags

Settings: set conditions to scan tags that are in these conditions

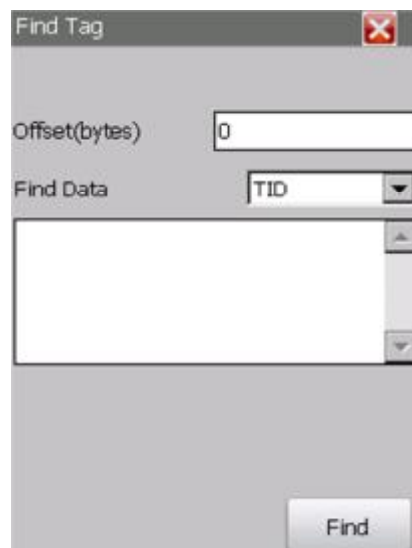


Figure 2-16 Find Tag

- | Offset: to set the offset byte of the tags to be matched.
- | Find Data: to set the data memory area of the tags to be matched, "TID" or "EPC".
- | Text area: to enter the key word in the tags to be matched. The text area cannot be empty.
- | Find: click to jump back to RFID interface and the scanning result will be displayed in the table.

Only the tags matching these conditions can be scanned.

2.2.11 Data Set

Path: RFID --> Option --> Data Set

Settings: save or upload tag data to specified PC. The interface is as shown in figure 2-17.

A screenshot of a 'Data configuration' dialog box. It has a title bar with a close button. Inside, there are two checkboxes: 'Save data' and 'Upload data'. Below 'Save data' is a text field for 'Interval(ms)' with the value '2000'. Below 'Upload data' are two text fields: 'IP Address' with the value '192 .168 .7 .69' and 'Port' with the value '6543'. At the bottom, there are two buttons: 'Cache data' and 'OK'.

Figure 2-17 Data configuration

- I Save data: tick to perform save data operation. The operation is to save tag data to the file system of the reader. You can click button "Cache data" to view or process saved data (please refer to details below).
- I Upload data: tick to perform upload operation. The operation is to save data to the PC which is running data receiving software. Please enter the IP address of that PC and the port monitored by data receiving software running on that PC (please refer to chapter data receiving software).
- I Interval: to set the interval of saving data, measured by milliseconds. The value works providing that "Sava data" or "Upload data" is ticked.
- I IP Address: the IP address of PC which receives uploaded data. The address works providing that "Upload data" is ticked.
- I Port: the port monitored by data receiving software running on the PC which receives uploaded data. The port works providing that "Upload data" is ticked.
- I OK: to perform the settings.
- I Cache data: to click to jump into another interface shown as figure 2-18.



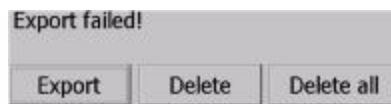
Figure 2-18 Cache data

- Export: to export cache data to local file system. A dialog will come up as below.

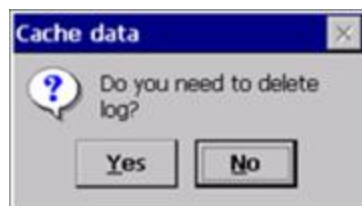


Click "No" to cancel the operation and return to cache data interface.

Click "Yes" to output data and save to "\\InvengoFlash\\Demo\\Data". The operation result will be displayed at the bottom of cache data interface, as shown below.



- Delete: to delete selected data. A dialog will come up as below.



Click "No" to cancel the operation and return to cache data interface.

Click "Yes" to delete selected data and return to cache data interface (cache data interface will be refreshed and the operation result will be displayed).

- Delete All: to delete all the cache data (Note: the output file is not deleted). A dialog will come up as below.



Click "No" to cancel the operation and return to cache data interface.

Click "Yes" to delete selected data and return to cache data interface (cache data interface will be refreshed and the operation result will be displayed).

2.2.12 Version

Path: RFID --> Option -->



Version

Settings: to display the version of software and hardware.

Figure 2-19 Version

The information displayed is:

- I The name of the software
- I The version number of software
- I The copyright
- I The version number of operation system
- I The inner version number (to distinguish customization of operation system)
- I The version number of RFID software

2.3 PDA settings

PDA settings include viewing power information, brightness adjusting, volume adjusting and version



information, as shown in Figure 2-19. Click PDA, the PDA settings interface is shown as below:

Figure 2-20 PDA Setting

2.3.1 Battery information

Path: PDA settings --> Battery information

Settings: to display power type, remained energy, current voltage and battery status.

There are two ways to supply power for RFID handheld reader as below:

- I Battery supplying interface is as shown below:

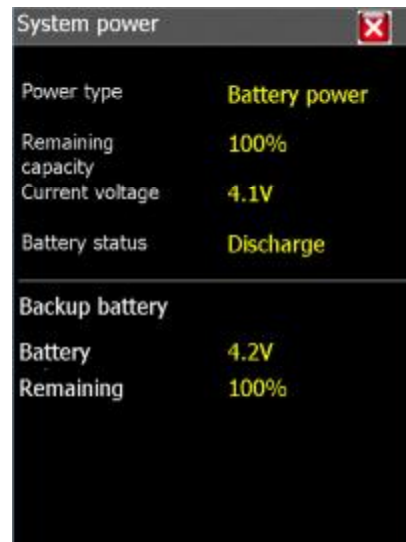


Figure 2-21 System power-battery power

The battery can be used directly. However, the power is limited so you need to charge the battery before it runs out.

- I Extra power supplying interface is shown below:

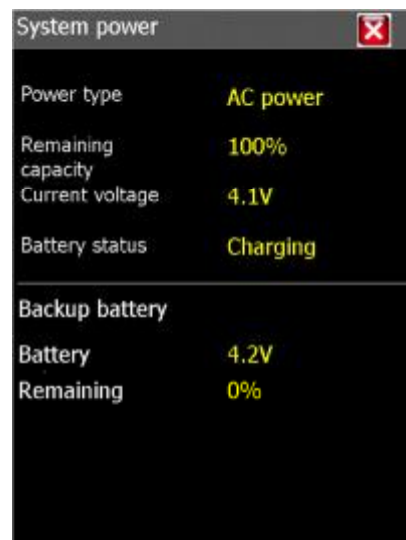


Figure 2-22 System power-AC power

You need connect the reader using the power line. That may be a little bit inconvenient but the power supplying is reliable.

2.3.2 Adjust Backlight

Path: PDA settings --> Adjust backlight

Settings: to adjust brightness of the screen by using the slider, as shown below.



Figure 2-23 Screen backlight

- | Upward: the screen will be brighter.
- | Downward: the screen will be darker.
- | Note: the brightness can also be adjusted by the progress bar.

2.3.3 Adjust Volume

Path: PDA settings --> Adjust Volume

Settings: to adjust the volume using the slider, as shown below.



Figure 2-24 Speaker volume

- | Upward: turn up the volume
- | Downward: turn down the volume
- | Note: the brightness can also be adjusted by the progress bar.

2.3.4 Version information

Path: PDA settings --> Volume adjusting

Settings: to display the version number of software, system and inner version. The interface is shown below.



Figure 2-25 Version

- I Software version: the version number of software.
- I Operation System: the version number of the operation system.
- I Inner System: the version number to distinguish customization of operation system.

2.4 Read Barcode

The interface is to display how RFID handheld reader reads barcodes.

2.4.1 Read operation



Click  to enter read barcodes interface, as shown below:

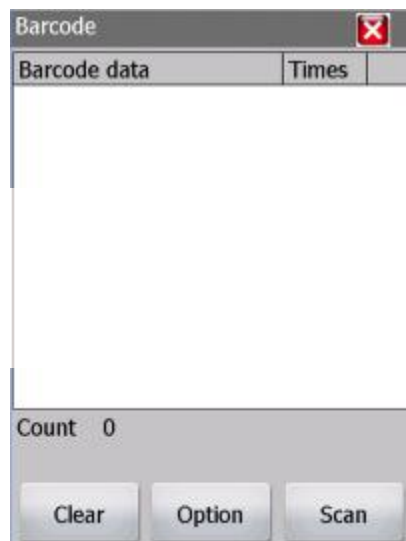


Figure 2-26 Barcode

Click button “Read”, barcodes scanning begins. Make the scanner toward to the barcode and the laser beam horizontally through the barcode. The scanning is set to single reading in default. In other words, the reader will stop as soon as the barcode has been read for once. (Note: the single operation can also be performed by pressing the key [SCAN] on the reader)

The scanning result is shown as below:

You can set loop reading in “Option” referring to chapter “Option” below. Then, the reader can read a

barcode for multiple times. Click button “Stop” to stop scanning. The scanning result will be displayed as shown below. The scanning state (including amount of tags that have been read, total scanning times, successful scanning times and reading rate) will be displayed under the table.

Barcode

Barcode data

Times

SA12766432SA620221M13

69012859912402

Figure 2-27 Barcode-scanning results

Note: if reading barcodes failed, please adjust the position including angle and distance of the reader towards the barcode.

I Clear: to clear the results.

2.4.2 Option

Click button “Option” on read barcode interface, as shown below:

Settings

Type

Honeywell 1D/2D

☒ Interval(s)

Loop scan

1

☐ Upload data

Interval(ms)

2000

IP Address

192 . 168 . 1 . 62

Port

6543

OK

Figure 2-28 Settings

- I Yes: perform the settings.
- I Type: to select the type of barcode imager. The available options are Honeywell 1D and Honeywell 1D/2D.
- I Loop read: tick the option “Interval(s)” to set loop read.
- I Interval: the interval of loop reading, measured by seconds.
- I OK: to perform the settings and return to read barcode interface. Then, loop reading begins by clicking “read” (the button will transfer to “Stop” after clicking). The reading status (reading times, successful times and failed times) will be displayed at the bottom of the read barcode interface. Loop reading can be stopped by clicking “stop” (the button will transfer to “read” after clicking).

The reading result is as shown below.

2.5 Synchronization



Click  on the main interface to synchronize the time on the RFID handheld reader and the server. The interface is as shown below.

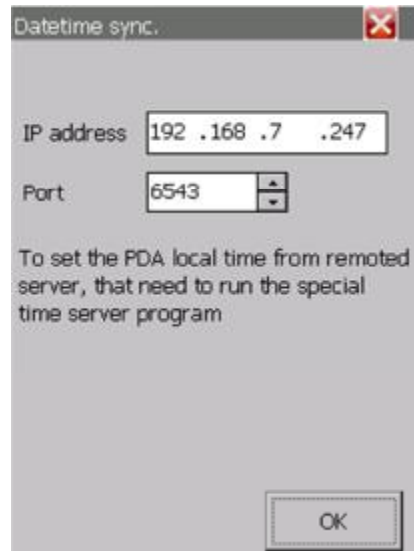


Figure 2-29 Datetime sync

IP address: the IP address of the server

Port: the port of the server

OK: perform the synchronization operation

The time on RFID reader will be set as same as that on the server, providing that the IP address and port is correct.

2.6 Other function

2.6.1 Basic operation

Click “wireless”, “Wi-Fi” icon and “GPRS” icon will come up, as shown below.



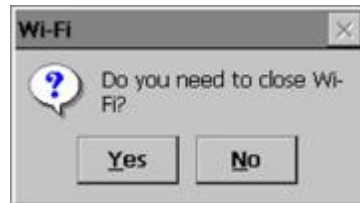
Figure 2-30 Wireless

The opening status of Wi-Fi and GPRS will be displayed under the icons. As shown in the picture above, the Wi-Fi and GPRS are being closed.

2.6.2 Wi-Fi

Path: "Wi-Fi" on main interface --> Wi-Fi 

Providing that Wi-Fi is opening, a confirm message to close Wi-Fi will come up by clicking the icon "Wi-Fi", as shown below.



Yes: to close Wi-Fi.

No: not to close Wi-Fi.

Providing that Wi-Fi is being closed, a new interface will come up, as shown below.

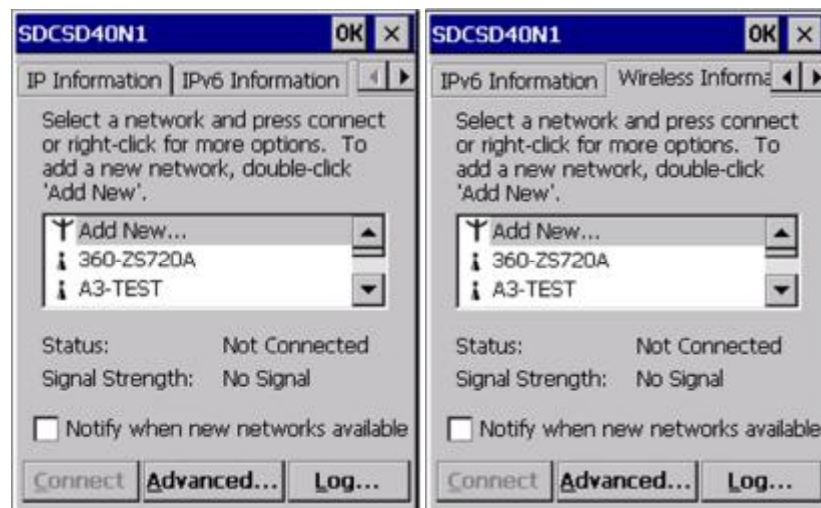


Figure 2-31 Wireless information

There are three tabs: IP information, IPv6 information and wireless information. The interface is as shown above.

The IP information tab page will display the IP information. The IPV6 information tab page display the IPv6 information. Please click the tab to view.

Wireless tag page shows all the Wi-Fi signal that has been searched, click the target one and click the button "connect" to connect to it, as shown below.

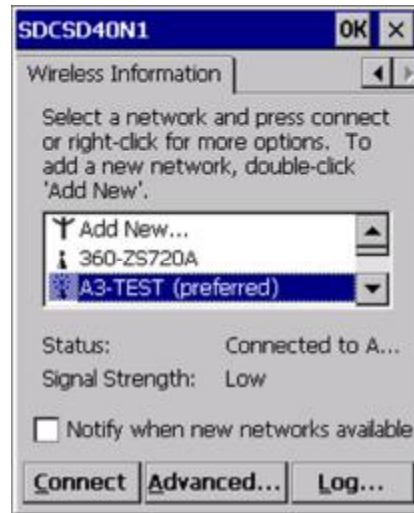


Figure 2-32 connect the wireless

If it is necessary to modify the setting of the target network, please double-click the target name. Then, another interface will come up, as shown below.



Figure 2-33 Wireless Properties

If the password identifying is not configured, the text box for encryption will display "Forbidden", otherwise you need to enter correct password. After modifying the settings, click "OK" to perform the settings and return to wireless information interface. Then, the reader will be connected to the target network(if the connection is not made automatically made, please click the target network and click the button "OK" to connect).

2.7 Data receiving software(PC)

Data receiving software is run on the PC, cooperating with the RFID demo software, receiving data sent by the demo software. Open CommunicationServer.exe on the PC, the interface is shown as below:

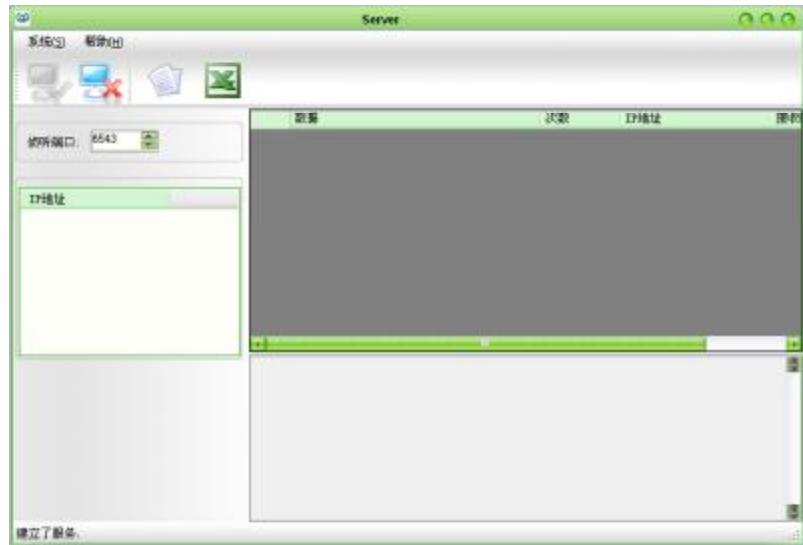


Figure 2-34 Data receiving software

The program will monitor automatically.

Then, please open the demo software on RFID handheld reader, select “RFID--> Option--> data config”, as shown below.

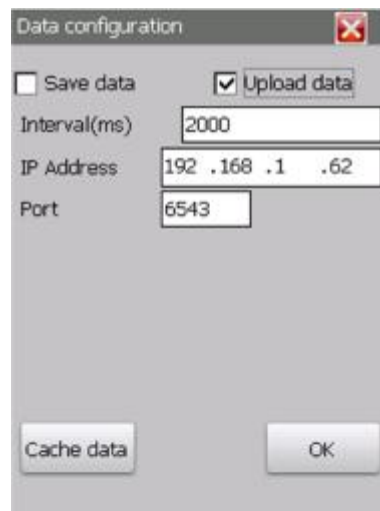


Figure 2-35 Data configuration

Please see the chapter 2.2.11 Data set for the description of this interface.

Tick “upload data”, enter the IP address of the PC where runs the data receiving software. The port should be the port monitored by the program on the server (6543 in default). Click “OK” to return to the RFID interface. Then, click the button “Scan”.



Figure 2-36 RFID interface

By the time the tags are scanned, the demo software will upload the data shown in the table, as shown above. Then, the data receiving program receives the data as shown below.



3. After sale

3.1 Contact

Invengo Information Technology Co.,Ltd.
 3/F, No.T2-B, High-tech Industrial Park South,
 Shenzhen 518057,
 China
www.invengo.cn
 Tel: (86)755 26711633
 Fax: (86) 755 26711693
 E-mail: sales@invengo.cn