CSL CS208-3G Intelligent Integrated RFID Reader with GPS

User's Manual

Version 1.0.0

CSL: The One-Stop-Shop for RFID Solutions

1 Content

2 FCC Statement

FCC NOTICE: To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination is expressly forbidden.

3 Introduction

CS208-3G Integrated Reader Features:

- Intelligent Integrated Reader with embedded edge server
- 3G/GSM/GPRS, SMS, Ethernet, USB and Serial
- Multiple choices of edge servers with intelligent event engine, and with APIs ranging from high level HTTP to C# to low level C, are available
- Ruggedized (MIL-STD-810) integrated reader with long read range
- Dense Reader Mode (DRM) available
- Unique offering: choice of Left Hand Circular Polarization or Right Hand Circular Polarization for dock door implementation
- Best of breed antenna performance: excellent axial ratio to give best read zone control
- Built-in Global Positioning System

Specifications:

Physical Characteristics:	Length: 300 mm; Width: 300 mm; Height: 100 mm
Weight:	3.5 Kg
Edge Software:	Multiple choices of edge servers with intelligent event engine, and with APIs ranging from high level HTTP to C# to low level C
Operating System:	Win CE
Read Range:	13 meters with DogBone tags from Smartrac (FCC version)
Protocol:	ISO18000-6C, EPC UHF Class 1 Gen 2, Dense Reader Mode available (Class 3 Gen 2 compliant)
Frequency Range:	One of the following: 865-868 MHz, 865-867 MHz, 902-928 MHz, 922-928 MHz, 920-925 MHz, 915-922MHz
Polarization:	Circular Polarization Antenna, choice of LHCP or RHCP
Signaling:	LEDs and industrial grade buzzer for read acknowledgement and alert
External Control:	4 x GPO and 4 x GPI
Operating Temp:	-20°C to 50°C (-4°F to 122°F)
Storage Temp:	-40°C to 85°C (-40°F to 185°F)
Humidity:	95% Non-condensing
Dust & Water:	IP 68, works in outdoor environment
Shock:	MIL-STD-810F Method 516.5 Procedure V, 75g, 6ms, 2 shocks per axis
Vibration:	MIL-STD-810F Method 514.5 Category 24
Mechanical Impact Resistance:	Free falling ball impacting test: 500 g weight of ball in 1 meter height
Connectivity:	3G/GSM/GPRS, SMS, Ethernet, USB and Serial (RS232)
Power Supply:	DC supply (12 V, 5 A), or use POE+ (IEEE802.3at)
Order Code:	**CS208-3G-NXHCP** **N=1: 865-868 MHz (Europe) & 865-867 MHz (India),** **N=2: 902-928 MHz (USA),** **N=4: 922-928 MHz (Taiwan),** **N=7: 920-925 MHz (China, Australia, Malaysia, Hong Kong etc.),** **N=8: 915-922 MHz (Japan)** **X=L : LHCP** **X=R : RHCP**

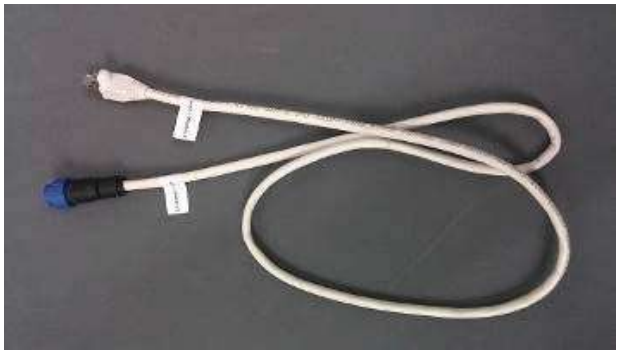
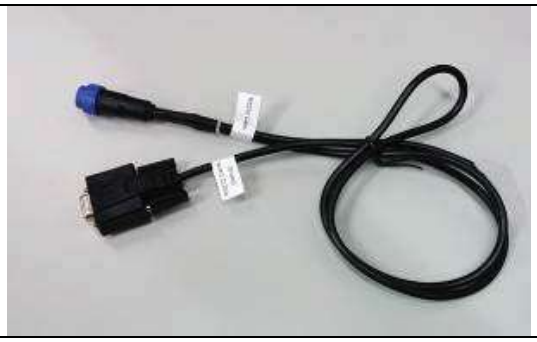
3.1 Product Package

3.1.1 Basic Package Content

Integrated reader	
12V power adaptor	
Power cord	

3.1.2 Optional Accessories

Optional Accessories that customer has to select and buy

Ethernet Cable	
Serial cable – Control Port	
Serial cable – Debug Port	
USB cable – Client Cable	

USB cable – Host Cable	
GPO Cable	
GPI Cable	
USB Cable – Dual Head	

Serial Cable Dual Head	

3.1.3 Useful Components Customer Has to Source

If the user's or programmer's computer does not have serial port but only has USB ports (many laptops are like that now), then the user has to buy for themselves the following convertor to connect to USB ports:

USB to RS232 Convertor	

4 Hardware Installation

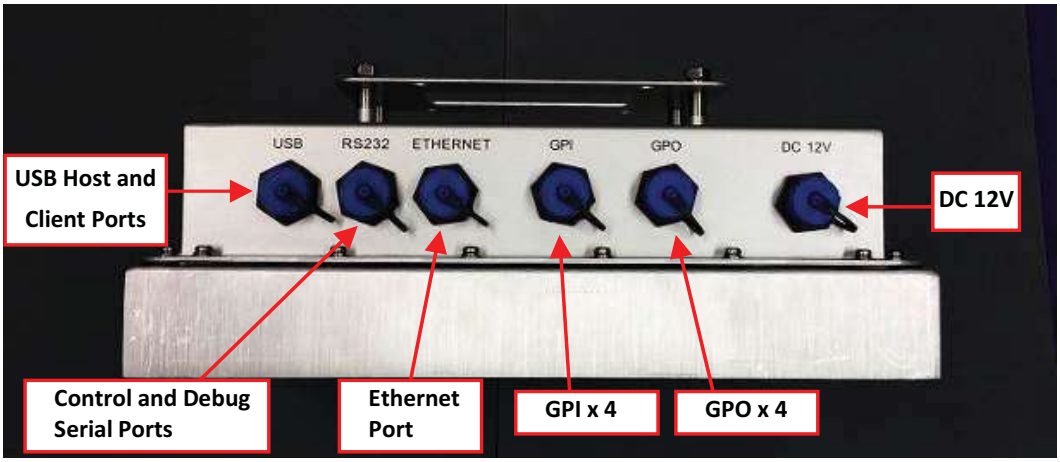
4.1 Hardware Content of CS208-3G

4.1.1 CS208-3G Reader Overview

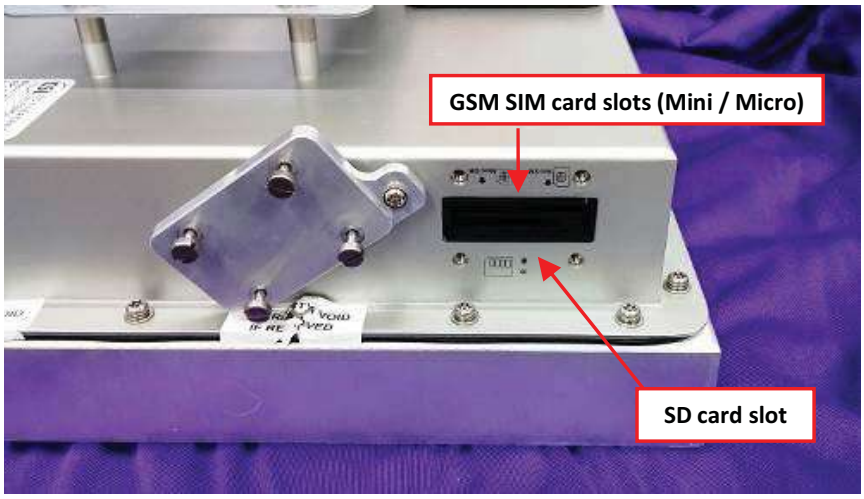
The CSL CS208 is the first INTELLIGENT INTEGRATED Reader in the world with GPS, embedded edge server and a wide selection of connectivity, including 3G/GSM/GPRS, SMS, Ethernet, USB and Serial.

Front panel of CS208.

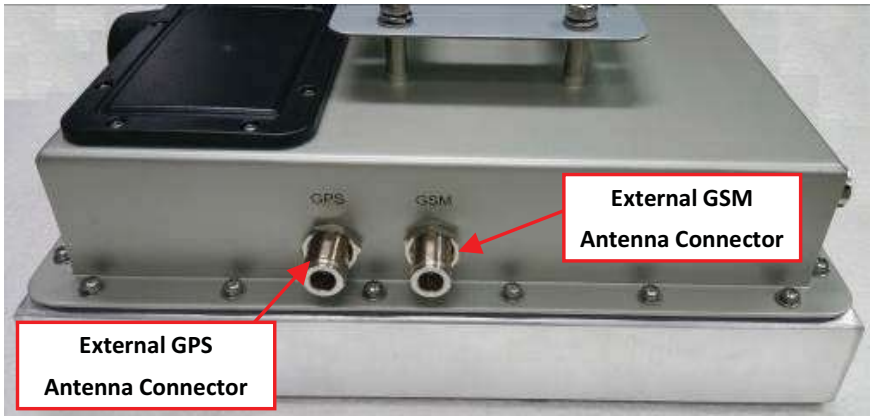
Rear panel of CS208

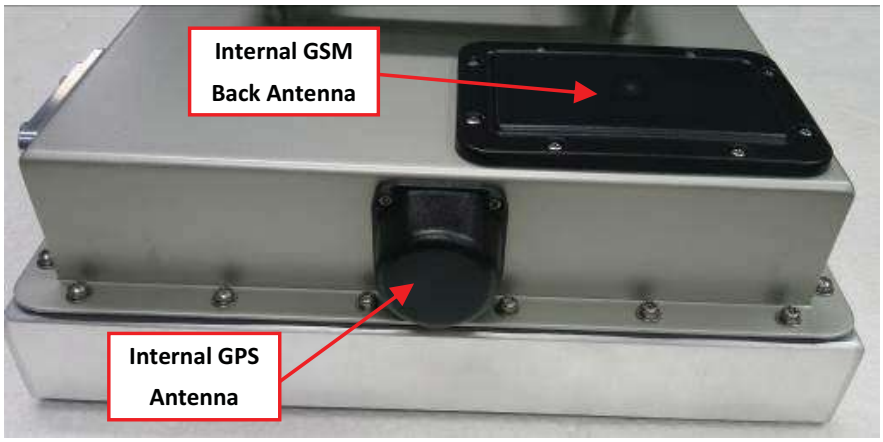


CS208 Side View



GSM SIM card and SD card Slots



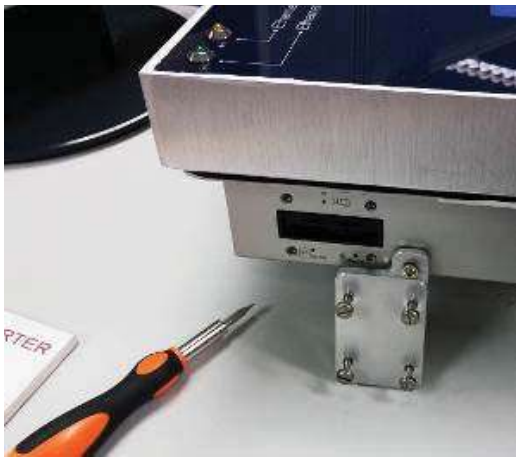


4.2 Operating Setup

4.2.1 Installation

4.2.1.1 Install the SIM card

- 1. Open the GSM SIM and SD card slot cover

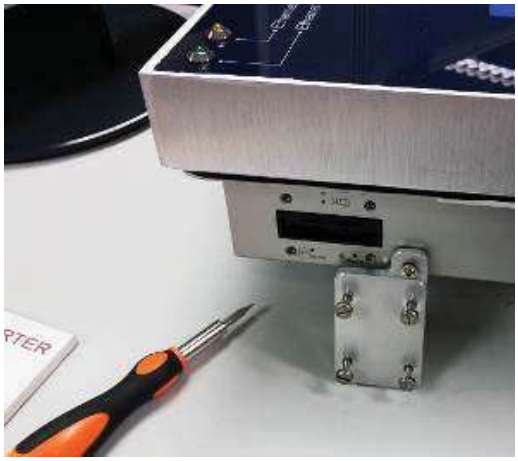


- 2. Insert the GSM SIM card into the GSM SIM card slot. The contact pins of GSM SIM card should be followed the below photo.

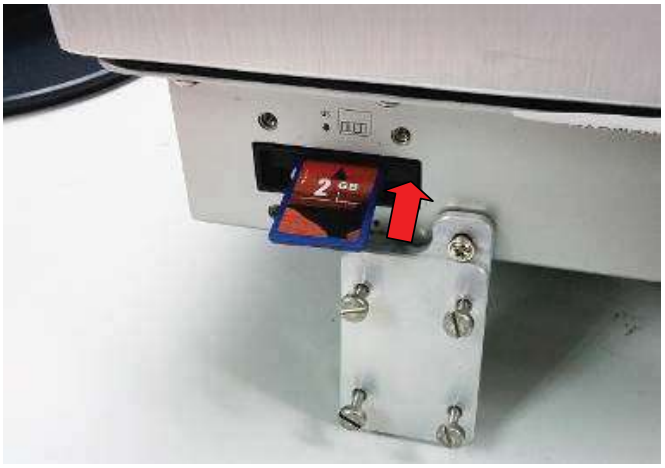
- 3. Close the GSM SIM card/SD card slot Cover.

4.2.1.2 Install SD card

- 1. Open the GSM SIM and SD card slot cover.



- 2. Insert the SD card into the SD card slot



- 3. Close the cover of GSM SIM card/SD card Slots.

4.2.1.3 Install Power Supply

12 V Power Adaptor

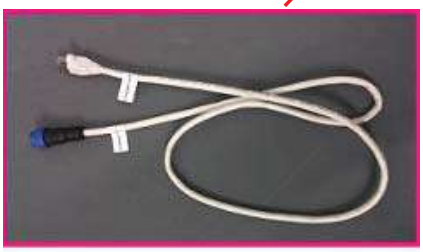
4.2.1.4 Install "Control Serial" and "Debug Serial" (Optional for "Debug Serial")

Or

Serial Cable Dual Head

Serial Cable - Control Port

4.2.1.5 Install Ethernet



Ethernet Cable

4.2.1.6 Install USB

USB cable

5 Software Application

5.1 Software Content of Shipment Package

The software of CS208 includes the following:

1.	**Demo Applications and default setting**	**Demo to run CS208 reader:** **CS208BackendServer.exe** **CS208CommissioningAndFwUpgrade.exe** **Default setting file:** **default.ini (For user to define default setting of CS208-3G)**
2.	**Bootloader**	**CS208 Bootloader:** **u-boot_532M_v1.0.0.5_20140206.bin**
3.	**Operating System**	**WinCE 6.0: NK.nb0**
4.	**User Manuals**	**CSL CS208 User's Manual**

5.2 PC Side Prerequisites

To run the CS208 application programs, the PC must have the following software installed:

1) Dot Net Framework 3.5 or above
2) Visual Studio 2008
3) PuTTY for test (Not included in software package. Free download from http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html)

The software can be downloaded from Microsoft website or found on the CS208 software package inside folder "Software Development Environment on PC".

5.3 Default Setting

CS208 is shipped out with default setting stored in the file **factory.def**. User can refer to factory.def in the software package to define the default setting of CS208 reader and reconfigure the reader.

User is required to define the default setting file as default.ini and download the file to run CS208 the first time.

User can download the defined **default.ini** file from PC to CS208 via USB or Ethernet download:

USB download:

1. Power on CS208 and wait 2 minutes.
2. Connect CS208 USB client cable to PC and make sure PC installed active sync(for Window XP) or mobile center (for Window 7/8).
3. Open file exporter in PC and copy deault.ini into "CS208/Storage Card/CS208device" folder.
4. Power off CS208.
5. CS208 will use new configuration when user restart CS208.

Network download:

1. Start demo program "CS208CommissioningAndFwUpgrade.exe" in "CS208-PC Demo\CS208FWUpgrade\bin\Release" folder.
2. Power on CS208 and wait 2 minutes.
3. Screen show "connected from xxxxxx" (xxxxx is CS208 Device ID)
4. Select "default.ini only"
5. Press "upgrade" button
6. Wait until success message box is displayed.
7. Power off CS208
8. CS208 will use new configuration when user restart CS208.

5.3.1 Format of default.ini for initial setting of CS208 RFID reader

```
[DEVICEID]
Model = CS208                ; Model Name
ID = SerialNumber            ; Device ID (default set to CS208 Reader internal serial number if the ID =
                               SerialNumber, you can change it other name)
CommMode = NETWORK           ; Communication mode (GPRS / NETWORK / USB / SMS / SERIAL)

[NETWORK]
DHCP = N                     ; Ethernet DHCP N/Y  (N means Static IP)
IP = 192.168.25.208          ; Ethernet IP Address, Static IP
Subnet = 255.255.255.0       ; Ethernet Subnet
Gateway = 192.168.25.1       ; Ethernet Gateway
DNS1 = 192.168.25.1          ; First DNS
DNS2 = 192.168.25.1          ; Second DNS

[GSM]
Antenna = 0                  ; 0 = Auto select,
                               1 = Antenna Front Side;
                               2 = Antenna Back Side,
                               3 = External Antenna

[GPRS]
APN = CMNET                  ; GPRS APN (CMNET in China, CMHK in HK, rcomnet in India)  (APN
                               stands for Access Point Name, which is a property unique to a service
                               provider)
PHONENUMBER = *99#           ; Dialup network phone number

[SMS]
PhoneNumber =                ; Phone number of Backend control center
AutoSwitchOverTime = 60      ; Time of switching to SMS when network connection fails (minute)
AuthorizedSender1 =          ; SMS authorized sender 1
AuthorizedSender2 =          ; SMS authorized sender 2
AuthorizedSender3 =          ; SMS authorized sender 3
AuthorizedUser1 =
AuthorizedUser2 =
AuthorizedUser3 =
AuthorizedPassword1 =
AuthorizedPassword2 =
AuthorizedPassword3 =

[SERVER]
BackendServer = 1            ; Select Backend Server (1/2)
ServerIP1 = 192.168.25.100   ; Backend Server IP 1
ServerIP2 = 192.168.25.108   ; Backend Server IP 2
Port = 9092                  ; Backend Server Port number
SynchronizationInterval = 60 ; Keepalive interval time (minute).  Reader will send keep alive packet
                               per this time in minute.

[DATA]
ReadTag = N                  ; Read Tag at power up or restart
Access Password = 00000000   ; Tag Password
TagAuthenticationMask =      ; Authenticated TAG Mask (bit mask 1 = 1, 0 = 0, * = wildcard)
MultiBank1 = NONE            ; First additional data bank to be read (Multi bank reading)
Offset1 = 0                  ; First additional data Offset
Count1 = 0                   ; First additional data length (word)
MultiBank2 = NONE            ; Second additional data bank to be read (Multi bank reading)
```



```
Offset2 = 0                     ; Second additional data Offset
Count2 = 0                      ; Second additional data length (word)
TagScanningCycle = 1            ; Tag scanning cycle (minute), 0 = continuous read
TagScanningTime = 10            ; Tag scanning time (second)
TagDuplicateFilterTime = 10     ; Tag duplicate filter time (second)

[DATETIME]
NTP1 = time.nist.gov            ; NTP Server IP  (NTP stands for Network Time Protocol, it is the
                                  network location that gives you accurate current time
NTP2 = stdtime.gov.hk           ; NTP Server IP (backup)
TIMEZONE = India Standard Time  ; Time Zone

[READER]
Power = 300                     ; RFID reader power (10 x value in dBm, 300 means 30 dBm)
Country = IN                    ; Country Code ETSI / IN / G800
Channel = 1                     ; Frequency Channel (1 - 50, 0 = hopping) (India only 3 channels, 1,
                                  2 and 3)
Profile = 2                     ; Profile. Gen2 Profile
ALGORITHM = DYNAMIC             ; DYNAMIC Q / FIXED Q
QVALUE = 3                      ; Dynamic Start Q value / Fixed Q value

[SIGNALS]
Buzzer = 64                     ; Volume 0 ~ 128 (0 = MUTE, 1 = min volume, 128 = max volume)

[GPS]
Antenna = 1                     ; 1 = Internal Antenna,
                                  2 = External Antenna

[DATASTORAGE]
Storage = 1                     ; 0 = RAM(1 record) / 1 = SDCARD (max 2G data)
DataResendTime = 5              ; Resend Tag data to backend server if reader does not receive data
                                  acknowledgement from PC server (minute)
```

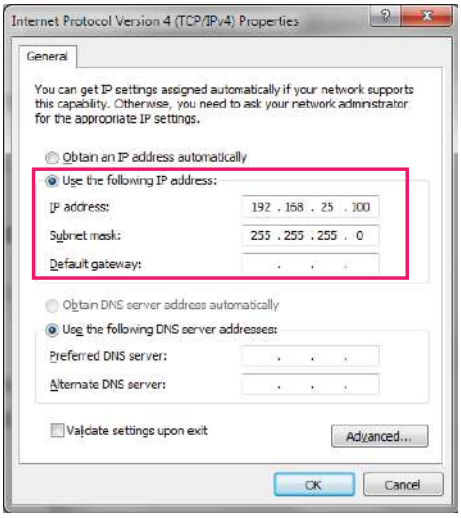

5.4 CS208 Burn-In Demo program startup procedure

5.4.1 Server (Far-end Computer) Setup

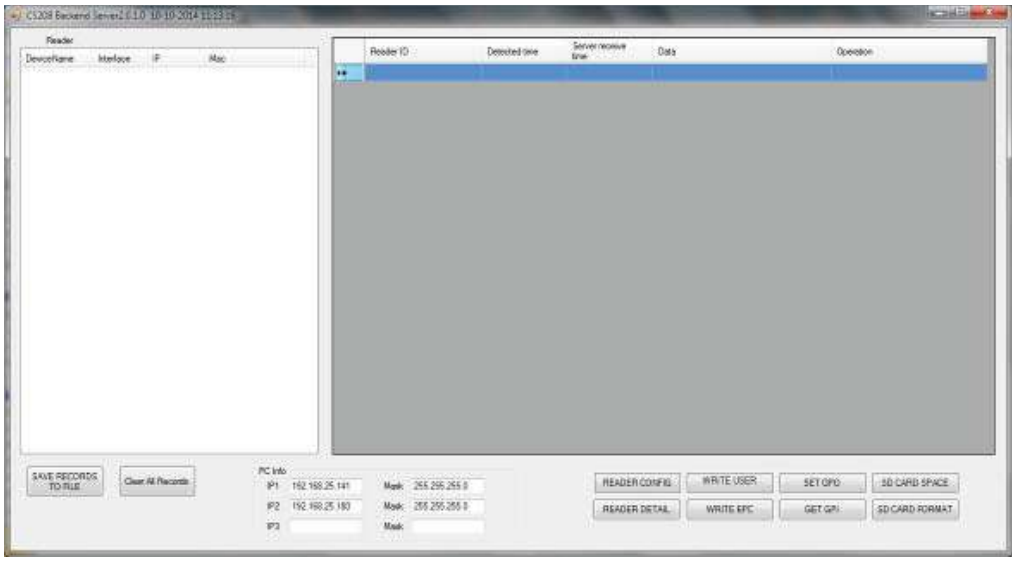
1. Manually input the TCP/IP properties to target PC / Server to connect CS208 with **default setting**.

   IP address: 192.168.25.100

   Subnet Mask: 255.255.255.0

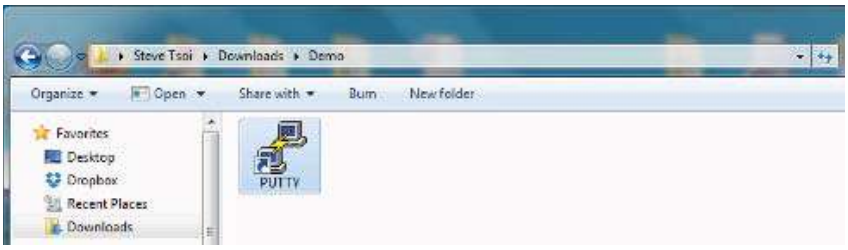


2. Run "CS208BackendServer.exe"

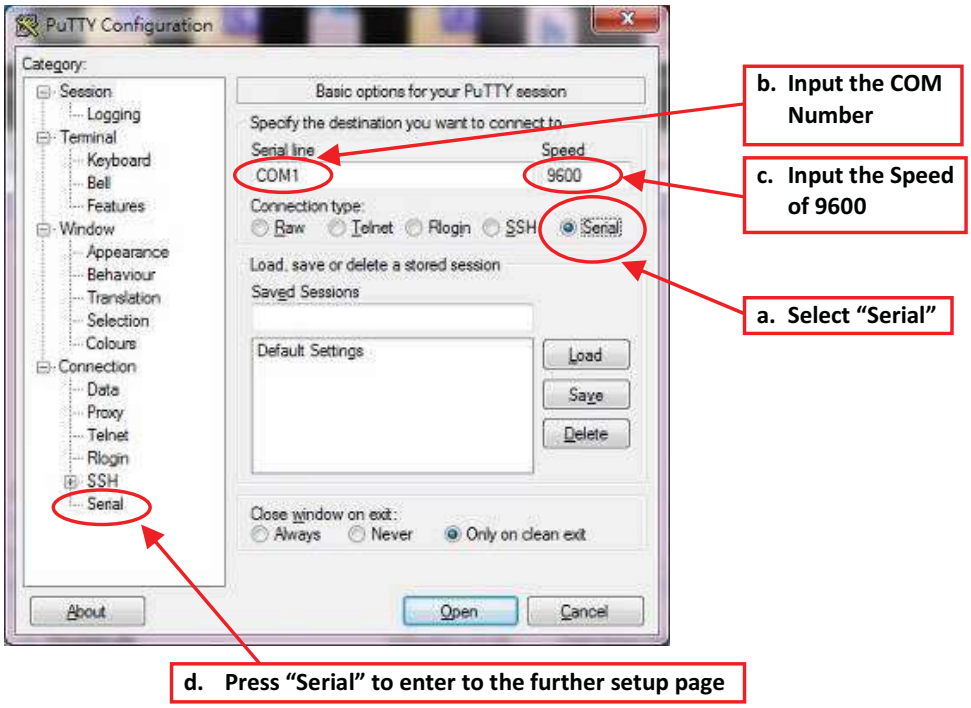


5.4.2 Client Setup

- 1. Hardware: Ensure CS208 "Control Serial" port to PC “COM port” is connected.
- 2. Run "**putty.exe**" program in PC with setting as follow:

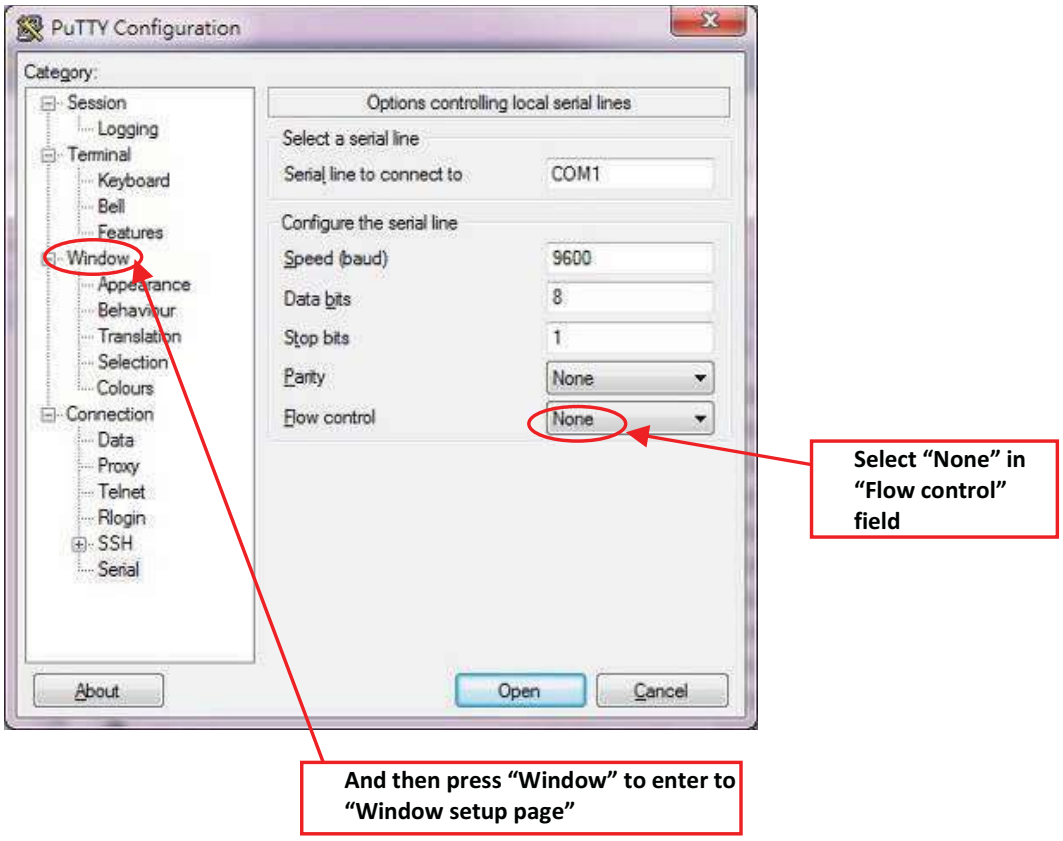


- Select “**Serial**”
- Set the COM port number, for example “COM1”, that is connected to the “Control serial” port of CS208.
- Input the Speed of “**9600**” for the above used COM port.
- “**Serial**” to enter to the further setup page of the COM port.

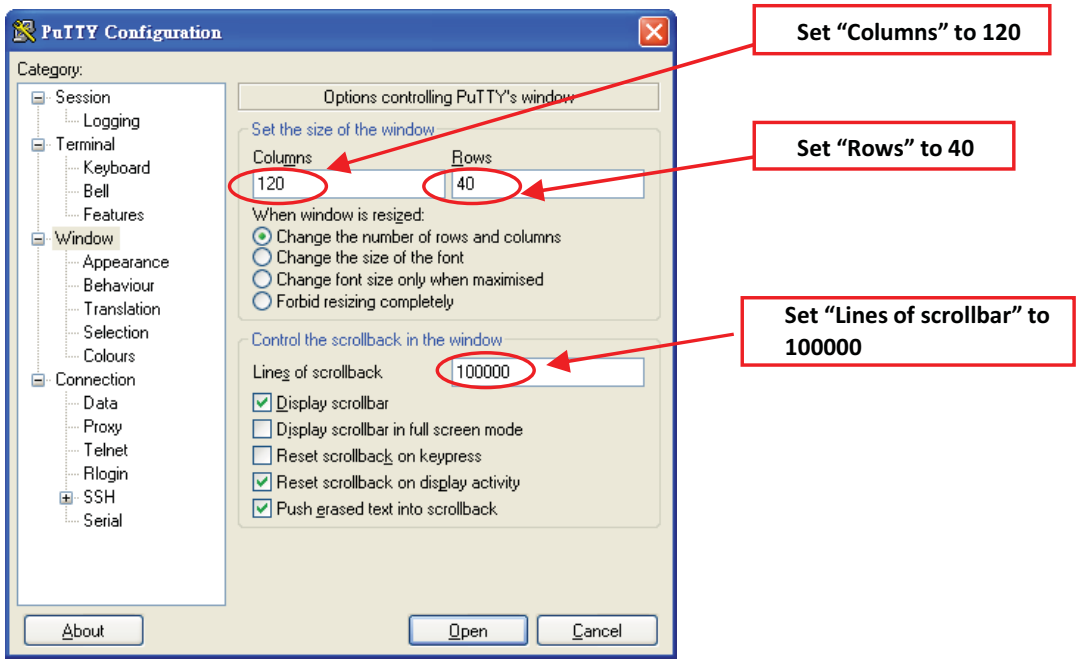


- 3. In the COM setup page, select “None” in field of the “Flow control”. And then press “Window” to enter to the “Window Setup Page”.

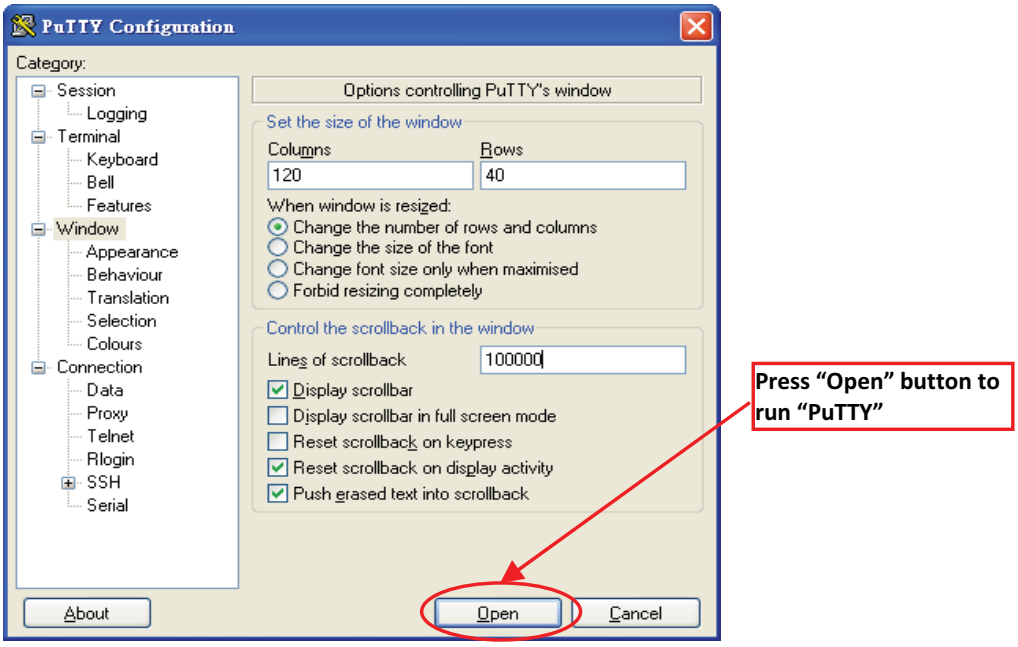
-



- 4. In “Window” setup page, in order to clearly display the information from CS208, it is better to set the “Window” as below.



- 5. Press “Open” button to run “PuTTY”



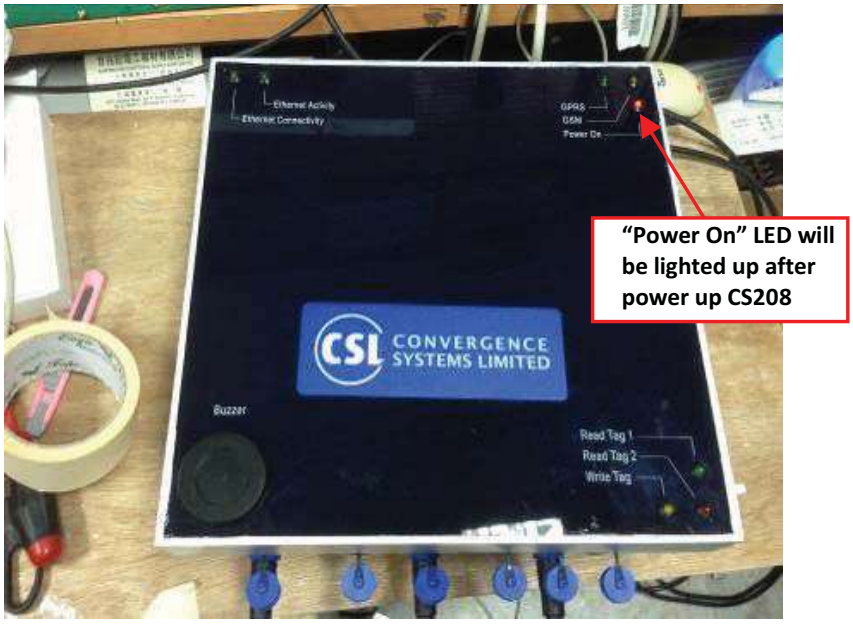
- 6. After run the “PuTTY”, the “PuTTY” screen is shown as

5.4.3 CS208 Normal Mode

5.4.3.1 CS208 Reader in Normal Mode

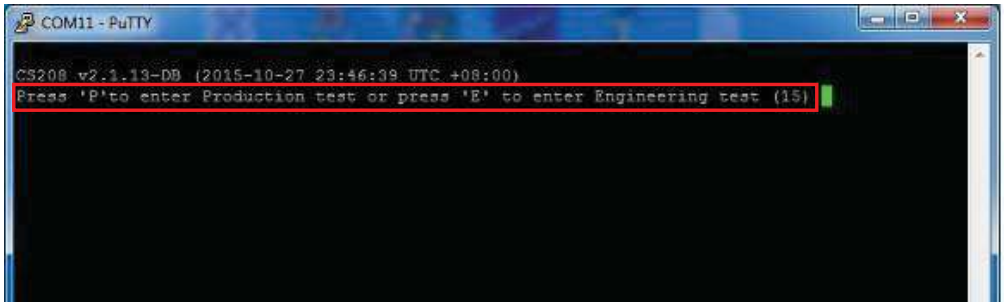
1. After setup "PuTTY" in 4.4.2. Client Setup, power up CS208.
2. The Power LED on the front panel will be lighted up as below

-

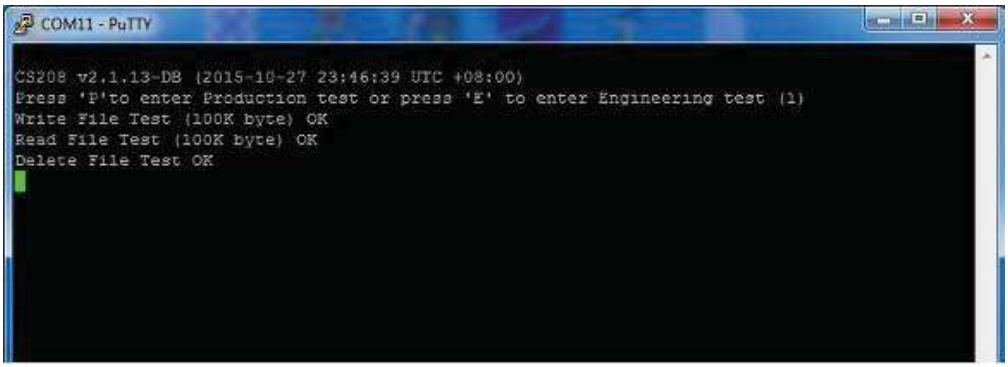


3. After CS208 search the GSM network, "GSM" LED will flash slowly.

4. When the announcement “Press ‘P’ to enter Production test or press ‘E’ to enter Engineering test” is displayed, user has 20 seconds to enter the “Production test” mode with pressing “P” or to enter the “Engineering test” mode with pressing “E”. At this moment, just WAIT until the reader count down from 20 to 0 and skip self test mode.

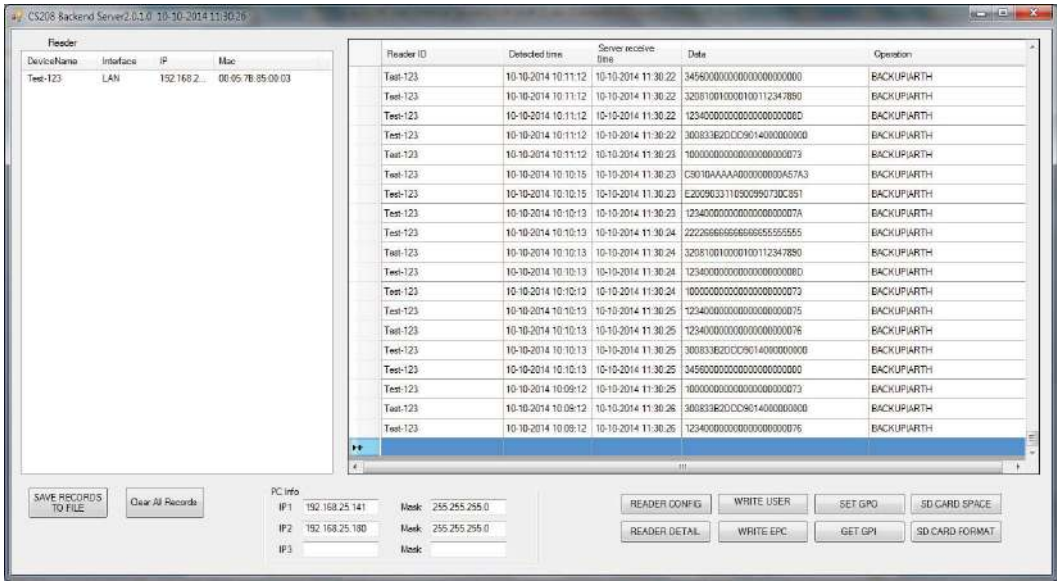


5. The reader enters Normal Mode and is then connected to server (Remote Computer)



5.4.3.2 Server (Remote Computer) in Normal Mode

When the reader enters normal operation mode after power up, ensure the CS208 Backend Server (Remote computer) is turned on and press "Start". RFID Tag data will be displayed according to the setting of TagScanningInterval, TagScanningTime and TagDuplicateFilterTime in **default.ini**



In **default.ini:**

Tag Scanning Interval

- Tag Scanning Interval is configured in term of minute (1 = 1 minute). If the value is zero, the reader will read data continuously.

Tag Scanning Time

- Time of scanning tag in each Tag Scanning Interval (1 = 1 second). After the Tag Scanning Time in each Tag Scanning Interval, the reader will stop reading tag.

Tag Duplicate Filter Time

- Time of checking duplicate tag in the same period. For the same tag is read in the same Tag Duplicate Filter Time, the tag data will only displayed once only. (1 = 1 second)

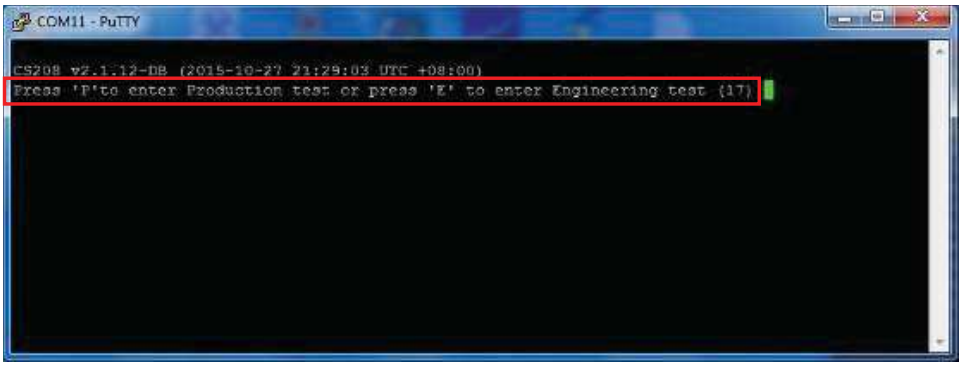
5.4.4 CS208-3G Self-Test Mode

- 1. After setting up "**PuTTY**" in **Client Setup**, power up CS208. Watch the printout on the PuTTY screen connected to the Control Serial Port. Make sure that window is the ACTIVE window on the screen.
-
- 2. The Power LED on the front panel will light up as below

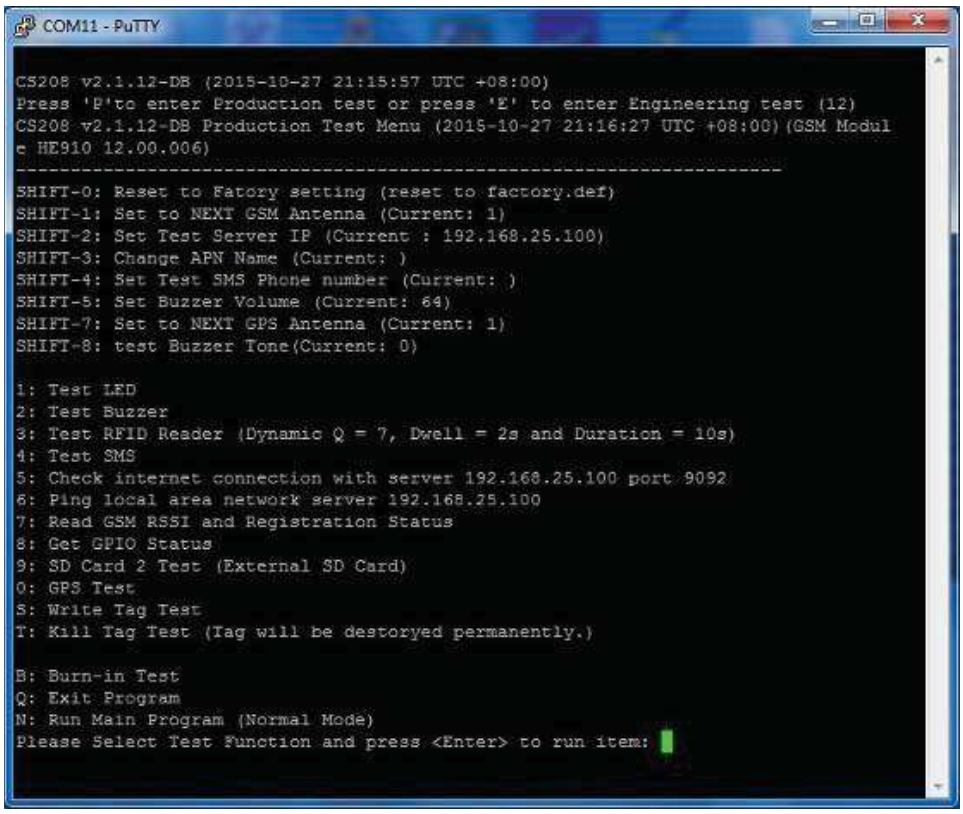
-

- 3. After CS208 search the GSM network, "GSM" LED will flash slowly.

- 4. At that point you will see a the announcement “Press ‘P’ to enter Production test or press ‘E’ to enter Engineering test” is displayed and the number in the bracket will decrement. The user has 20 seconds to enter the self test mode. At this moment, press ‘P’ or ‘E’ key (the PuTTY window must be the active window of the screen to receive the key press, of course) to enter production test mode or enter engineering test mode.



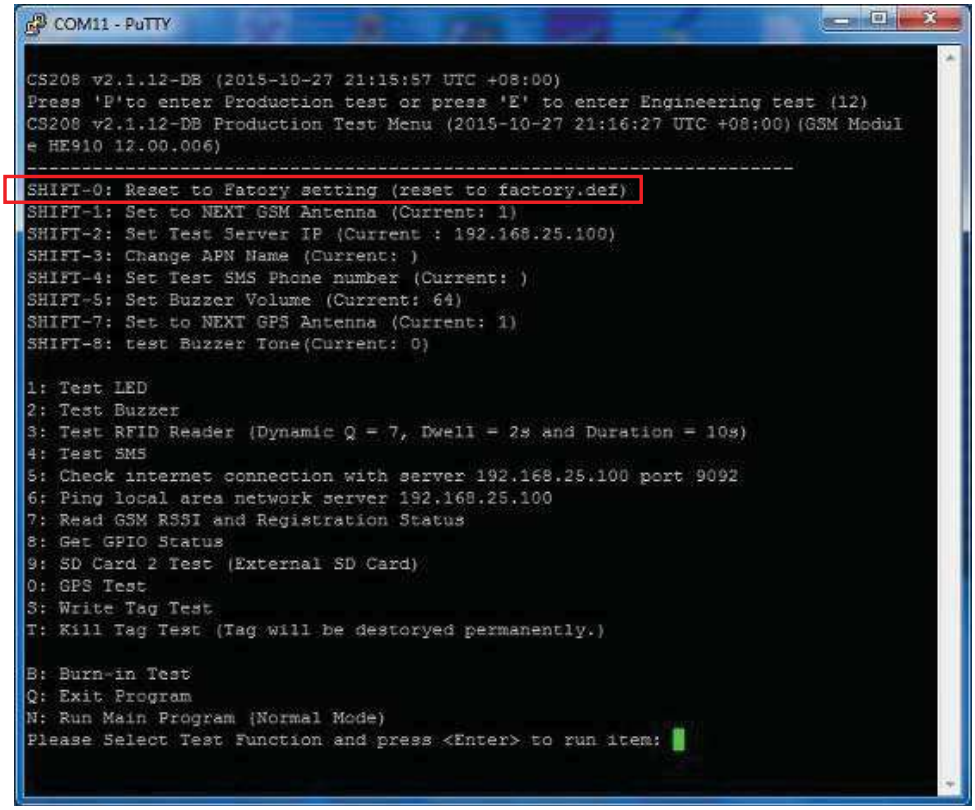
- 5. The self test menu will then be shown on the “PuTTY” screen as below



5.4.5 CS208 Self Test Menu

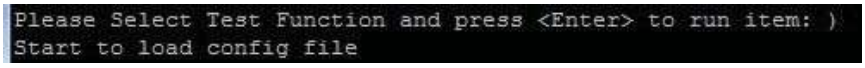
5.4.5.1 Reset to Factory setting (SHIFT-0)

1. User can reset CS208 configuration file "default.ini" to initial setting (factory.def) using SHIFT-0 in Self Test Menu.



2. In the menu of Self Test Menu, choose "SHIFT-0: Reset to Factory setting …."

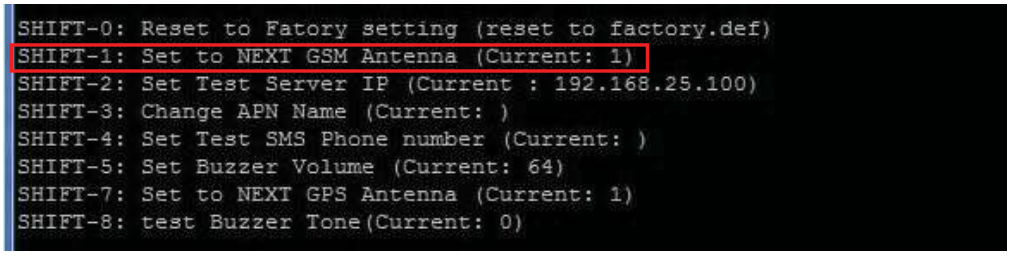
3. CS208 undergoes factory reset and return message shown as below.



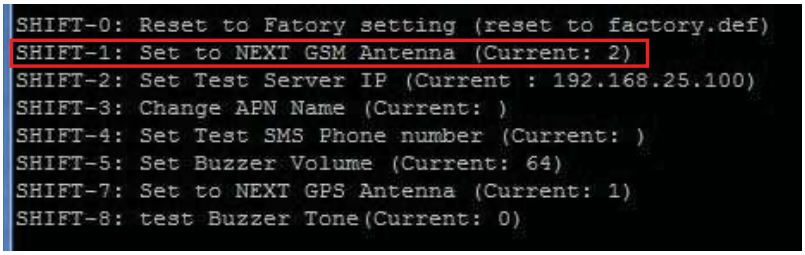
4. And then auto-return to Self Test Menu.

5.4.5.2 Change GSM Antenna (SHIFT-1)

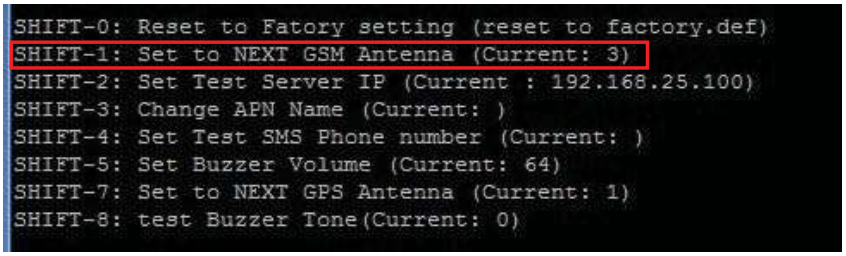
1. In the menu, check “SHIFT-1: Set to Next GSM Antenna”. The default value of “Antenna” is 1.



2. If you want to change antenna from 1 to 2, press “SHIFT” and “1” together.
3. The result is displayed when the test is finished. Current value of antenna is set to 2.



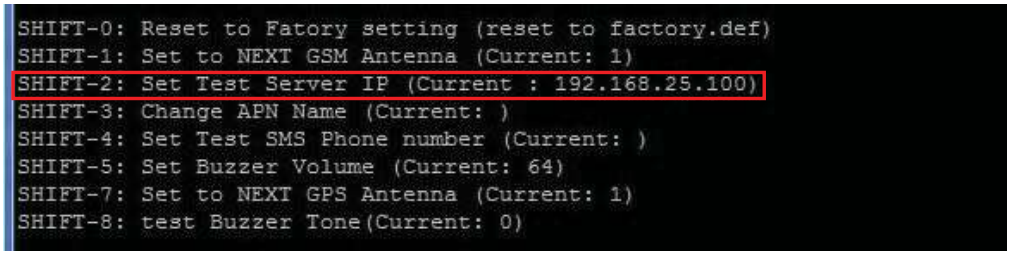
4. If you want to change antenna back from 2 to 3, press “SHIFT” and “1” together again.



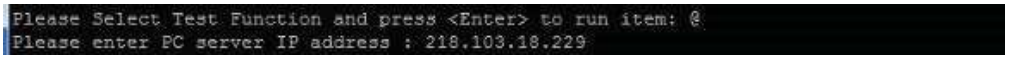
Note: 1 = Front GSM Antenna; 2 = Back GSM Antenna; 3 = External GSM Antenna

5.4.5.3 Set Test Server IP (SHIFT-2)

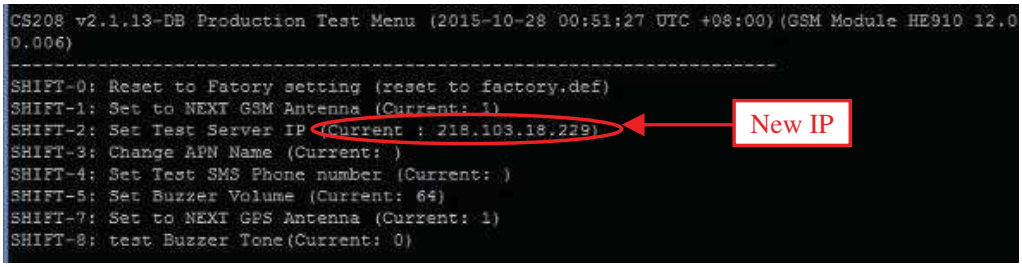
1. In the menu, check “SHIFT-2: Set Test Server IP …”.
2. The default “Test Server IP” is “192.168.25.100”.



3. If you want to change “Test Server IP”, press “SHIFT” and “2” together.
4. Input the new IP address of Test Server. (for example: 218.103.18.229)
5. Press “Enter”

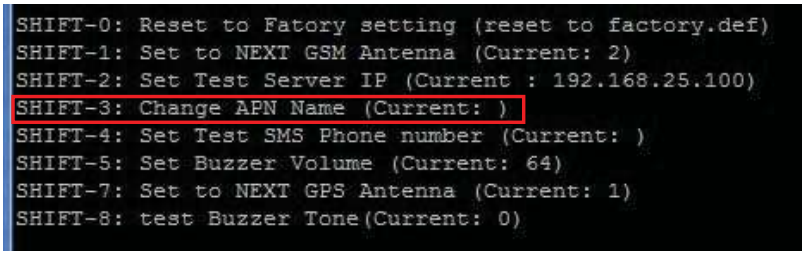


6. The menu is displayed with the new IP address as shown below.



5.4.5.4 Change APN Name (SHIFT-3)

1. In the menu, check “SHIFT-3: Change APN Name …”.
2. The default APN Name is empty as below.



3. If you want to change APN Name, press “SHIFT” and “3” together.
4. Input the new APN Name (e.g. “CMHK”)
5. Press “Enter”

```
Please Select Test Function and press <Enter> to run item: #
Please enter APN : CMHK
```

6. The menu is displayed with the new APN name as shown below.

```
SHIFT-0: Reset to Fatory setting (reset to factory.def)
SHIFT-1: Set to NEXT GSM Antenna (Current: 1)
SHIFT-2: Set Test Server IP (Current : 192.168.25.100)
SHIFT-3: Change APN Name (Current: CMHK)
SHIFT-4: Set Test SMS Phone number (Current: )
SHIFT-5: Set Buzzer Volume (Current: 64)
SHIFT-7: Set to NEXT GPS Antenna (Current: 1)
SHIFT-8: test Buzzer Tone(Current: 0)
```

New APN

5.4.5.5 Set Test SMS Phone Number (SHIFT-4)

1. In the menu, check "SHIFT-4: Set Test SMS Phone Number…". There is no default value for SMS Phone Number

```
SHIFT-0: Reset to Fatory setting (reset to factory.def)
SHIFT-1: Set to NEXT GSM Antenna (Current: 1)
SHIFT-2: Set Test Server IP (Current : 218.103.18.229)
SHIFT-3: Change APN Name (Current: )
SHIFT-4: Set Test SMS Phone number (Current: )
SHIFT-5: Set Buzzer Volume (Current: 64)
SHIFT-7: Set to NEXT GPS Antenna (Current: 1)
SHIFT-8: test Buzzer Tone(Current: 0)
```

2. If you want to change "SMS Phone Number", press "SHIFT" and "4" together.
3. Input the new SMS Phone Number for test.
4. Press "Enter"

```
Please Select Test Function and press <Enter> to run item: $
Please enter Test SMS Phone number : 12345678
```

5. The menu is displayed with the new APN name as shown below.

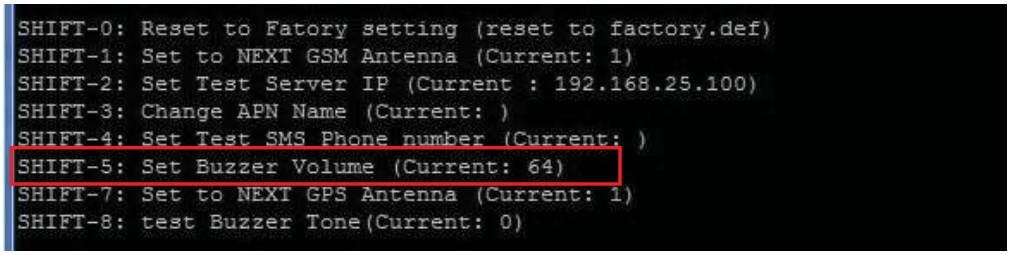
```
SHIFT-0: Reset to Fatory setting (reset to factory.def)
SHIFT-1: Set to NEXT GSM Antenna (Current: 1)
SHIFT-2: Set Test Server IP (Current : 192.168.25.100)
SHIFT-3: Change APN Name (Current: CMHK)
SHIFT-4: Set Test SMS Phone number (Current: 12345678)
SHIFT-5: Set Buzzer Volume (Current: 64)
SHIFT-7: Set to NEXT GPS Antenna (Current: 1)
SHIFT-8: test Buzzer Tone(Current: 0)
```

New SMS phone number

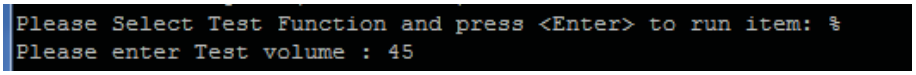
5.4.5.6 Set Buzzer volume (SHIFT-5)

1. In the menu, check "SHIFT-5: Set Buzzer volume". The default value of Buzzer volume

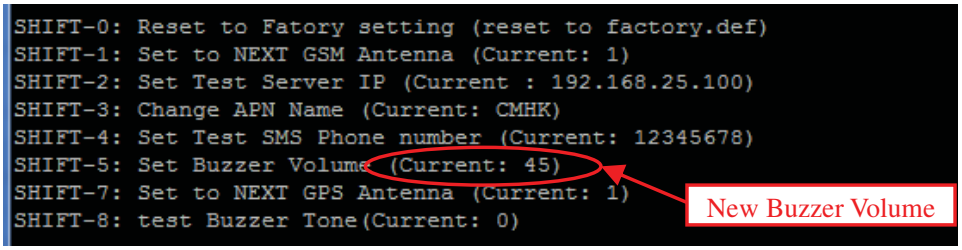
is 64



2. If you want to set Buzzer volume, press "SHIFT" and "5" together.
3. Input the new Buzzer volume. (Example: 45)

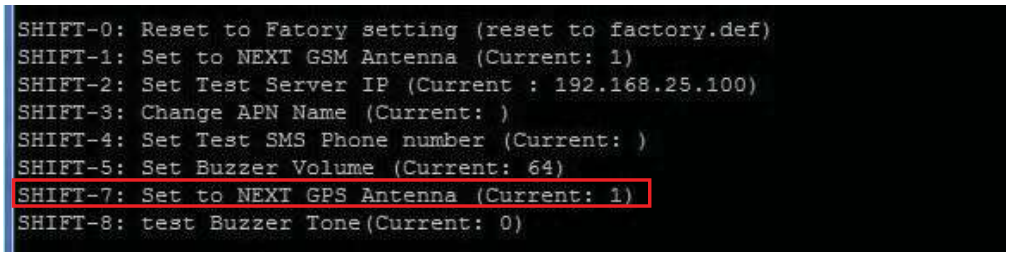


4. The menu will be shown on the screen again. Current value of Buzzer volume is set to 45.

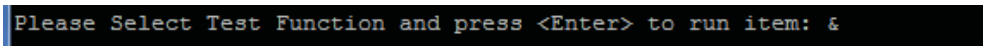


5.4.5.7 Set GPS Antenna (SHIFT-7)

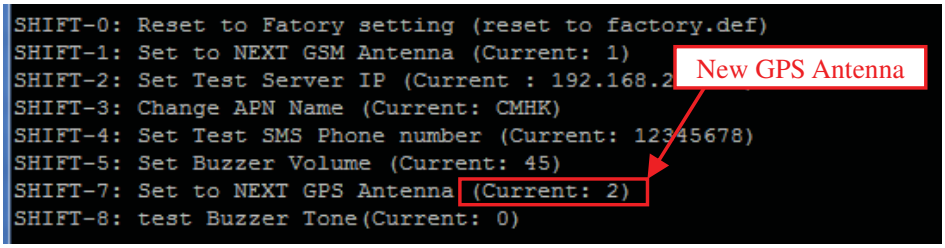
1. In the menu, check "SHIFT-7: Set to Next GPS Antenna". The default value of "Antenna" is 1.



2. If you want to change antenna from 1 to 2, press "SHIFT" and "7" together.



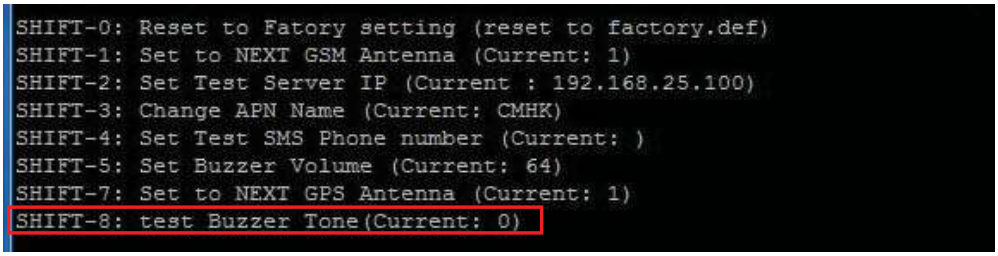
3. The result is displayed when the test is finished. Current value of antenna is set to 2.



Note: 1 = Internal GPS Antenna; 2 = External GPS Antenna

5.4.5.8 Test Buzzer Tone (SHIFT-8)

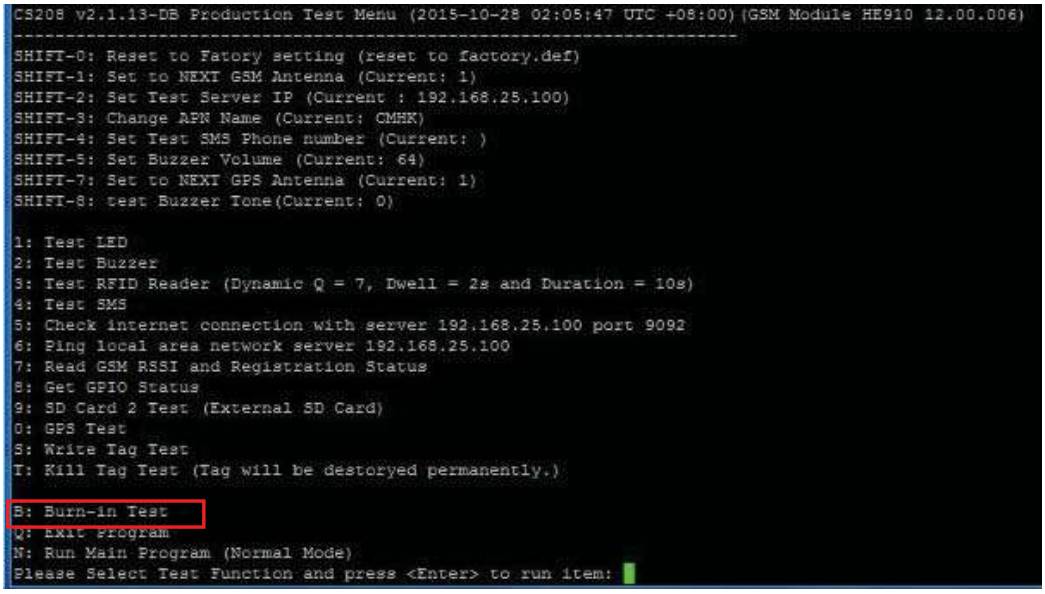
1. In the menu, check "SHIFT-8: test Buzzer Tone". The default value of Buzzer Tone is 0 (There are 3 tones output sequentially, one for Read Tag 1 alert, one for Read Tag 2 alert, and one for Write Tag alert when you press "2" to test Buzzer with Buzzer Tone value 0).



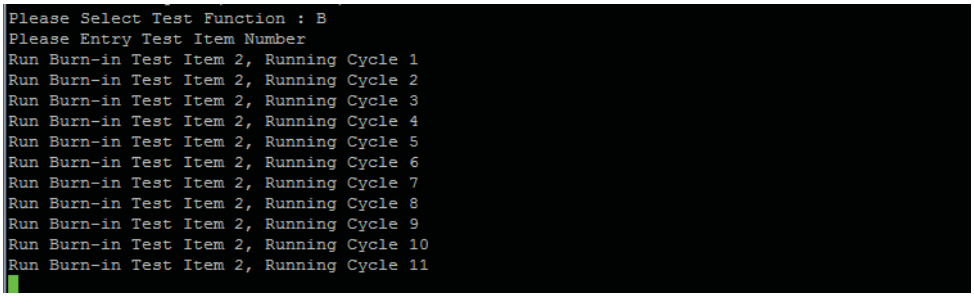
2. If you want to test Read Tag 1 only, you can change the value of Buzzer Tone to "1" with pressing "SHIFT" and "8" together.
3. If you want to test Read Tag 2 only, you can change the value of Buzzer Tone to "2" with pressing "SHIFT" and "8" together.
4. If you want to test Write Tag only, you can change the value of Buzzer Tone to "3" with pressing "SHIFT" and "8" together.

5.4.5.9 Burn-in Program (B)

1. Press "B" to start the burn-in program. After start the burn-in program the information come from CS208 is shown on the screen as below.



2. When Burn-in Program is entered, the next Test Item entered will be run continuously ("Running Cycle 1/2/3/4 ….." are seen) until the user press "any key" to exit as below.

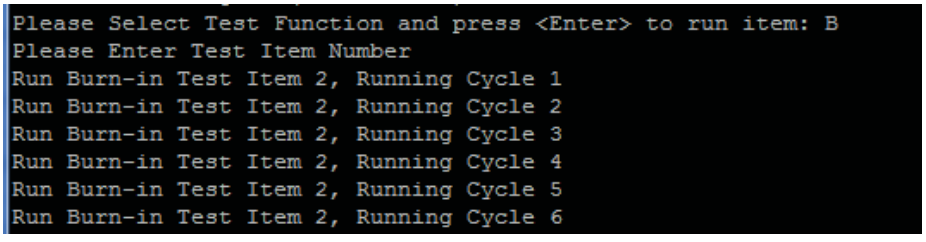


5.4.5.10 Test LED (1)

1.In the menu, use "1" to test LED

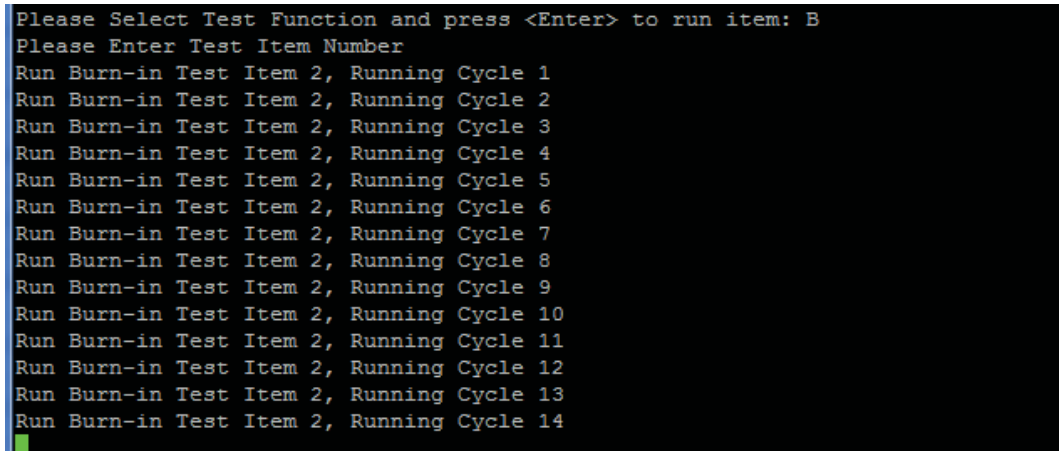
2.The main menu is displayed again when the test is finished.

3.If the test is run with Burn-in Program, the result is displayed as above.



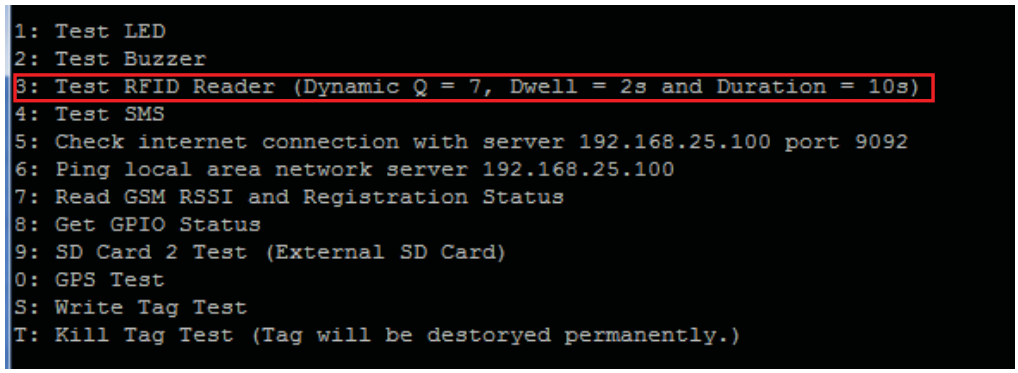
5.4.5.11 Test Buzzer (2)

1. In the menu, use “2” to test Buzzer. Use “SHIFT-5” to set Buzzer Volume” and “SHIFT-8” to set Buzzer Tone before test Buzzer.
2. The main menu is displayed again when the test is finished.
3. If the test is run with Burn-in Program, the result is displayed as below.



5.4.5.12 Test RFID Reader (3)

1. In the menu, check “3” to test RFID Reader, with Dynamic Q, Dwell, Duration defined. (Example: Dynamic Q = 7, Dwell = 2s, Duration = 10s)



2. The Tag info is displayed continuously when RFID tag is checked.


```
EPC : 300833B2DDD9014000000000 RSSI : 43.2
EPC : AD8A20000000000000000603 RSSI : 48
EPC : 041027094900000000000236 RSSI : 48.8
EPC : 300833B2DDD9014000000000 RSSI : 52.8
EPC : E200680600000000000000000 RSSI : 54.4
EPC : 555555555555555555000005 RSSI : 52
EPC : E20090331109009911 50A00B RSSI : 51.2
EPC : 112233445566778899009988 RSSI : 53.6
EPC : 300833B2DDD906C000000000 RSSI : 49.6
EPC : 041027094900000000000236 RSSI : 44.8
EPC : E2003412DC03011951395554 RSSI : 56
EPC : 300833B2DDD9014000000000 RSSI : 52.8
Stop Inventory
Disconnect Reader
```

3. After the time of duration defined (10 seconds), the test finished and the program return to menu

5.4.5.13 Test SMS (4)

1. In the menu, choose "4: Test SMS", the reader can send SMS to Phone with number set in "SHIFT-4", valid SIM card inserted with mobile service enabled in the reader.

```
SHIFT-0: Reset to Fatory setting (reset to factory.def)
SHIFT-1: Set to NEXT GSM Antenna (Current: 1)
SHIFT-2: Set Test Server IP (Current : 192.168.25.100)
SHIFT-3: Change APN Name (Current: )
SHIFT-4: Set Test SMS Phone number (Current: 12345678)
SHIFT-5: Set Buzzer Volume (Current: 64)
SHIFT-7: Set to NEXT GPS Antenna (Current: 1)
SHIFT-8: test Buzzer Tone(Current: 1)
```

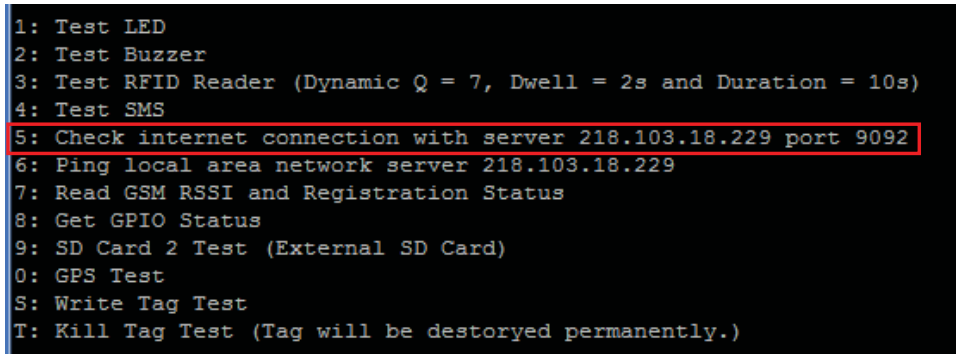
2. Press "4" to test SMS.
3. The program returns to main menu when the test is finished.
4. The Mobile phone with No.12345678 will receive the message: "**CS208 Send SMS Test**".

5.4.5.14 Check internet connection with server (5)

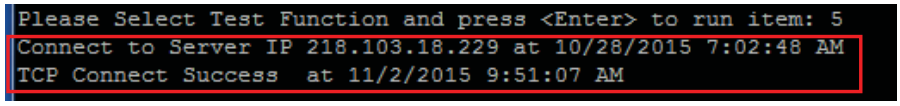
1. In the menu, use "SHIFT-2" to set target Test Server IP (for example: 218.103.18.229) and use "SHIFT-3" to set APN (for example: CMHK).

```
SHIFT-0: Reset to Fatory setting (reset to factory.def)
SHIFT-1: Set to NEXT GSM Antenna (Current: 1)
SHIFT-2: Set Test Server IP (Current : 218.103.18.229)
SHIFT-3: Change APN Name (Current: CMHK)
SHIFT-4: Set Test SMS Phone number (Current: )
SHIFT-5: Set Buzzer Volume (Current: 64)
SHIFT-7: Set to NEXT GPS Antenna (Current: 1)
SHIFT-8: test Buzzer Tone(Current: 0)
```

2. When the menu is shown again, check "5: Check internet connection with server ….." and press "5"



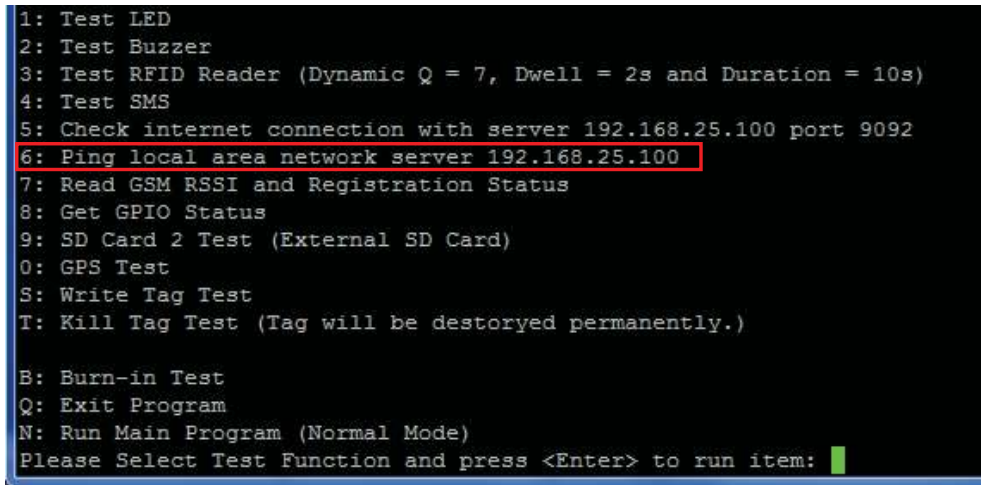
3. The result is displayed as below.



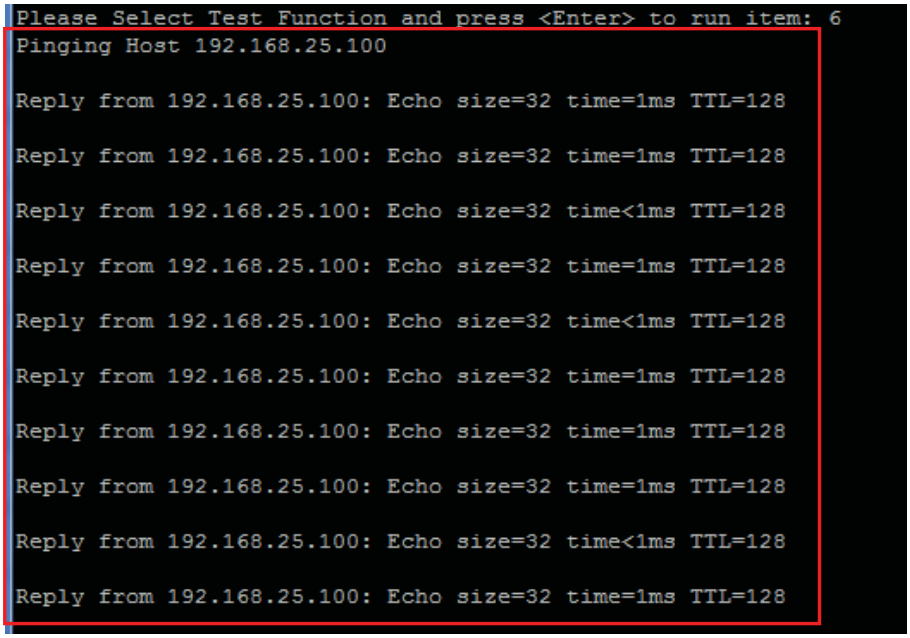
4. The program automatically returns to the test menu.

5.4.5.15 Ping local area network server (6)

1. In the menu, use "SHIFT-2" to set target Test Server IP (Example: 192.168.25.100)
2. When the menu is shown again, choose "6: Ping local area network server ..."



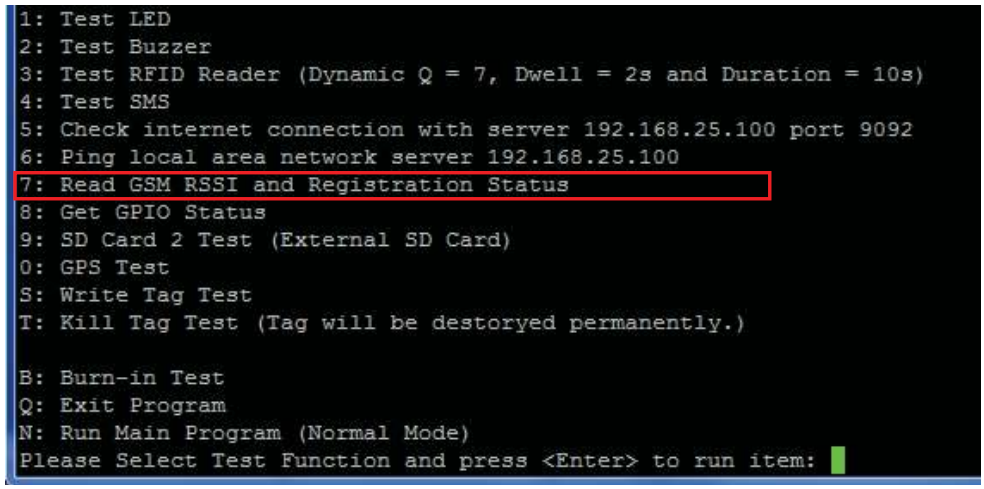
3. The result is displayed as below.



4. The program automatically returns to the test menu.

5.4.5.16 Read GSM RSSI and Registration Status (7)

1. In the menu, if you want to check GSM RSSI and registration status, choose "7".



2. The result is displayed (CSQ: GSM RSSI, CREG: GSM Registration) as below.


```
Please Select Test Function and press <Enter> to run item: 7
+CSQ: 30,0
GSM Connected
```

3. The program automatically returns to the test menu.

5.4.5.17 Get GPIO status (8)

1. In the menu, if you want to get GPIO status, choose “8: Get GPIO Status”.

```
Please Select Test Function : 9
I0 status = ON
I1 status = ON
LED will flash 3 times
```

2. The returned message is displayed with status of GPI pins. GPO pins will toggle in a HIGH-to-LOW transition 3 times.

5.4.5.18 SD Card Test (9)

1. In the menu, if you want to run SD Card Test, check “9: SD Card 2 Test (External SD Card)”.

```
1: Test LED
2: Test Buzzer
3: Test RFID Reader (Dynamic Q = 7, Dwell = 2s and Duration = 10s)
4: Test SMS
5: Check internet connection with server 192.168.25.100 port 9092
6: Ping local area network server 192.168.25.100
7: Read GSM RSSI and Registration Status
8: Get GPIO Status
9: SD Card 2 Test (External SD Card)
0: GPS Test
S: Write Tag Test
T: Kill Tag Test (Tag will be destoryed permanently.)

B: Burn-in Test
Q: Exit Program
N: Run Main Program (Normal Mode)
Please Select Test Function and press <Enter> to run item:
```

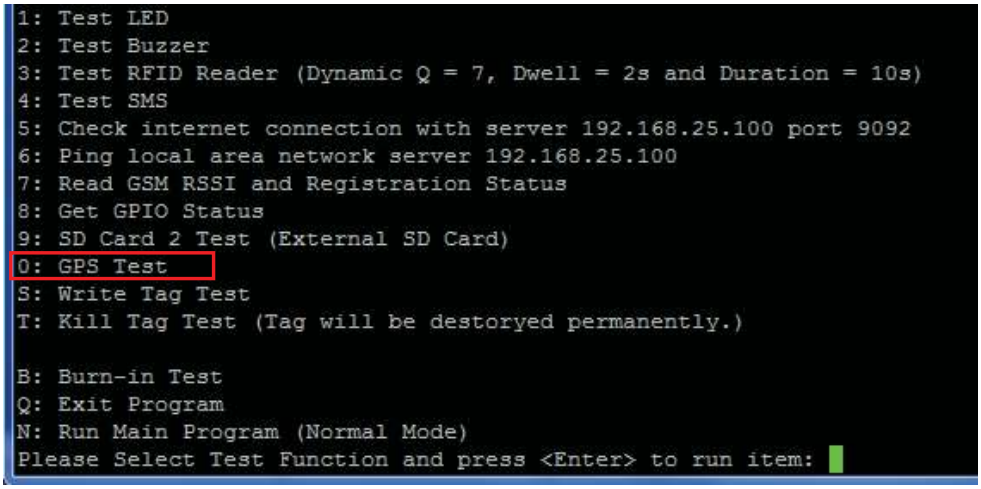
2. Press “9” to run the Write Test, Read Test, and Delete File Test in sequence.
3. The result is displayed when the test is finished.

```
Please Select Test Function and press <Enter> to run item: 9
Write File Test (100K byte) OK
Read File Test (100K byte) OK
Delete File Test OK
```

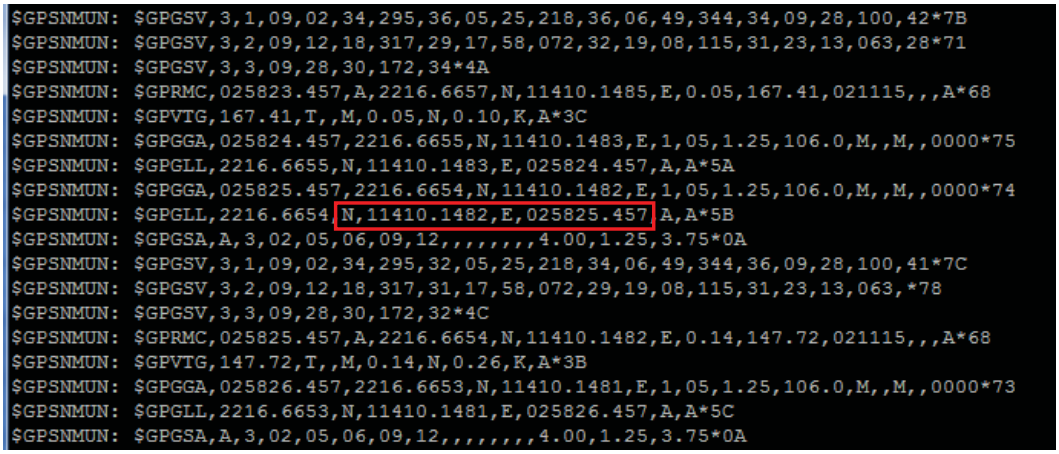
4.The program automatically returns to the test menu.

5.4.5.19 GPS Test (0)

1. In the menu, use "SHIFT-7" to set GPS Antenna used (Internal antenna or External Antenna).
2. Press "0" to run the GPS Test.



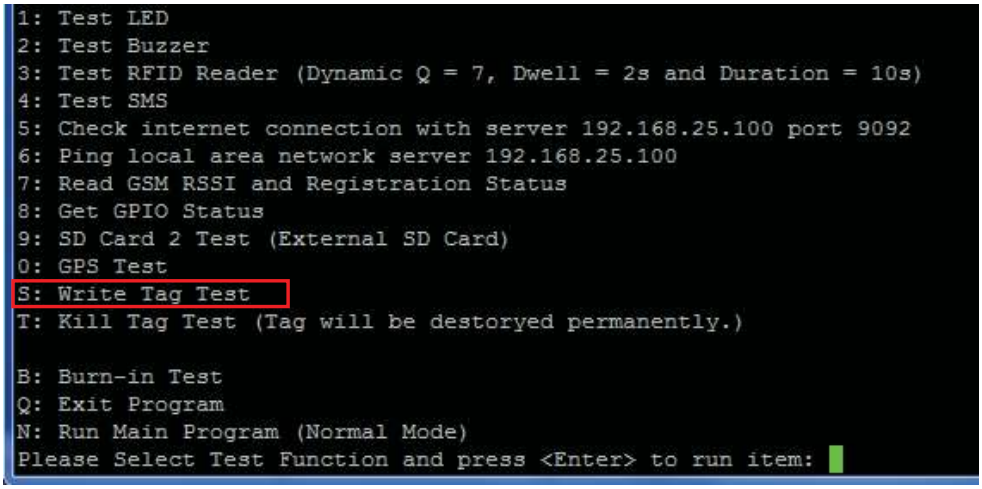
3. The result is displayed as below.



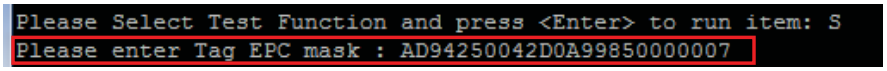
4. Press "any key" to stop the test and then turn to test menu.

5.4.5.20 Write Tag Test (S)

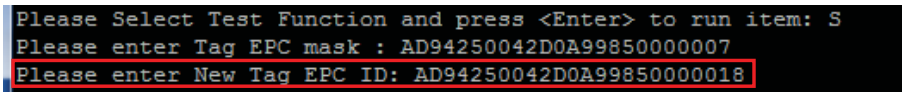
1. Before run the "Write Tag Test", you must know the EPC code of the Tag you want to Write. (for example: AD94250042D0A99850000007).
2. Press "S" to run the "Write Tag Test".



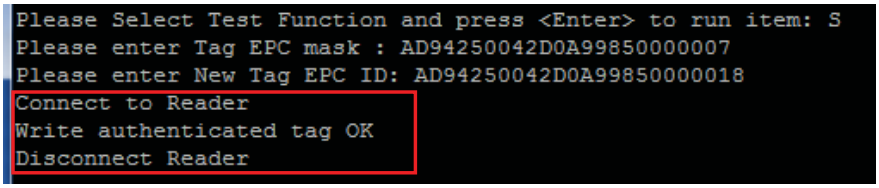
3. Enter the EPC code of the Tag you want to write.



4. Enter the new EPC code you want to change (for example AD94250042D0A99850000018).



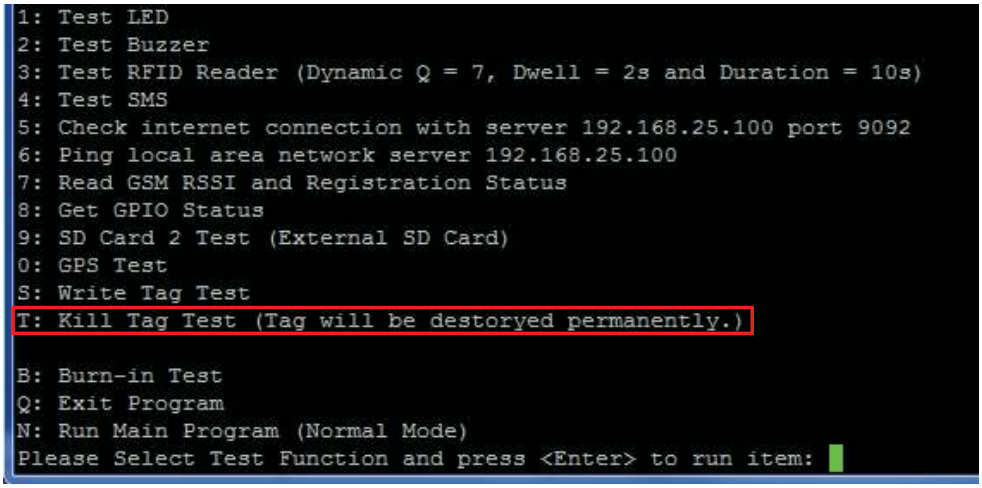
5. The test result is displayed as below.



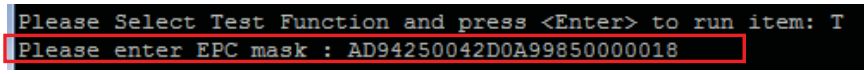
6. After finish the test, the program automatically return to the menu again.

5.4.5.21 Kill Tag Test (T)

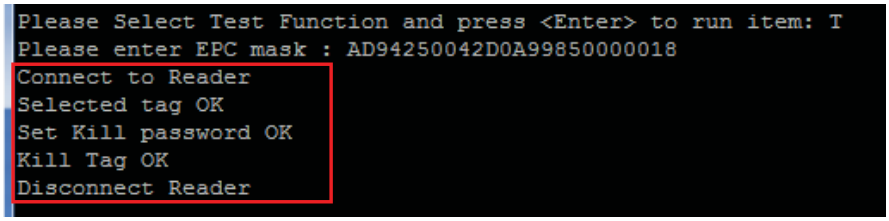
1. Before run the "Kill Tag Test", you must know the EPC code of the Tag you want to kill. (for example: AD94250042D0A99850000018).
2. Press "T" to run the "Kill Tag Test". (Note: after kill a tag, the tag will be destroyed permanently!!!).



3. Enter the EPC code of the Tag you want to kill.



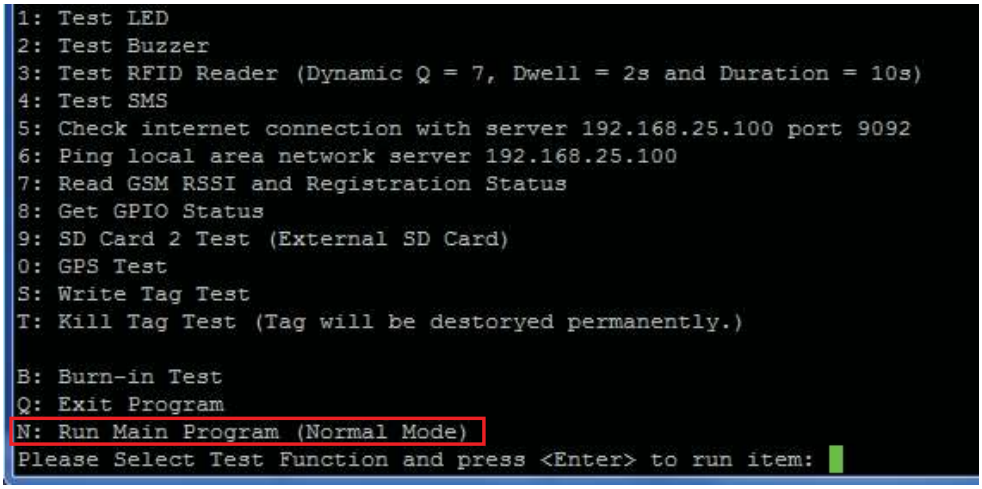
4. The test result is displayed as below.



5. After finish the test, the program automatically return to the menu again.

5.4.5.22 Run Main Program (Normal mode) (N)

Choose “N: Run Main Program (Normal mode)” will turn CS208 to return to normal operation mode from self test menu.

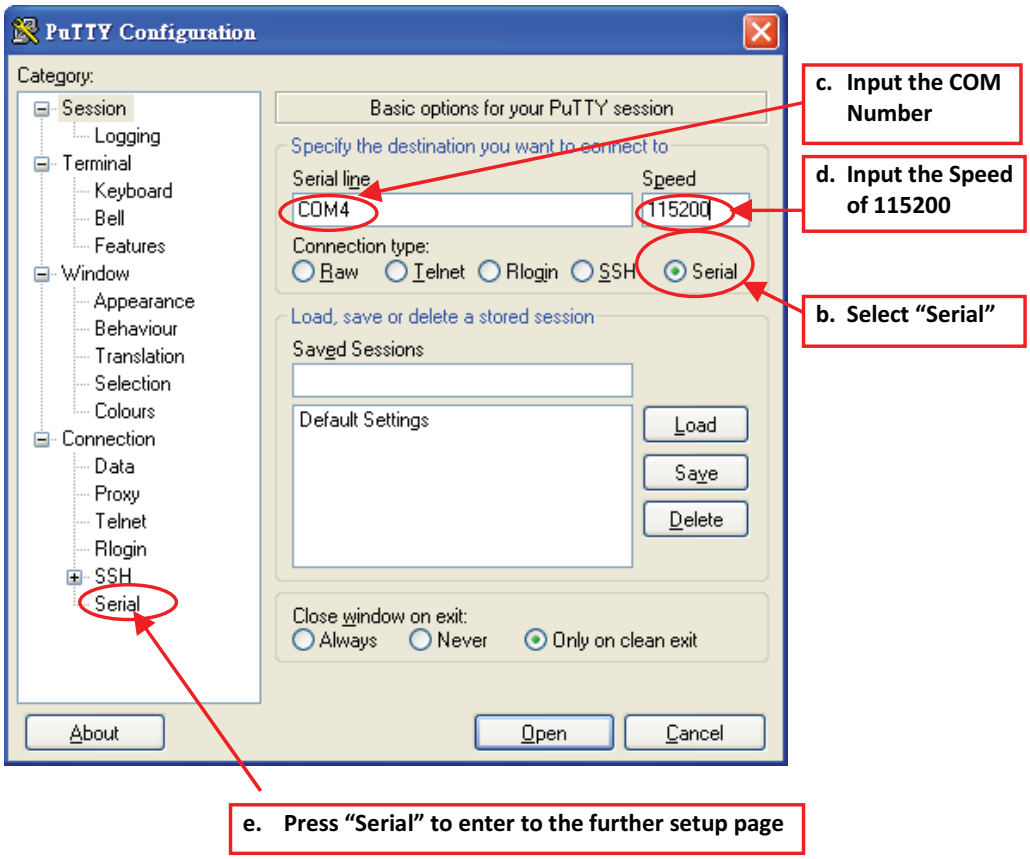


5.4.6 Debug Port Setup (Optional)

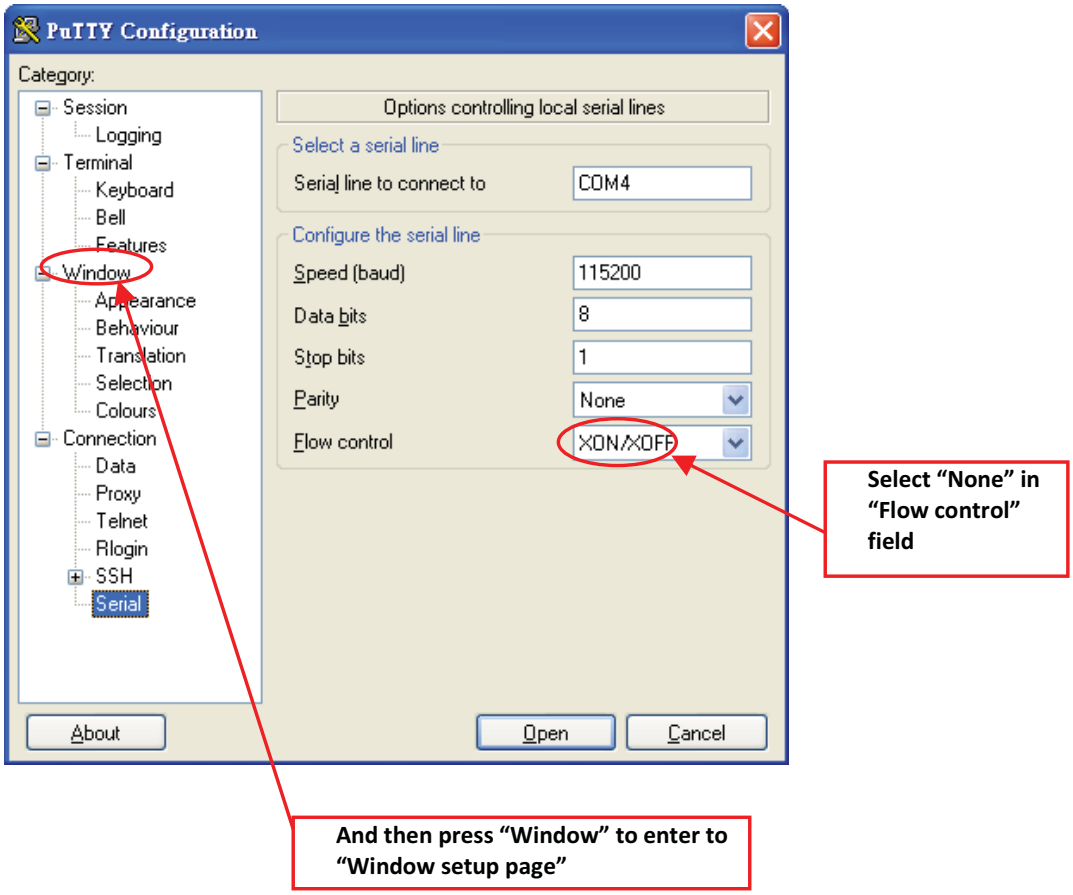
In order to monitor the status of CS208, it is better to use the “Debug Serial” port of CS208 and “PuTTY” in PC side.

The “PuTTY” Setup as follow:

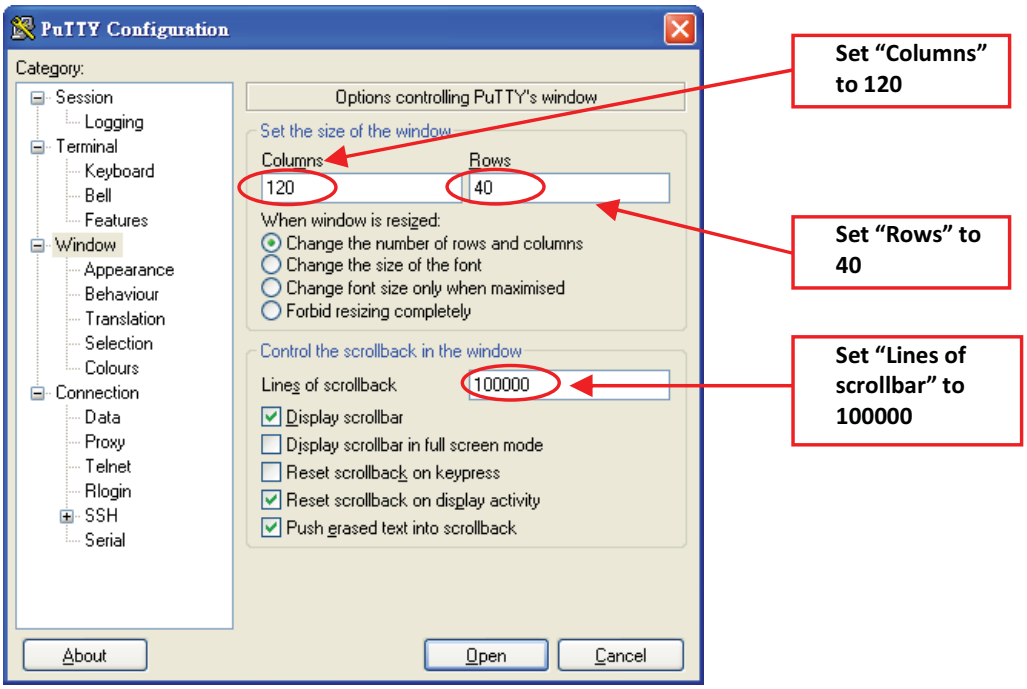
1. Connect "Debug Serial" port to PC “COM port”. This “COM port” should be different from “Control Serial” port.
2. Run "putty.exe" PC program.
3. Select “Serial”.
4. Input the COM port number, for example “COM4”, that is connected to the “Debug Serial” port of CS208.
5. Input the Speed of “115200” for the above used COM port.
6. Press “Serial” to enter to the further setup page of the COM port.



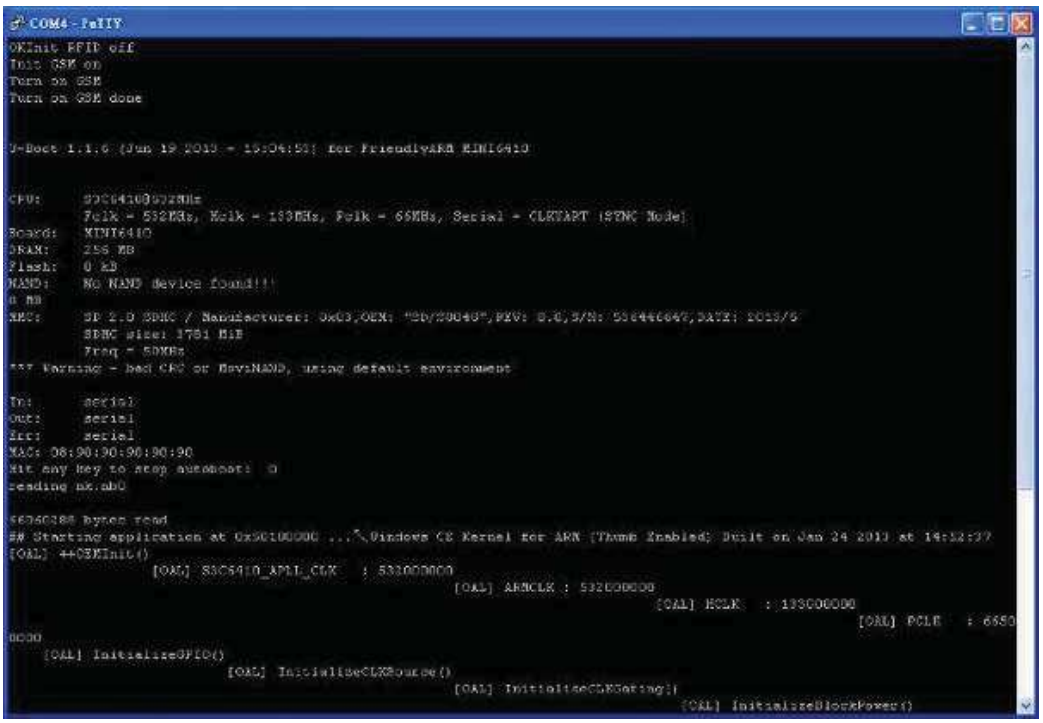
7. In the COM setup page, select “None” in field of the “Flow control”. And then press “Window” to enter to the “Window Setup Page”.



8. In “Window” setup page, in order to clearly display the information from CS208, it is better to set the “Window” as below



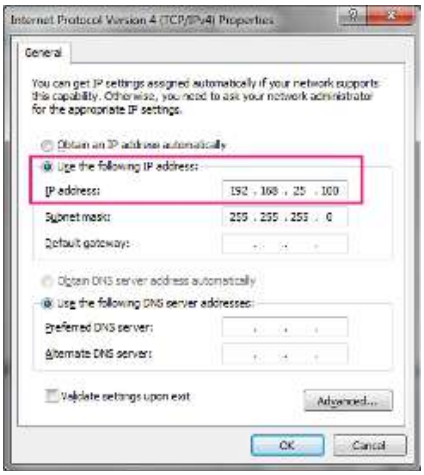
9. After setup, Press "Open" button
10. After power up CS208, the running status of CS208 is shown on the screen as below



5.5 CS208 Configuration

5.5.1 Initial Setup

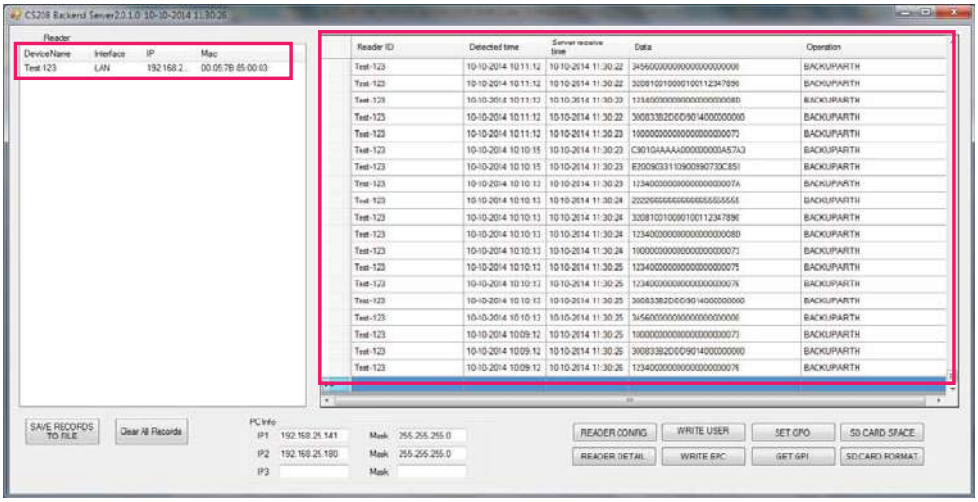
1. When CS208 is used in the first time, it is set to factory default setting and sends data to PC/Server via Ethernet in default static IP address 192.168.25.100. Therefore, user has to set PC for CS208 configuration as 192.168.25.100 at the beginning.



2. Connect CS208 to PC via Ethernet. Power up CS208.

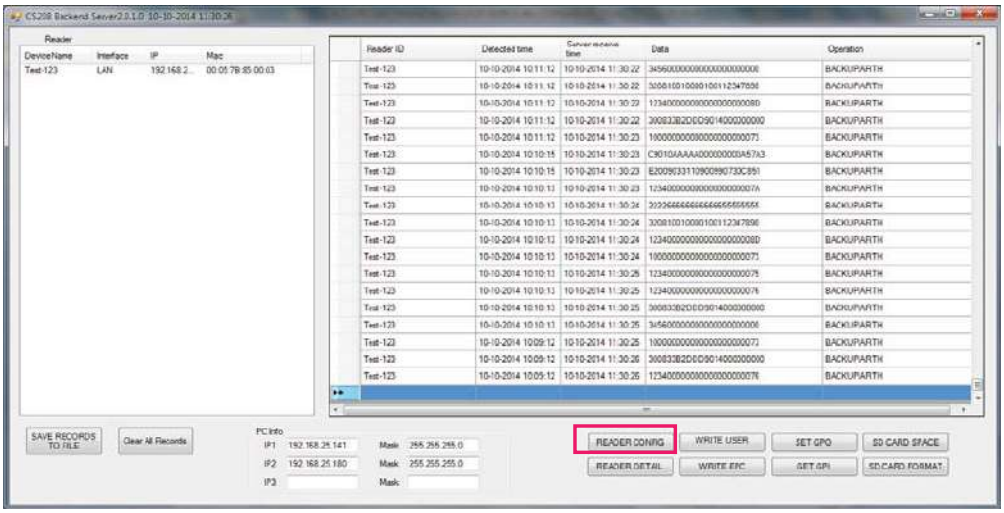
3. Place some tags near CS208 for test.

4. Open PC Software “CS208BackendServer.exe” in the PC for CS208 configuration. Wait until the CS208 reader appears and tag data is received.

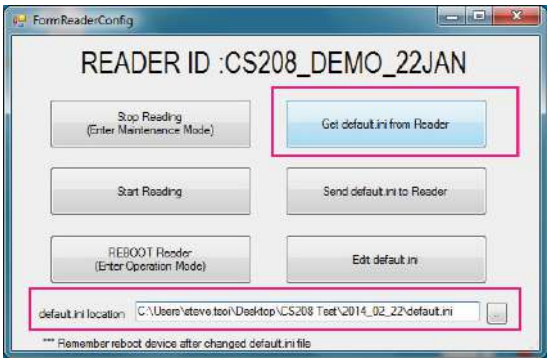


5. If CS208 reader does not appear and no tag data is received, please refer to CSL CS208 User's Manual and reconfigure CS208 Default Setting File (default.ini) by connecting CS208 reader via USB connection.

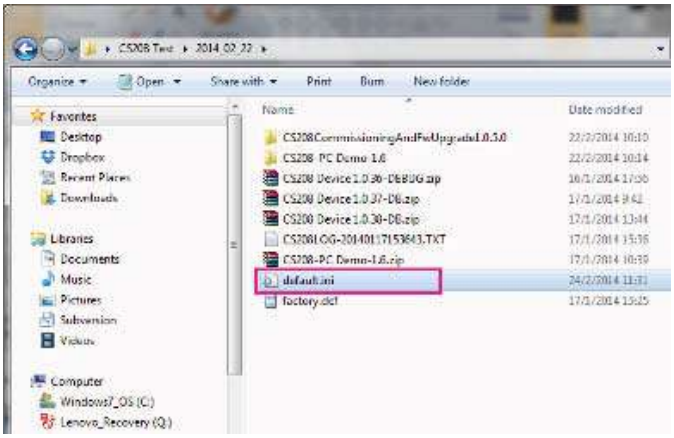
6. Choose and press button “READER CONFIG” from PC Software.



7. Input the default.ini location, where the destination the Default Setting file (default.ini) will be copied to. After that choose and press “Get default.ini from Reader”.



8. The Default Setting file (default.ini) is copied from CS208 to the target directory.

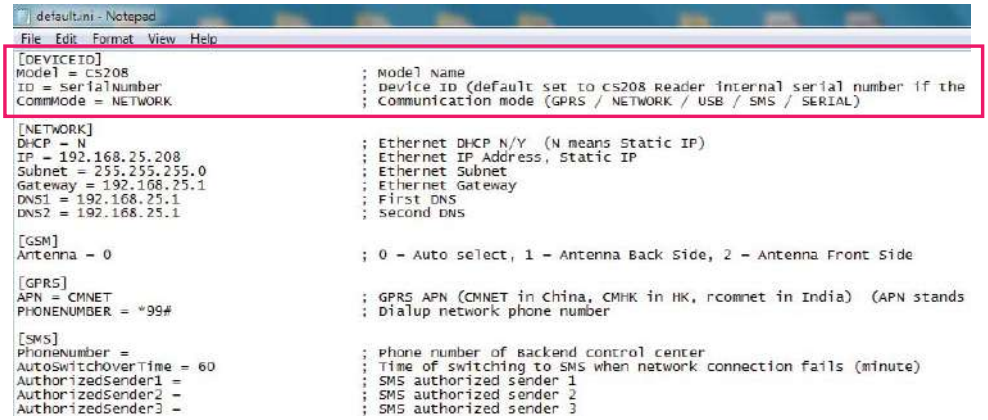


5.5.2 Set modes to send data via GPRS and Ethernet

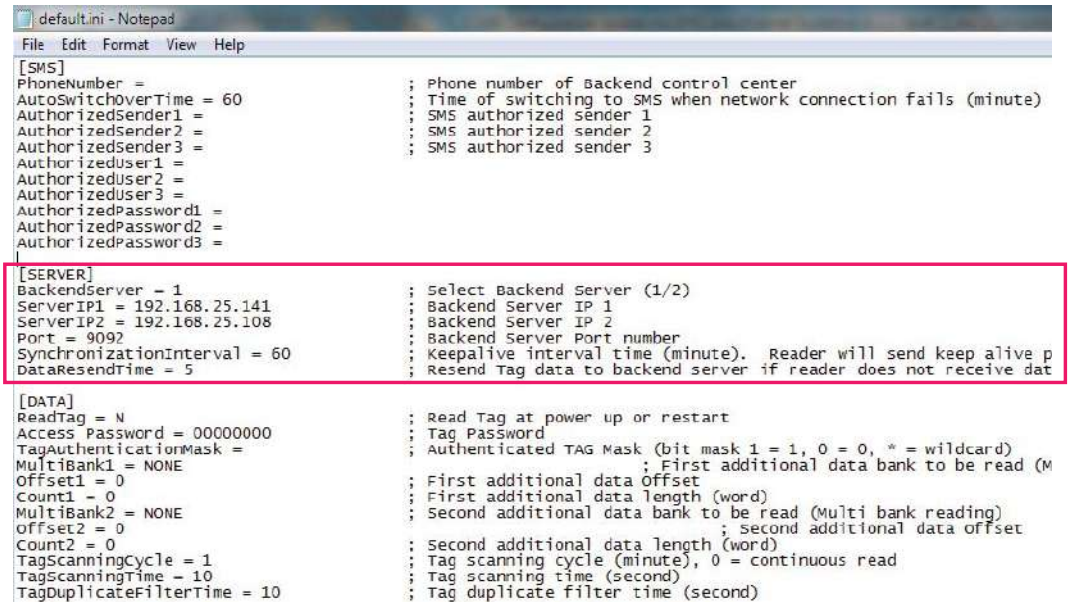
Please backup default.ini before doing any modification on mode setting (GPRS / LAN) to send data. User may use the copy to recover CS208 for wrong setting of the default.ini file.

5.5.2.1 CS208 sends data via Ethernet

1. In default.ini, find the section **[DEVICEID]**, set communication mode by setting **CommMode: NETWORK**.



2. In the **[SERVER]** section, set static IP for target PC to be used. Normally **ServerIP1** is used for setting static IP for target PC. Therefore **BackendServer** is set to **1**.

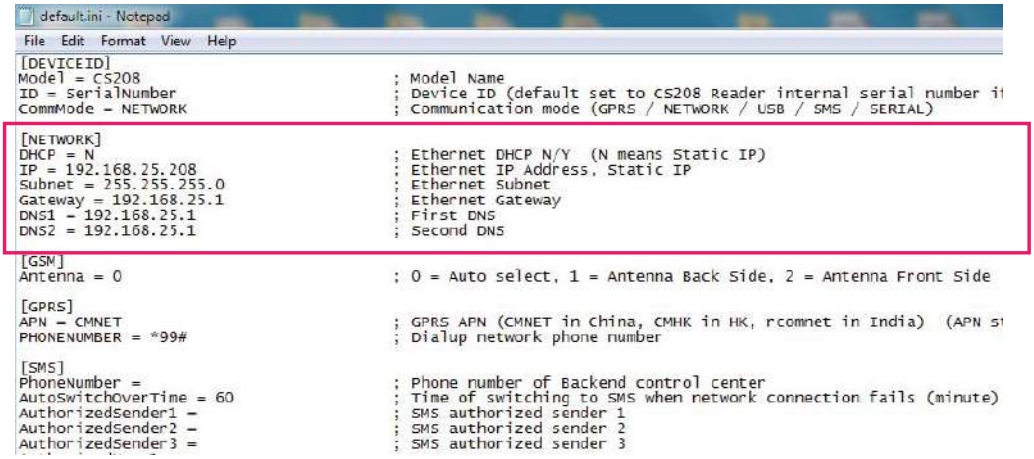


ServerIP1: Set the IP address where the PC (in static IP) receive the data

Port: Default is 9092 for Demo App

SynchronizationInterval: Reader will send keep alive packet per this time in minute (To the PC as server)

3. In the section **[NETWORK]**, set DHCP, IP, Subnet, Gateway and DNS for CS208 reader



Please ensure that the CS208 reader and the target PC are configured in the same subnet address. For example, if the ServerIP1 (target PC IP Address) is set to 192.168.12.163, the network setting can be set as follow:

IP = 192.168.12.208

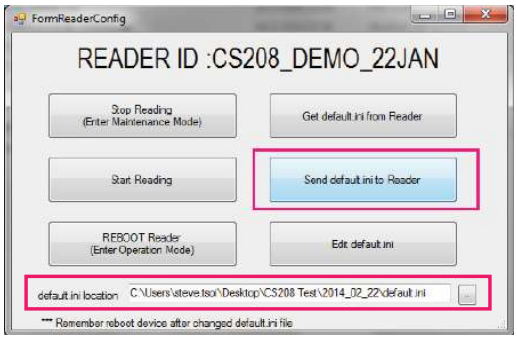
Subnet = 255.255.255.0

Gateway = 192.168.12.1

DNS = 192.168.12.1

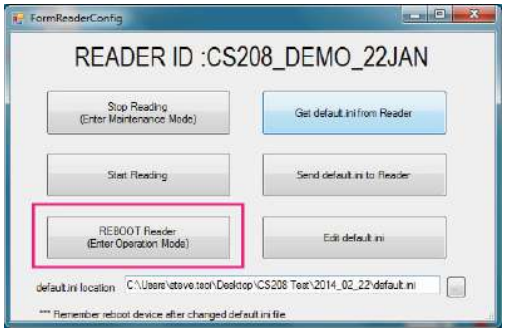
4. Save and Close default.ini

5. Copy the updated default.ini file from the directory back to CS208 using READER CONFIG again. Please note the default.ini location should remain unchanged. Choose and press “Send default.ini to Reader”.

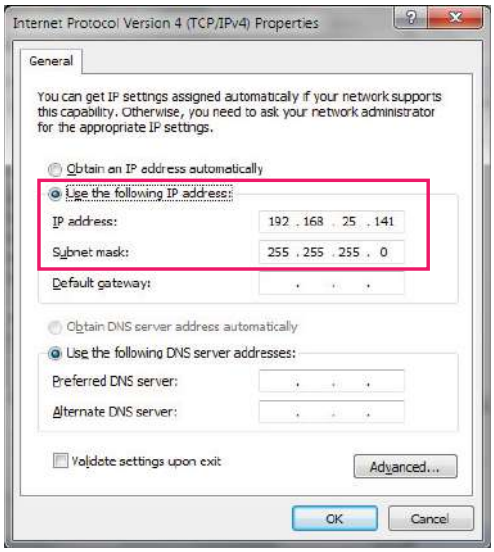


6. When the default.ini is copied to CS208 reader, a success message will be displayed. Press OK and quit Reader Config.

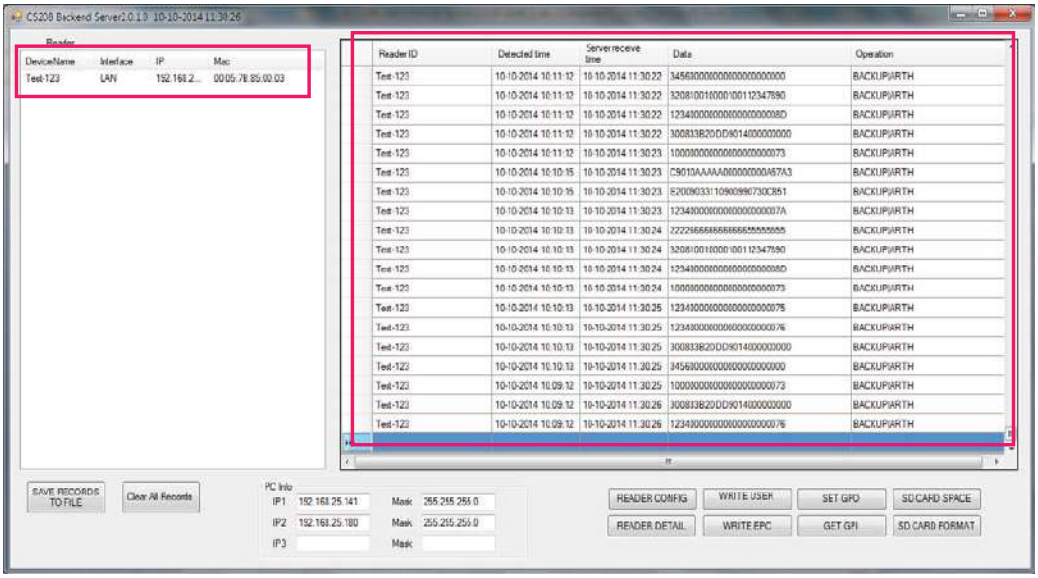
7. Reboot CS208 after default.ini file is changed



8. Check the IP address setting in target PC / Server



9. Open PC Software “CS208BackendServer.exe” in the target PC. Wait until the CS208 reader appears and tag data is received.



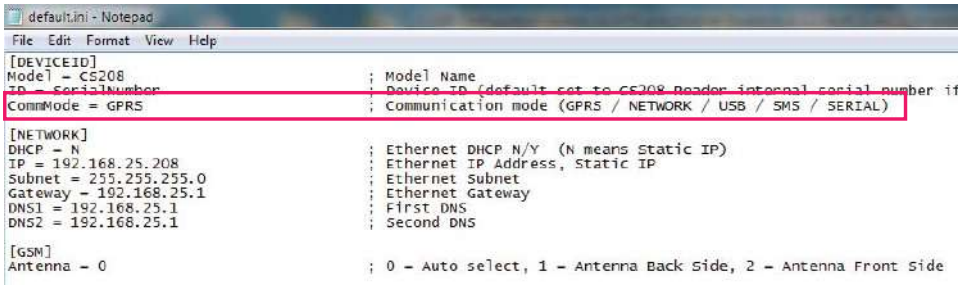
5.5.2.2 CS208 sends data via GPRS

1. Before configure CS208 sends data in GPRS mode, please ensure that that SIM card is inserted to CS208 and the GPRS data service is enabled.

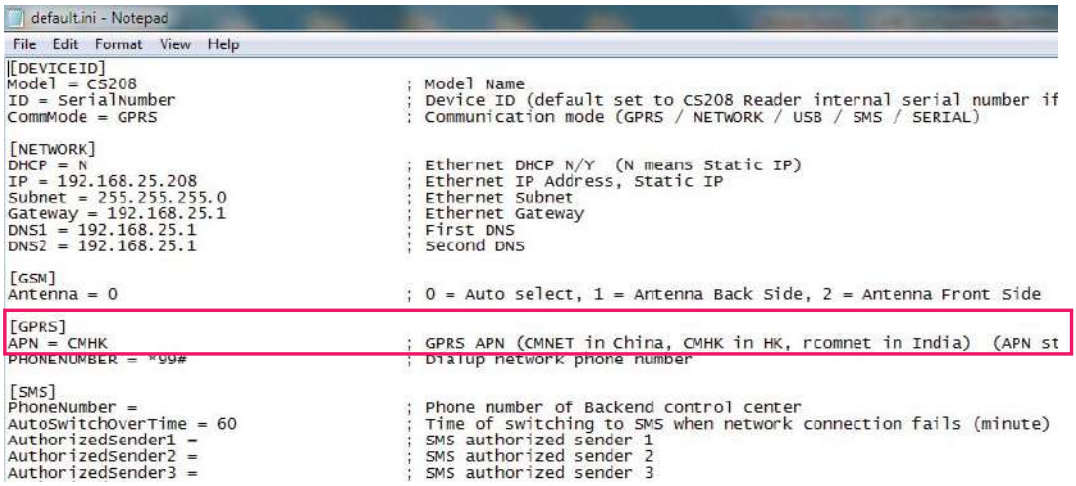
2. Please consult with Internet Service Provider or MIS in the company for the External IP address. Also Port Forwarding configuration is required so that the data will be map to PC with internal IP address. Below is an example:

   External IP address (from Internet Service Provider): 218.103.18.229
   port: 9092 map to
   Internal IP address (target PC / Server): 192.168.25.141 (FIXED IP)
   DNS1: 8.8.8.8 (Google Public DNS)
   DNS2: 8.8.4.4 (Google Public DNS)

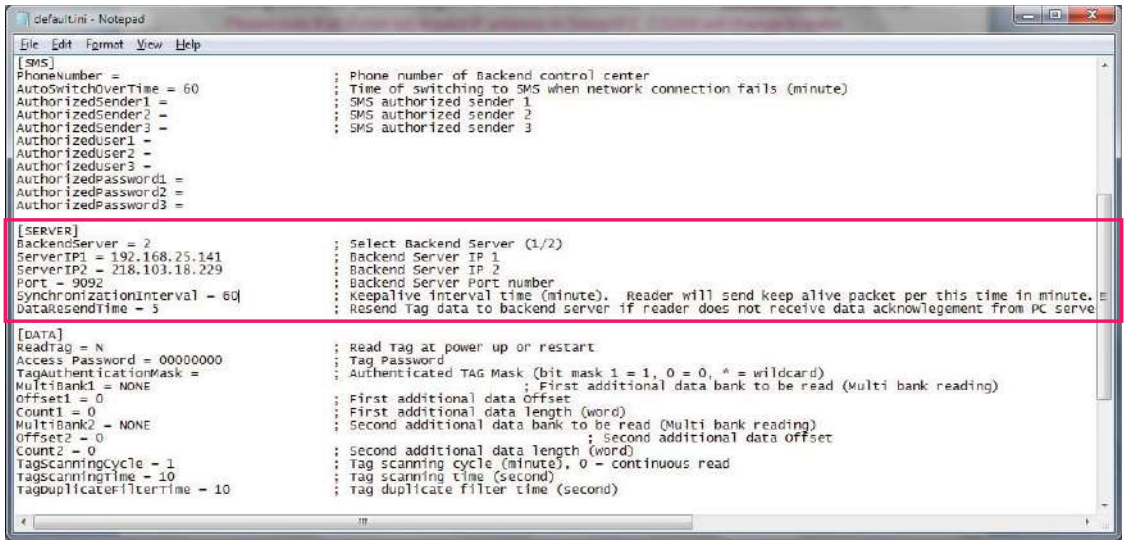
3. In default.ini, find the section **[DEVICEID]**, set communication mode by setting **CommMode: GPRS**.



4. In the section **[GPRS]**, set **APN** according to the country / region where CS208 is used



5. In the **[SERVER]** section, set static IP for target PC to be used. Normally **ServerIP2** is used for setting Internet IP address target PC / Server is connected. Therefore **BackendServer** is set to **2**. ServerIP1 can be ignored when ServerIP2 is used. Please note that if user set invalid IP address in ServerIP2, CS208 will change to make connection with PC with IP address set as ServerIP1 and send data.



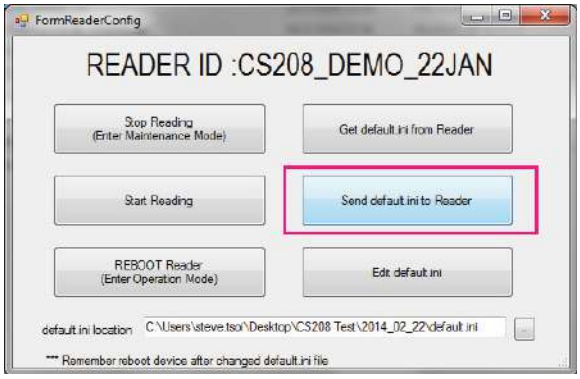
ServerIP2: Set the Internet IP address provided by the Internet Service Provider in CS208 test site.

Port: Default is 9092 for Demo App

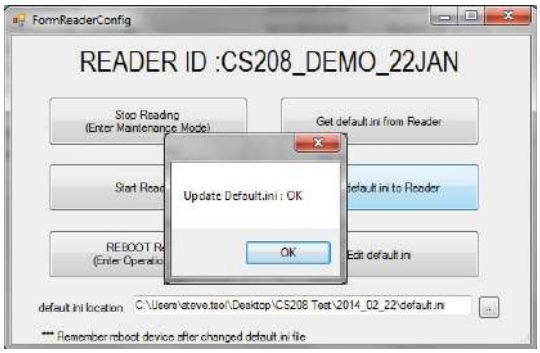
SynchronizationInterval: Reader will send keep alive packet per this time in minute (To the PC as server)

6. Save and Close default.ini

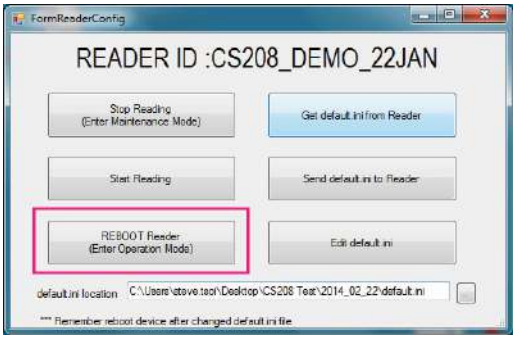
7. Copy the updated default.ini file from the directory back to CS208 using READER CONFIG again. Please note the default.ini location should remain unchanged. Choose and press "Send default.ini to Reader".



8. When the default.ini is copied to CS208 reader, a success message will be displayed. Press OK and quit Reader Config.



9. Reboot CS208 after default.ini file is changed.



10. Manually input the TCP/IP properties to target PC / Server:

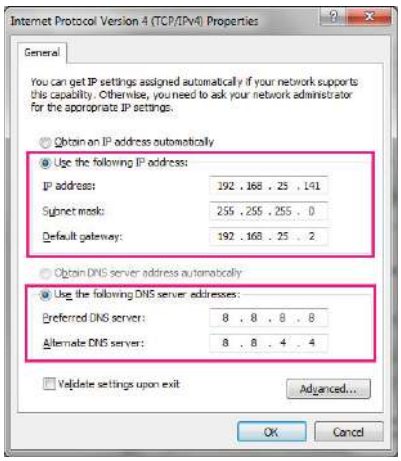
    IP address: 192.168.25.141

    Subnet Mask: 255.255.255.0

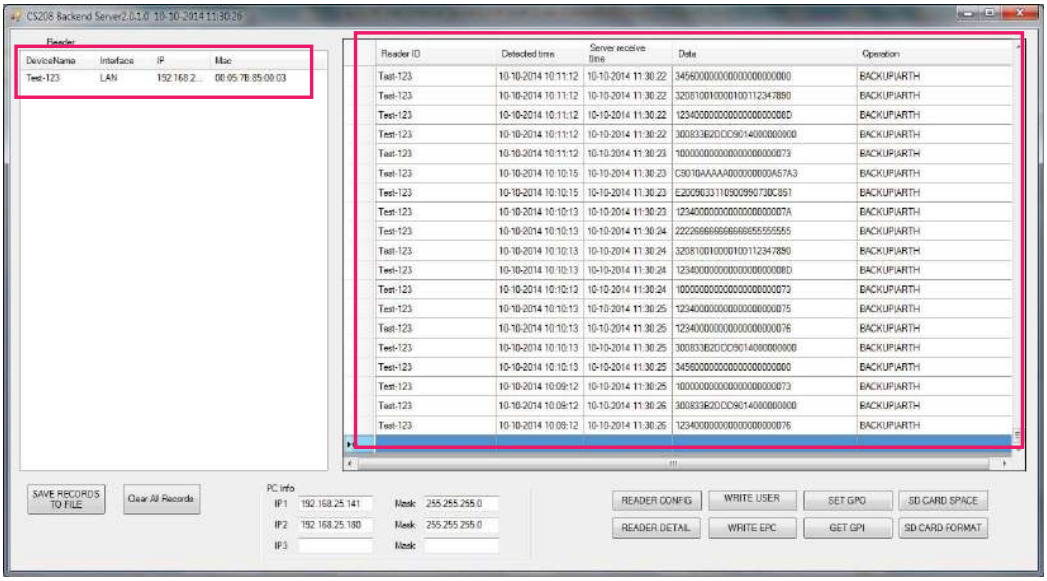
    Gateway: 192.168.25.2

    DNS1: 8.8.8.8

    DNS2: 8.8.4.4



11. Open PC Software "CS208BackendServer.exe" in the target PC. Wait until the CS208 reader appears and tag data is received.



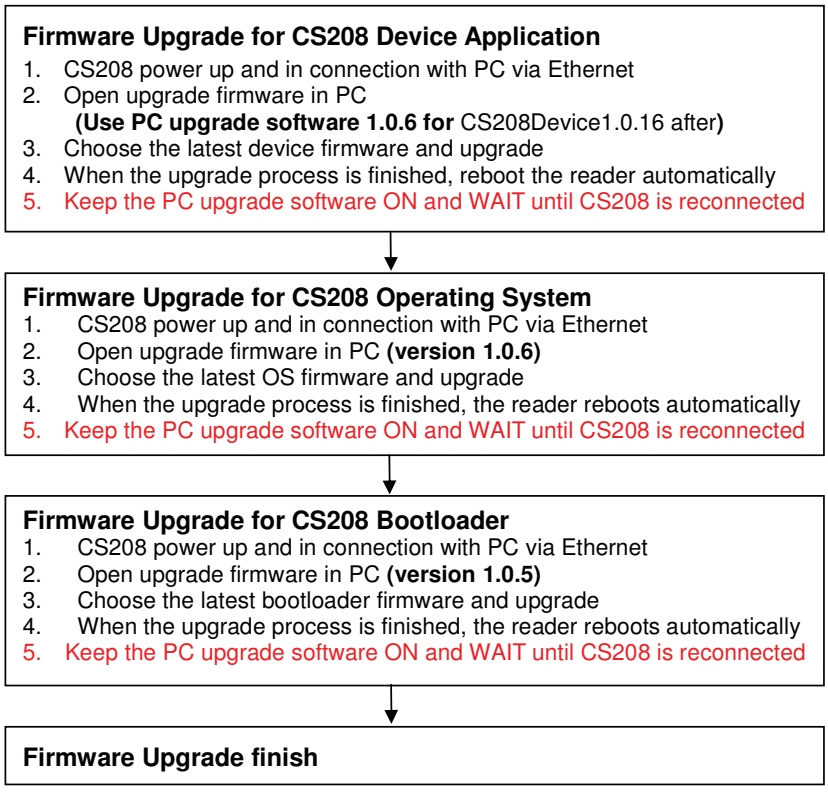
5.6 CS208 Firmware Upgrade

5.6.1 Firmware Upgrade Overview

User can have an overview of the files required for the firmware upgrade of the CS208 and the upgrade procedure in sequence. **The CSL CS208 Firmware Upgrade procedure is important for users for their CS208 RFID Reader upgrade. Incorrect firmware upgrade procedure may lead to system halt and may not be unrecoverable.**

5.6.1.1 CS208 Firmware Upgrade Flow Diagram

The flow diagram below shows the priority of firmware upgrade steps starting from device application, operating system and bootloader. **User MUST follow the sequence for multiple firmware upgrades.**



5.6.2 Firmware Upgrade Procedure

Below is the firmware list of CS208 RFID reader:

Firmware	File Name
Device Application	CS208DeviceXX.XX.XX.zip (e.g. CS208 Device 2.0.1-DB.zip)
Operating System	CS208_wince_fa_XXXXXXXX_XXXX_532mhz_nk.nb0 (CS208_wince_fa_20140407_1642_532mhz_nk)
Bootloader	u-boot_532M_vX.X.X.X_XXXXXXXX.bin (u-boot_532M_v1.0.0.5_20140206.bin)

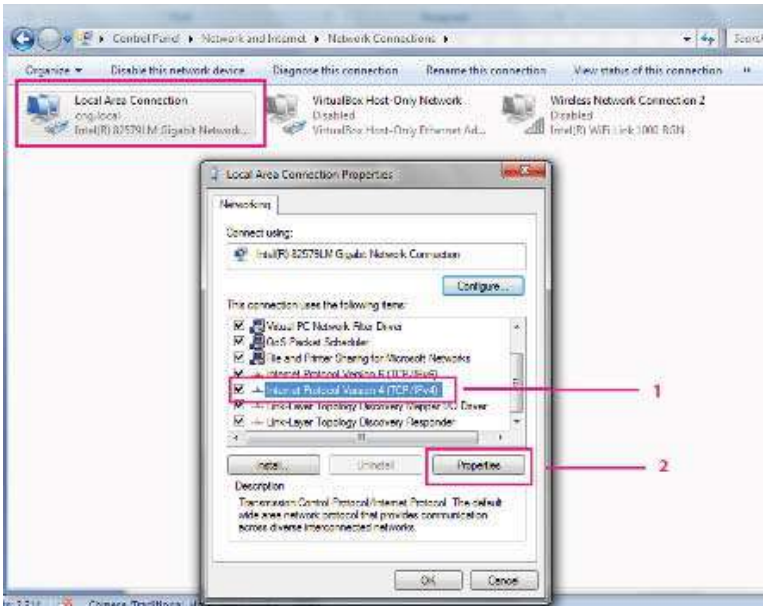
Below is the PC software list for firmware upgrade of CS208 RFID reader:

CS208 Upgrade	PC Software File Name
Device Application: version **after 1.0.16**	CS208CommissioningAndFwUpgrade1.0.6.exe
Operating System: All version	CS208CommissioningAndFwUpgrade1.0.6.exe
Bootloader: All version	CS208CommissioningAndFwUpgrade1.0.6.exe

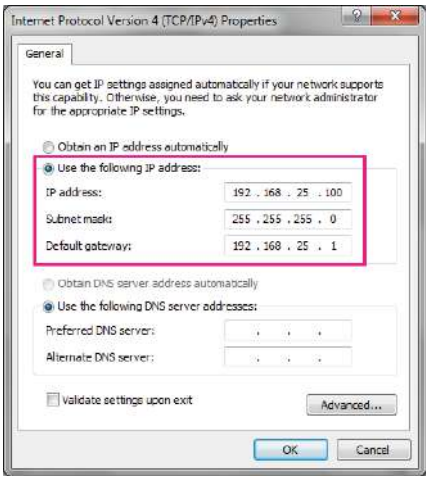
5.6.2.1 PC IP Configuration before CS208 firmware upgrade

Before firmware upgrade, user should check the IP configuration and firewall setting in PC.

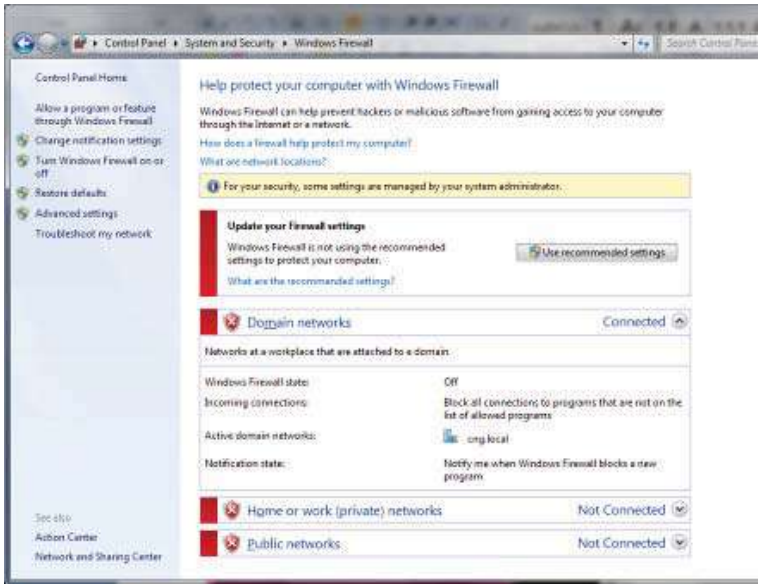
1. Go to Local Area Connection Properties. Find **Internet Protocol Version 4 (TCP/IPv4)** and choose **Properties**.



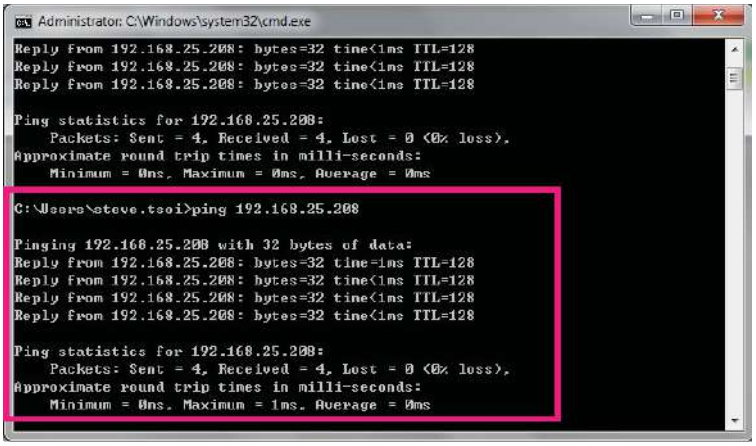
2. Choose “Use the following IP address”.
   Set IP address (**192.168.25.100**), Subnet mask (**255.255.255.0**), Default gateway (**192.168.25.1 for direct connect to CS208 reader**). Click OK after set.



3. Ensure the Windows Firewall is turned off.

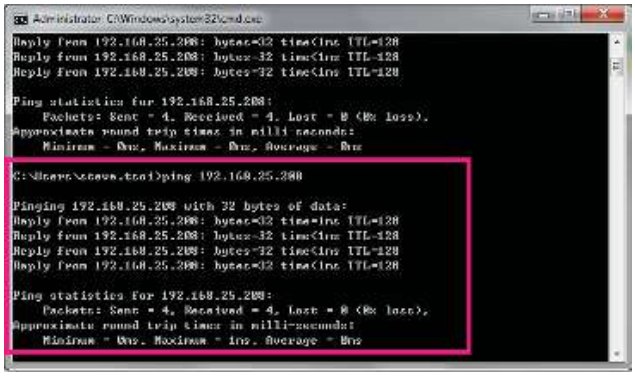


4. Open Command Prompt and do ping test ("Ping 192.168.25.208" <– default CS208 IP address). Reply message will received for successful network connection.

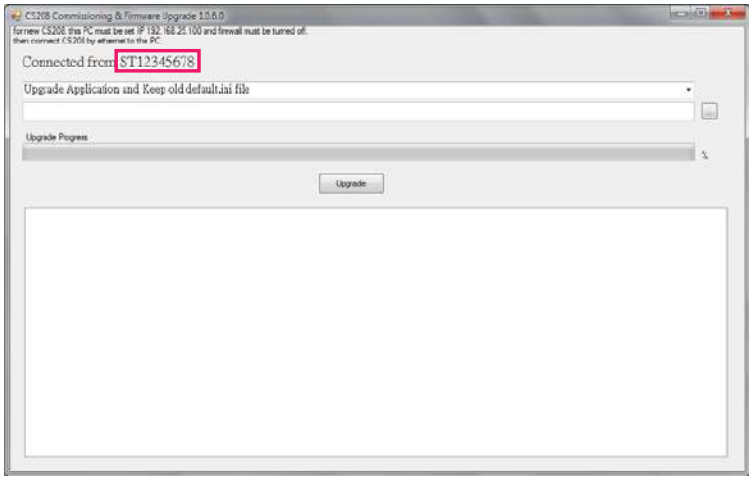


5.6.2.2 CS208 Device Application firmware upgrade via Ethernet

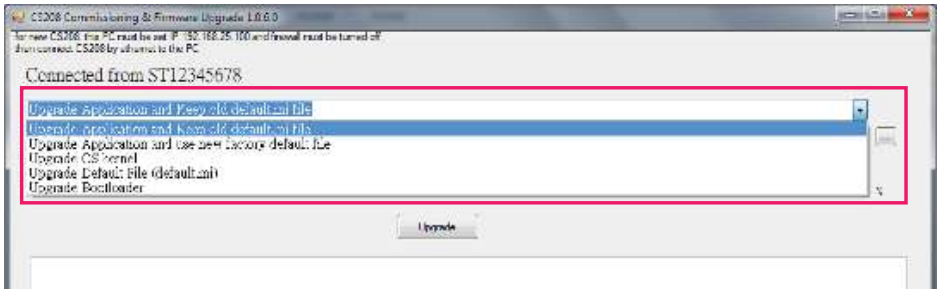
5. After CS208 RFID reader is power up, wait 1 minute.
6. In PC, Open Command Prompt and run ping test ("Ping 192.168.25.208" <- Default CS208 IP address). Check the network connection of CS208 reader.



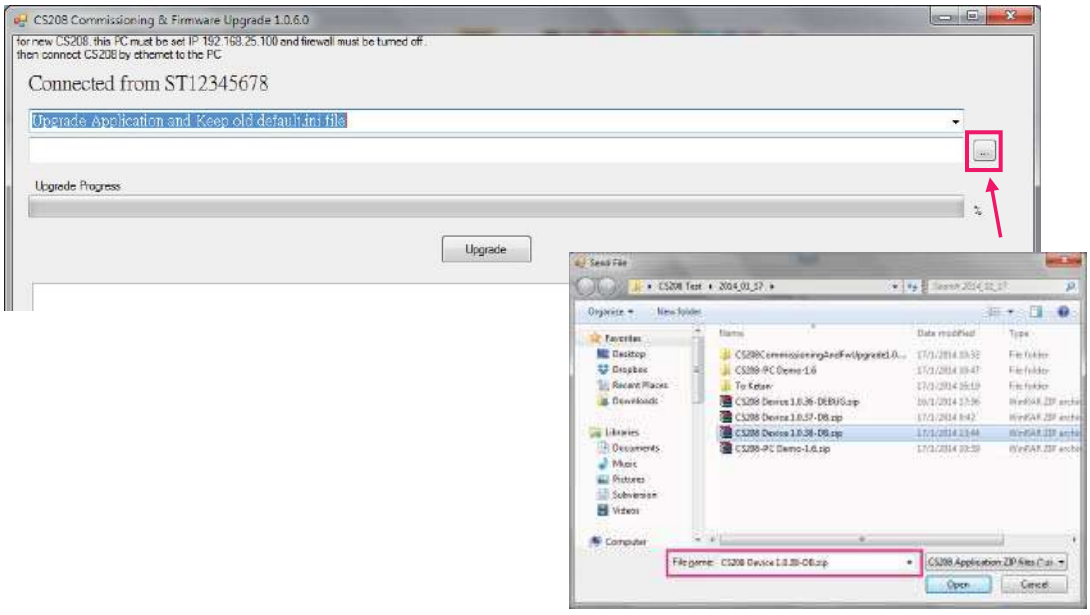
7. **"CS208CommissioningAndFwUpgrade1.0.6"** is used for Device Application upgrade. Run CS208CommissioningAndFwUpgrade.exe (version 1.0.6) provided in the CS208 software package. Wait until CS208 Serial ID is displayed. (Around 30 seconds)



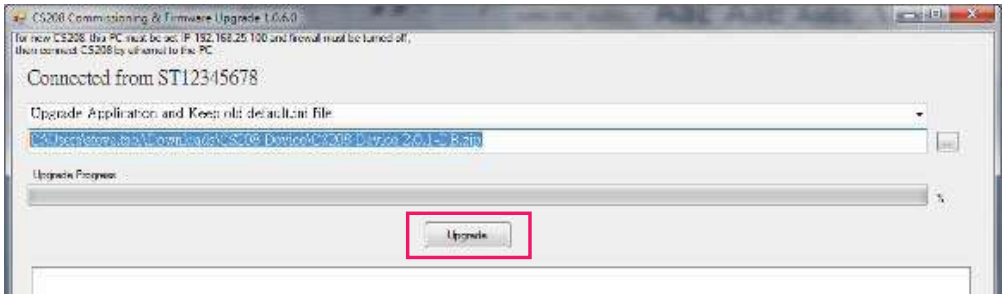
8. Choose "**Upgrade Application and Keep old default.ini file**" in the drop down list.



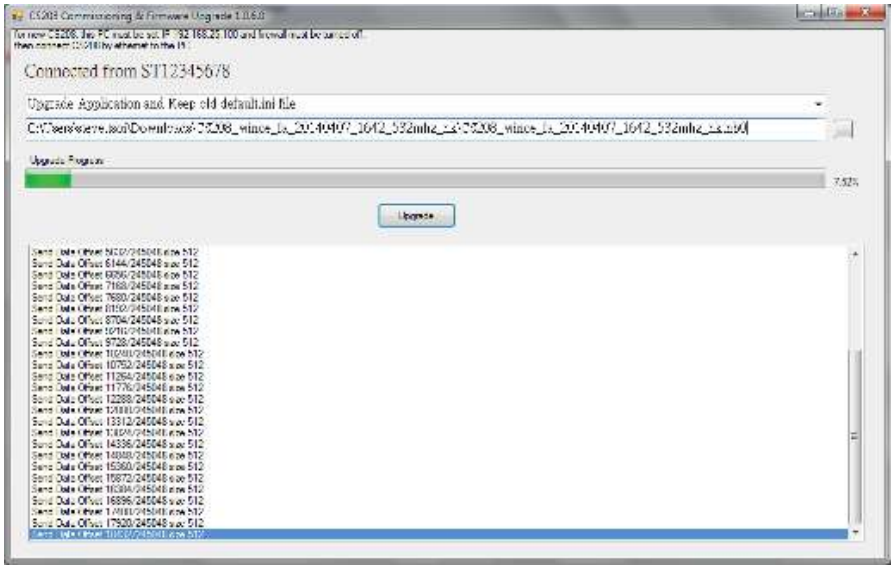
9. Click "**…**" to choose the latest Device Firmware for upgrade (CS208 Device 2.0.1-DB.zip).

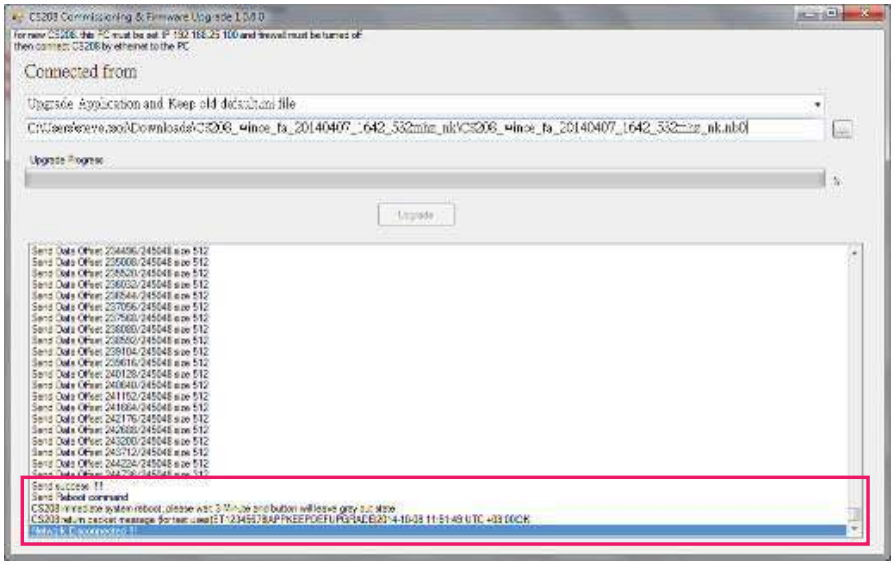


10. Click "**Upgrade**" button to start upgrade

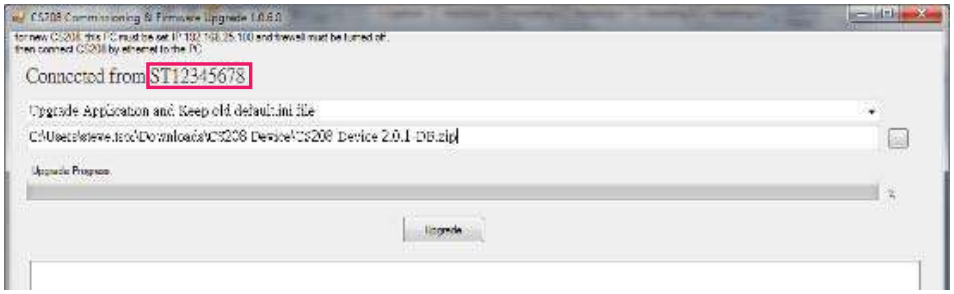


11. Wait until progress bar status reach 100%, a download complete message box is displayed when the upgrade process is finished.



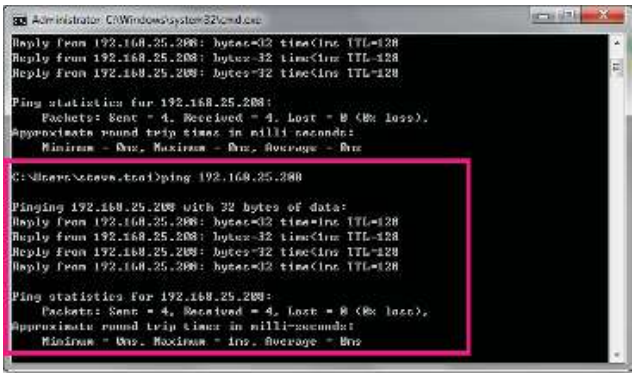


12. **CS208 RFID Reader reboot automatically after firmware upgrade. Keep the PC upgrade software ON and WAIT until the CS208 reconnected again.**

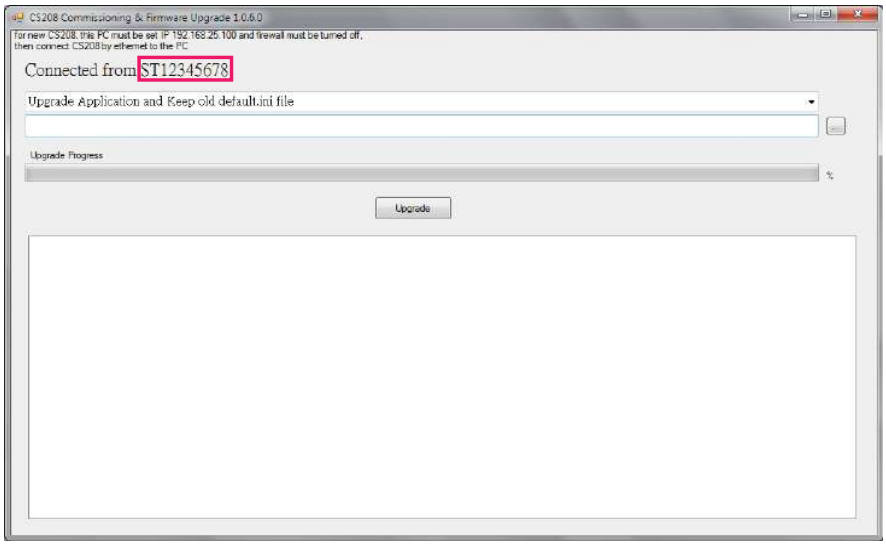


5.6.2.3 CS208 Operating System firmware upgrade via Ethernet

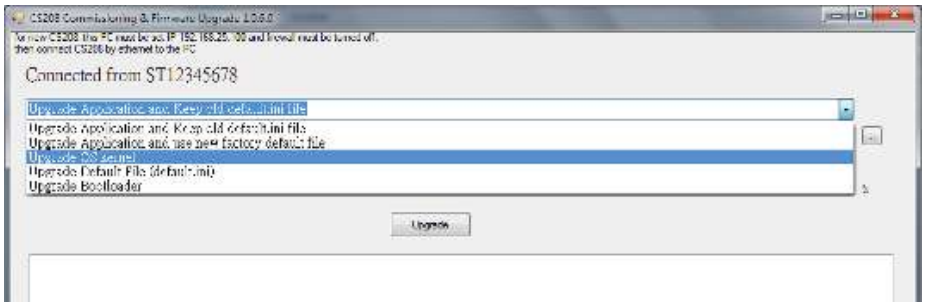
4. After CS208 RFID reader is power up, wait 1 minute.
5. In PC, Open Command Prompt and run ping test ("Ping 192.168.25.208" <- Default CS208 IP address). Check the network connection of CS208 reader.



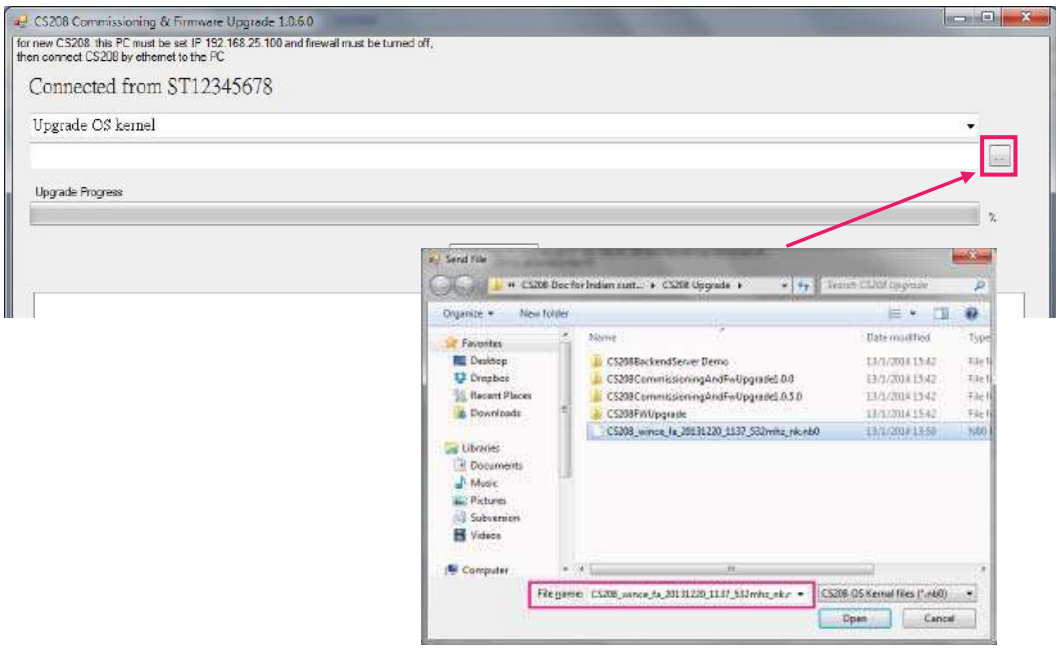
6. "**CS208CommissioningAndFwUpgrade1.0.6**" is used for OS firmware upgrade. Run CS208CommissioningAndFwUpgrade.exe (version 1.0.6) provided in the CS208 software package. Wait until CS208 Serial ID is displayed. (Around 30 seconds)



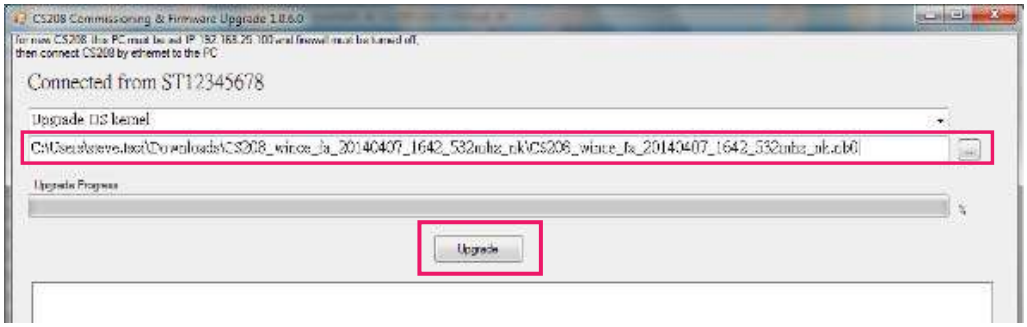
7. Choose "**Upgrade OS kernel**" in the drop down list.



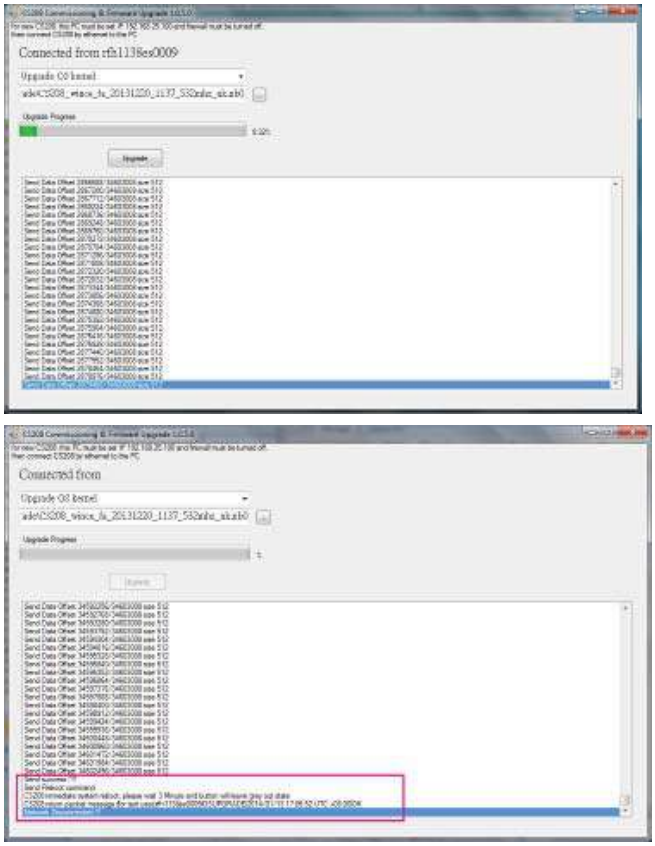
8. Choose the latest OS Firmware for upgrade (example: CS208_wince_fa_20140407_1642_532mhz_nk.nb0)



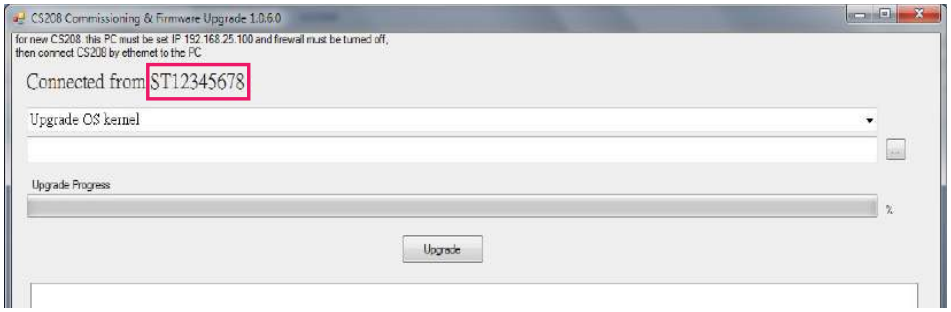
9. Click "**Upgrade**" button to start upgrade.



10. Wait until progress bar status reach 100%, a download complete message box is displayed when the upgrade process is finished.

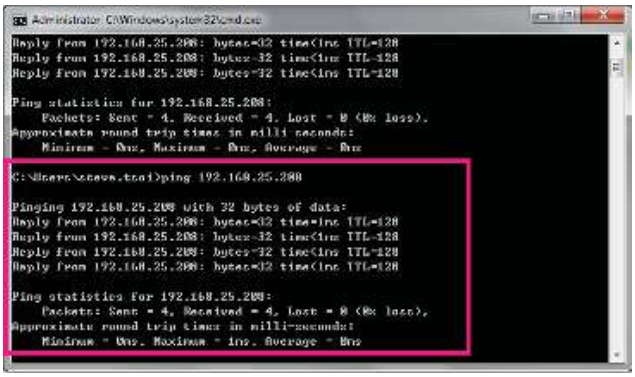


11. **CS208 RFID Reader reboot automatically after firmware upgrade. Keep the PC upgrade software ON and WAIT until the CS208 reconnected again.**

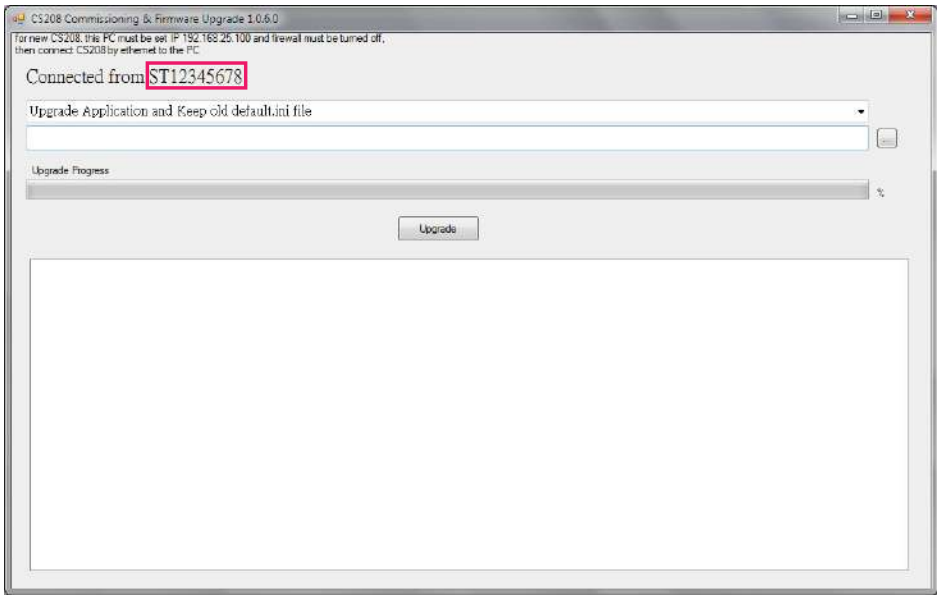


5.6.2.4 CS208 Bootloader firmware upgrade via Ethernet

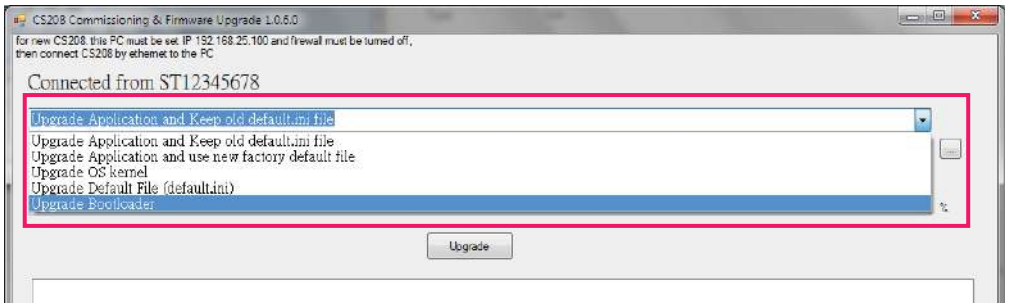
1. After CS208 RFID reader is power up, wait 1 minute.
2. In PC, Open Command Prompt and run ping test ("Ping 192.168.25.208" <- Default CS208 IP address). Check the network connection of CS208 reader.



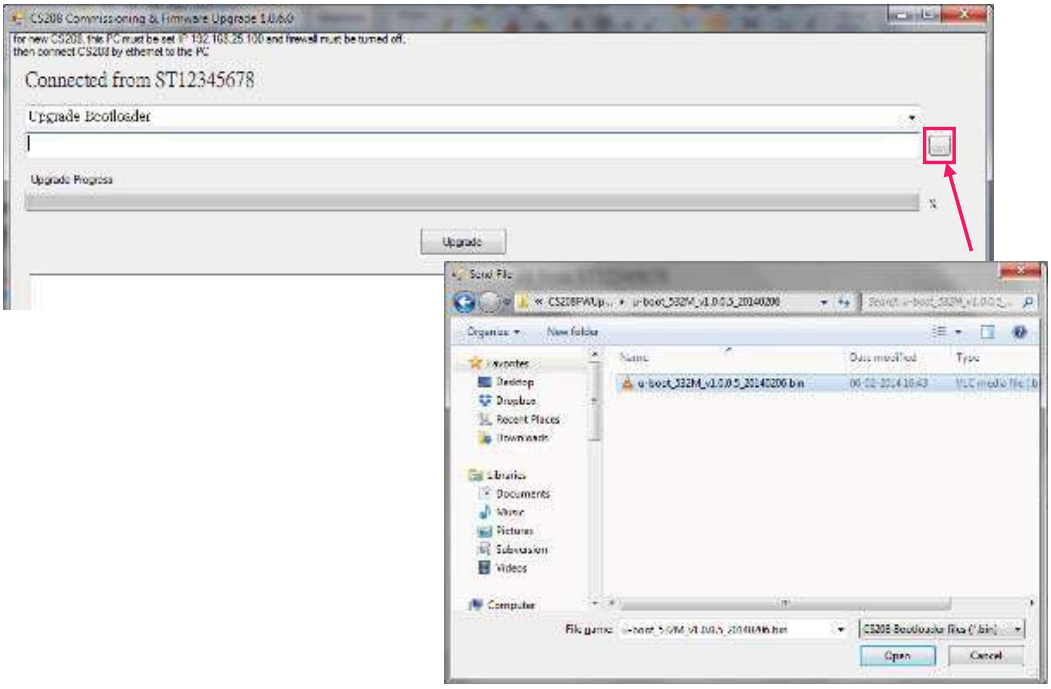
3. "**CS208CommissioningAndFwUpgrade1.0.6**" is used for OS firmware upgrade. Run CS208CommissioningAndFwUpgrade.exe (version 1.0.6) provided in the CS208 software package. Wait until CS208 Serial ID is displayed (Around 30 seconds).



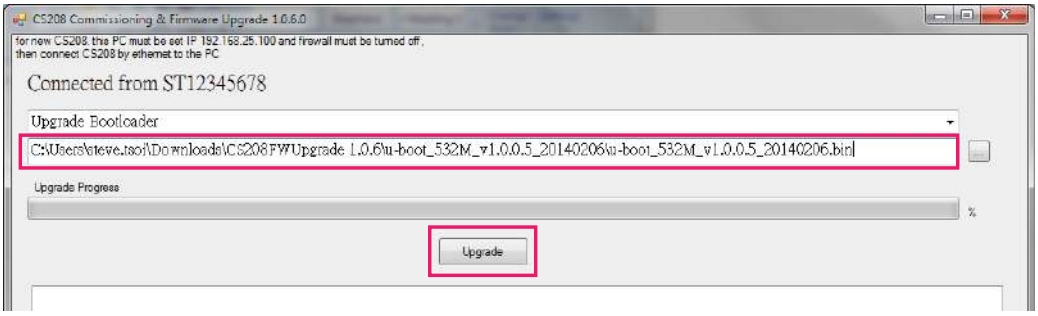
4. Choose "**Upgrade Bootloader**" in the drop down list.



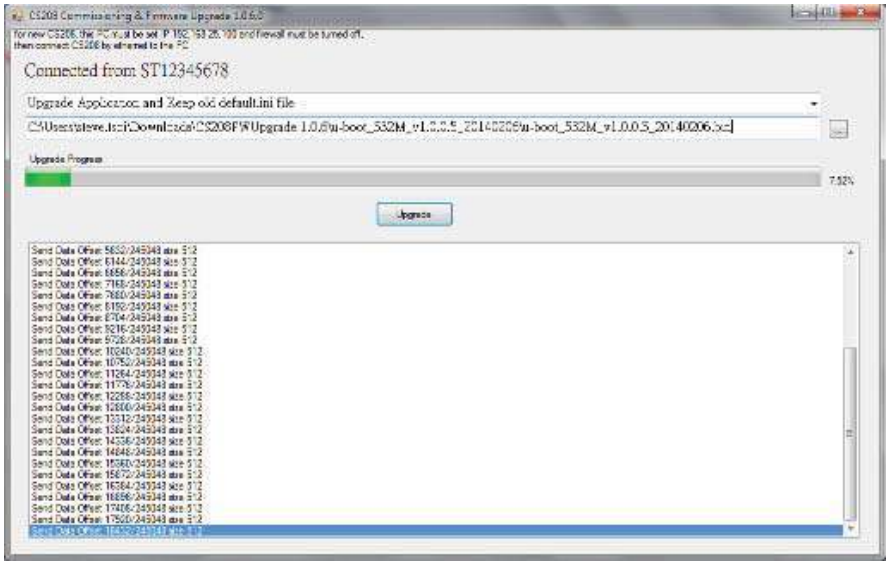
5. Choose the latest Bootloader Firmware for upgrade (example: u-boot_532M_v1.0.0.5_20140206.bin)

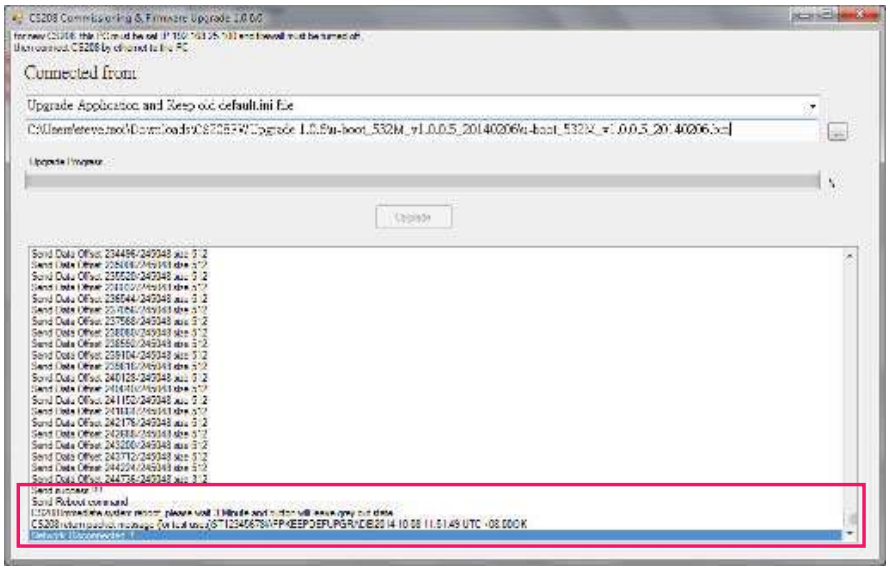


6. Click "Upgrade" button to start upgrade

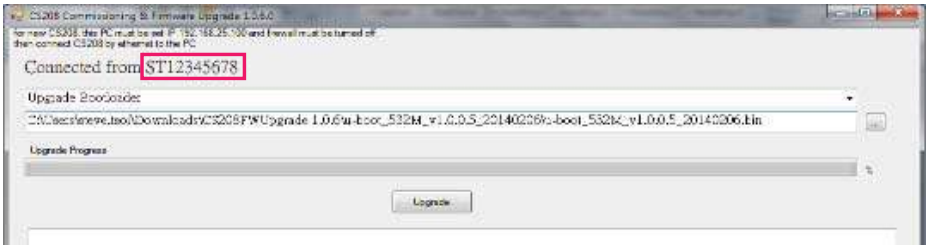


7. Wait until progress bar status reach 100%, a download complete message box is displayed when the upgrade process is finished.





8. **CS208 RFID Reader reboot automatically after firmware upgrade. Keep the PC upgrade software ON and WAIT until the CS208 reconnected again.**

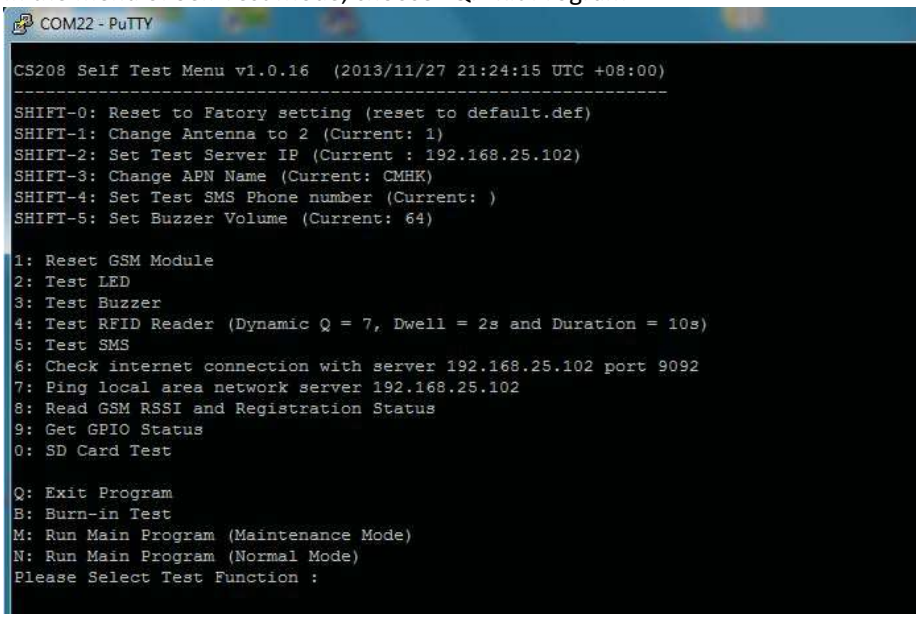


5.6.3 Firmware Upgrade via USB connection

5.6.3.1 Firmware Upgrade via USB connection (Window 7)

1. Since CS208 cannot do firmware upgrade in Normal mode. Restart CS208 and check CS208 enters Self Test Mode.

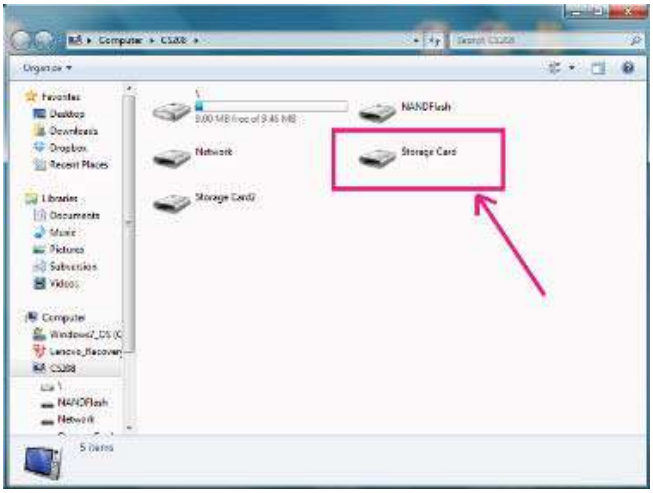
2. In the menu of Self Test Mode, choose “Q: Exit Program”



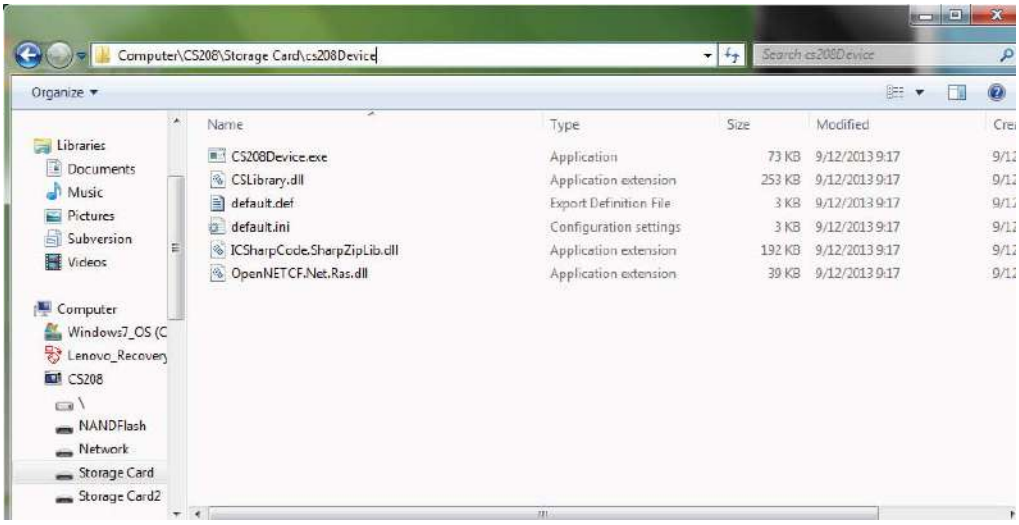
3. If user is using Window 7, check Windows Mobile Device Centre is opened.
4. Connect CS208 to PC via USB and wait until “connected” status is displayed.

5. In Windows Mobile Device Centre, choose “Connect without setting up your device”. Then choose “File Management” > “Browse the contents of your device”

6. A new drive “CS208” is found. Choose “Storage Card” where the CS208 application and default setting files are stored and can be upgraded.



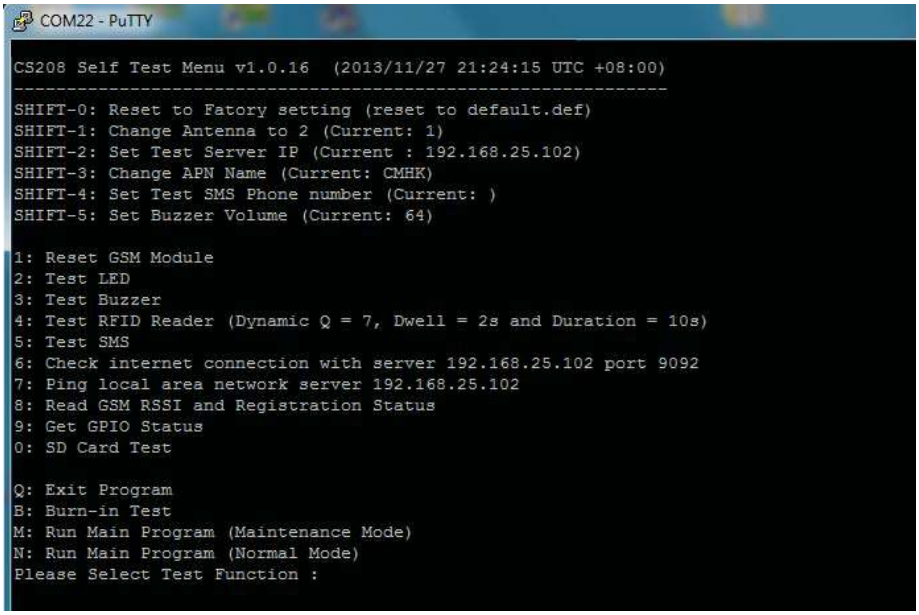
7. In the directory ““\CS208\Storage Card”, check “\cs208Device”. Here the user can upgrade the files CS208Device.exe, CSLibrary.dll, default.ini, etc directly by COPY and REPLACE with new version files.



8. Unplug USB cable and reboot CS208 manually.

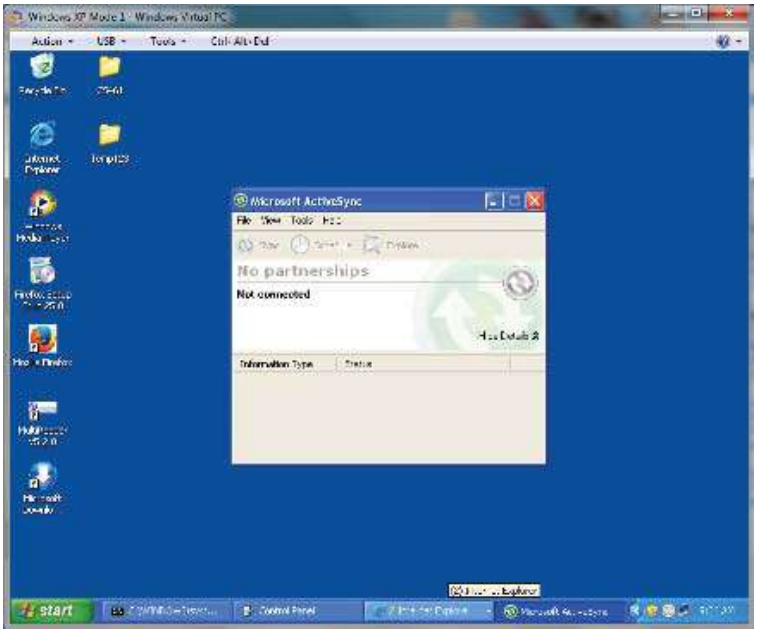
5.6.3.2 Firmware Upgrade via USB connection (Window XP)

1. Since CS208 cannot do firmware upgrade in Normal mode. Restart CS208 and check CS208 enters Self Test Mode.



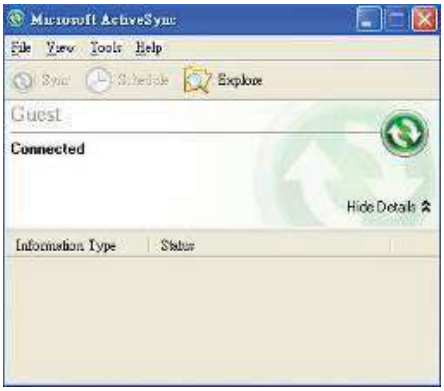
2. In the menu of Self Test Mode, choose “Q: Exit Program”.

3. If user is using Window XP, check Microsoft ActiveSync is opened. Connect CS208 to PC via USB.

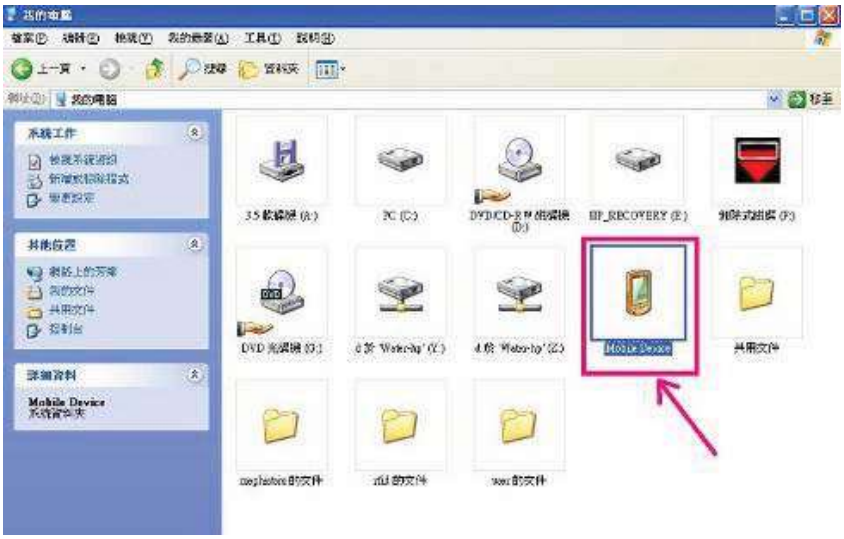


4. When CS208 is connected the first time, Microsoft Active Sync may ask for set up a partnership. Choose “No” and press “Next”.

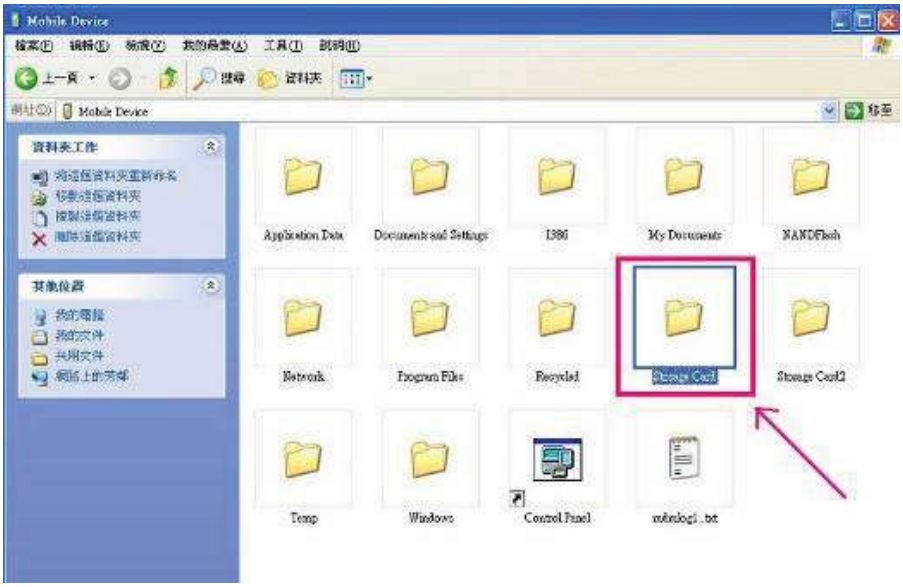
5. Check CS208 is automatically connected shown as below. User can also check the connection settings for CS208 connecting to ActiveSync automatically.



6. Choose “Mobile Device” in “My Computer”.



7. In “Mobile Device”, choose “Storage Card” where the CS208 application and default setting files are stored and can be upgraded.



8. Check the directory “\Storage Card\cs208Device”. Here the user can upgrade the files CS208Device.exe, CSLibrary.dll, default.ini, etc directly by COPY and REPLACE with new version files.

9. Unplug USB cable and reboot CS208 manually.

5.6.4 Reset CS208 to Factory Setting

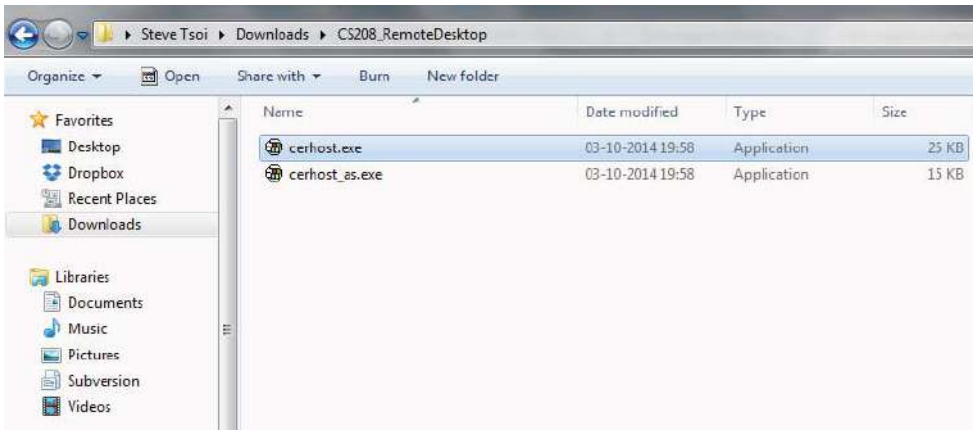
Please refer to **4.4.5.1 RESET TO FACTORY SETTING (SHIFT-0)** to reset CS208 to factory setting.

6 Remote access CS208 via Ethernet and USB using Remote Desktop

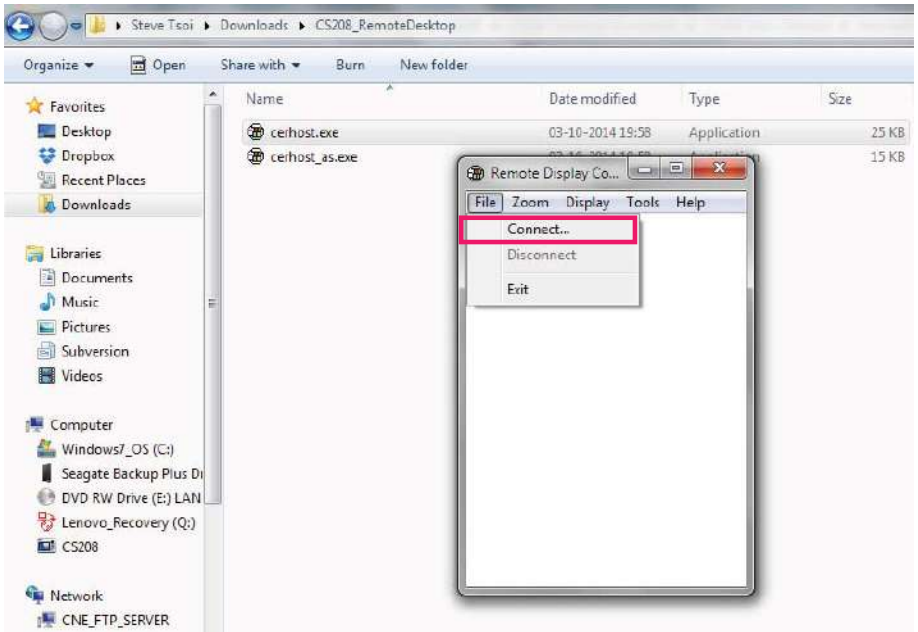
User can remote access the CS208 Integrated RFID Reader via Ethernet or USB interface using Remote Desktop.

6.1 Remote access CS208 via Ethernet

1. Run the Remote Desktop Tool **"cerhost.exe"**.

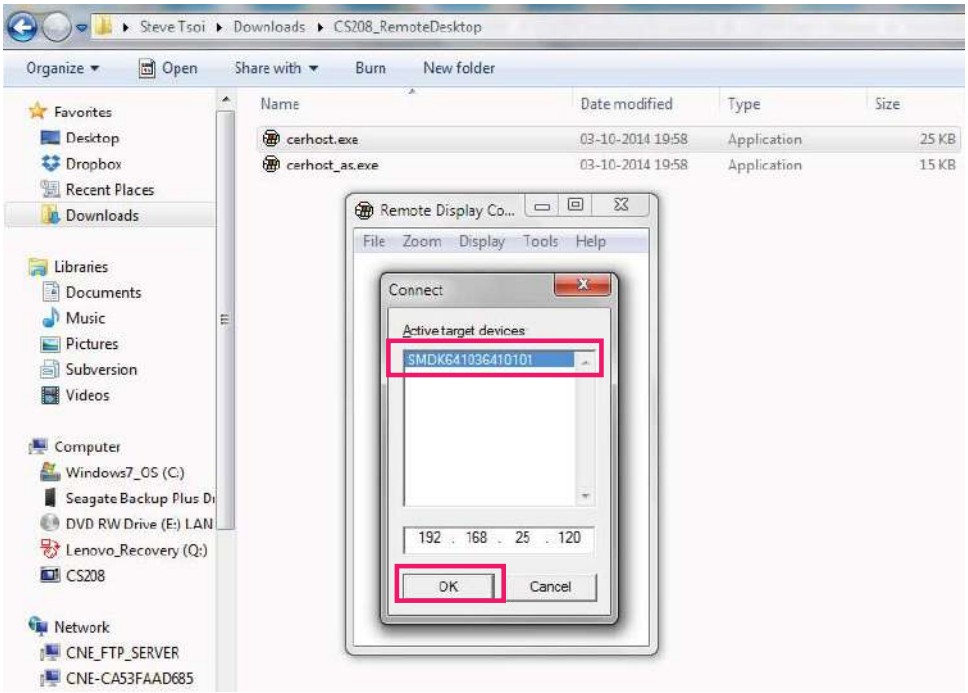


2. In the form "Remote Display Control for Window CE", Choose **"File > Connect…"**.

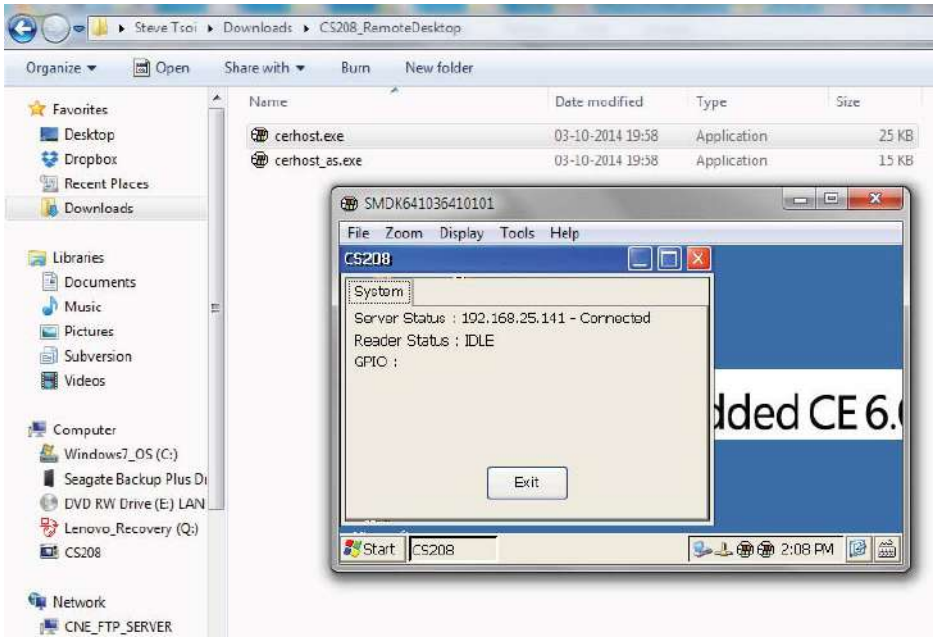


3. Wait several seconds until the active target device is displayed in the list. If no device is found in the list, please check the power of the reader and the Ethernet connection between the reader and the PC.
   Check the IP address of the target reader.

10. Choose the target reader in the list and press "**OK**" to confirm.

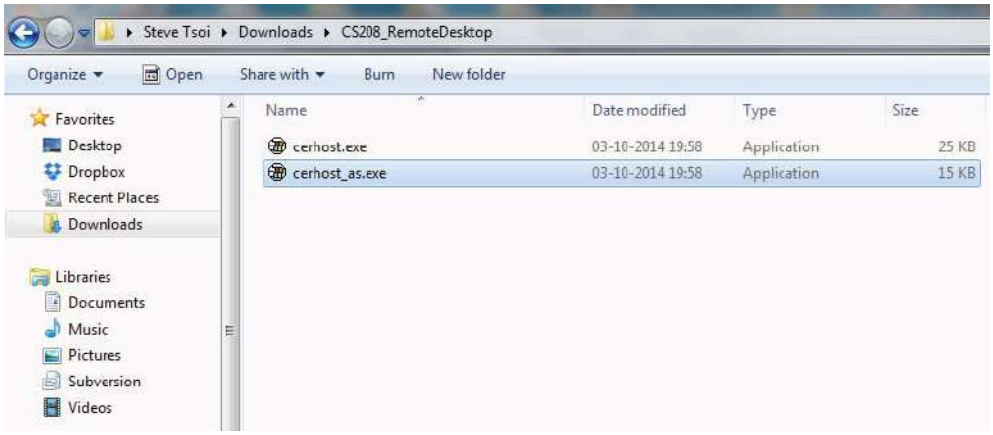


11. The Window CE Desktop of CS208 reader is ready for use.

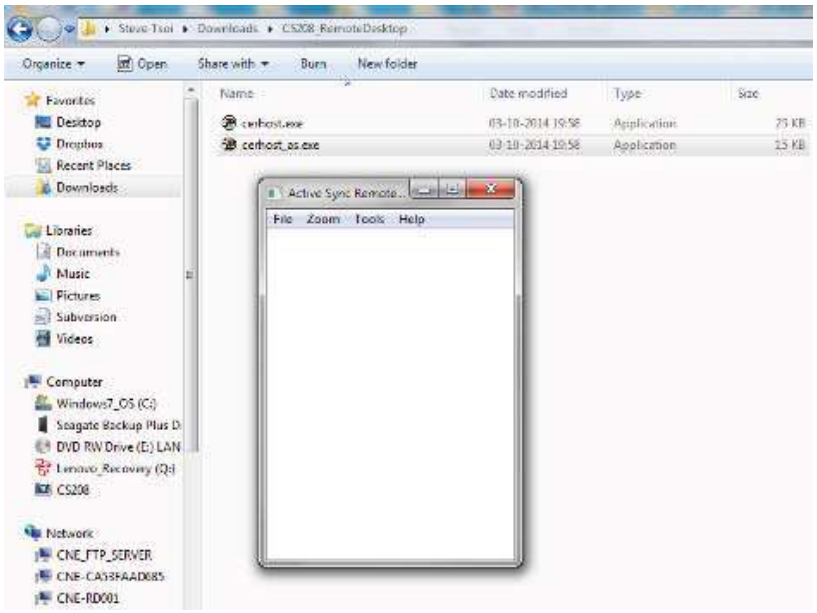


6.2 Remote access Application via USB

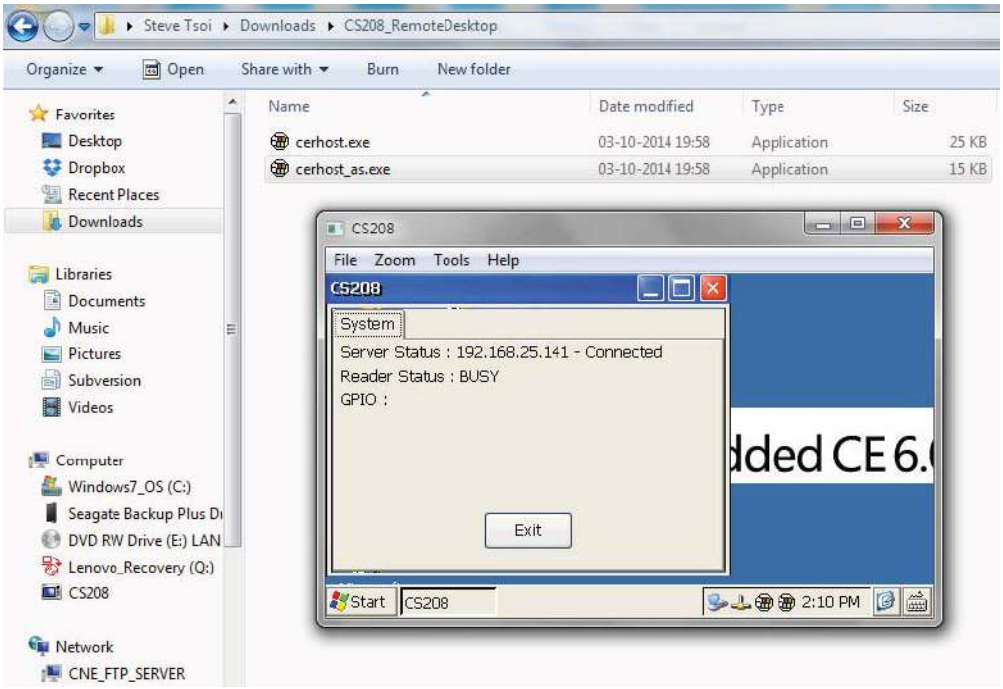
1. Run the Remote Desktop Tool **"cerhost_as.exe"**.



2. The form "**Active Sync Remote Display Control for CS208**" is displayed, wait several seconds.



3. The Window CE Desktop of CS208 reader is ready for use.



7 Software Tools for CS208 setup

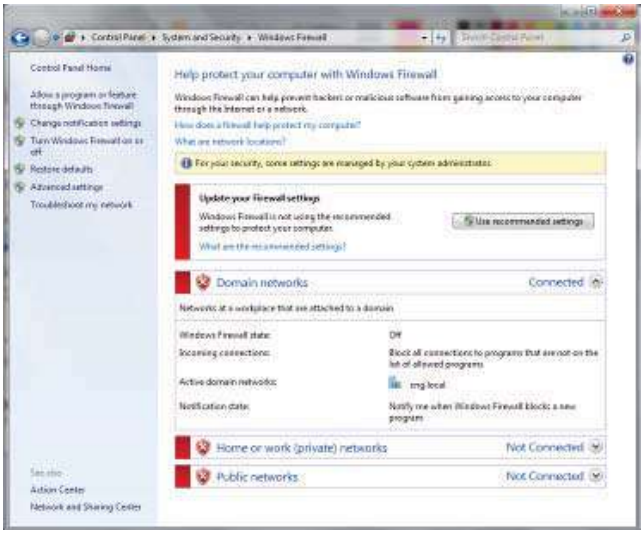
7.1 Wireshark - network protocol analyzer

Wireshark is a network protocol analyzer which can help to capture the IP packet exchanges between the user PC and the RFID reader.

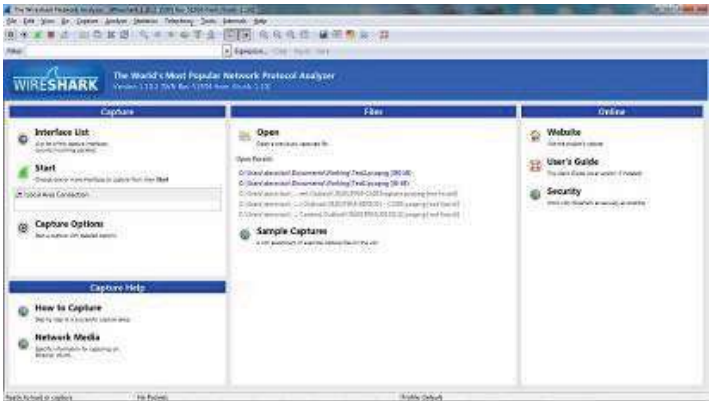
User can download Wireshark from http://www.wireshark.org/download.html. It is a freeware.

Below is the procedure for setting up the diagnosis of IP packet exchanges of the RFID reader:

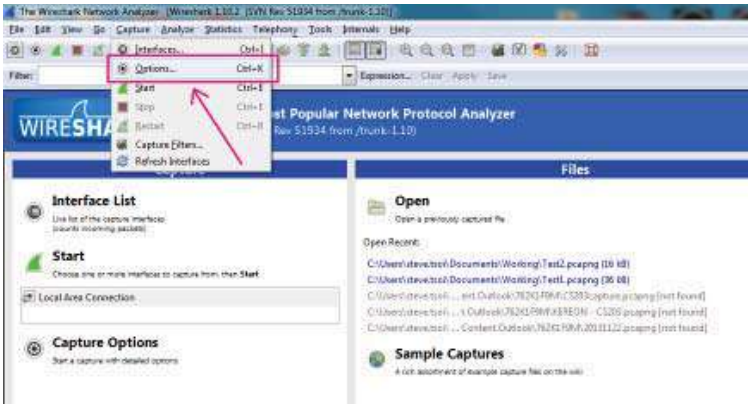
4. Turn off PC Firewall



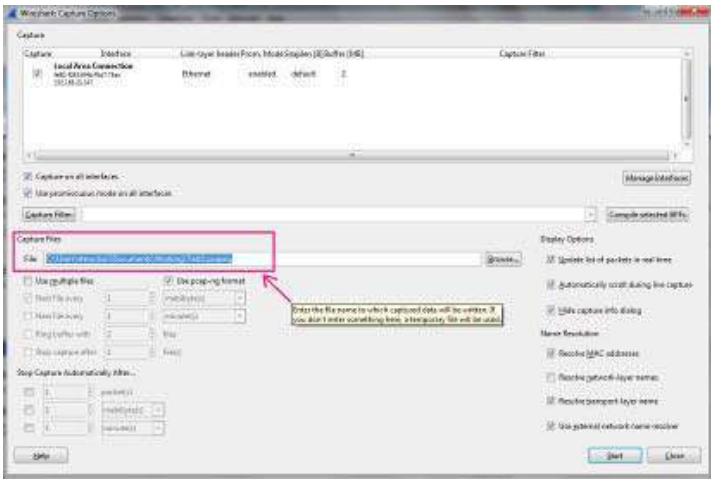
5. Turn on Wireshark capture



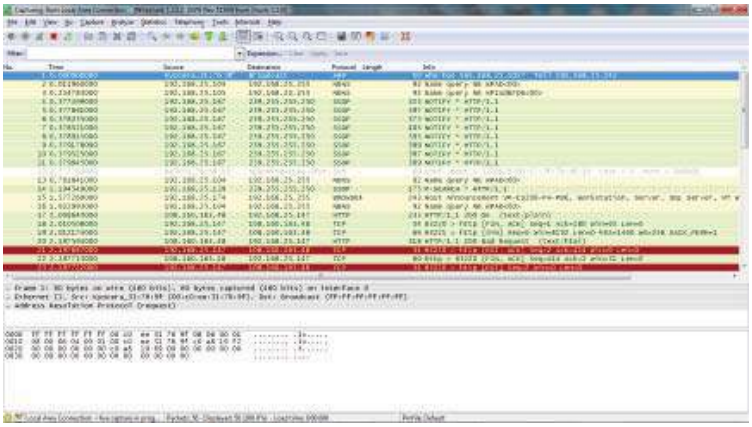
6. Choose **Capture > Options** in the menu bar



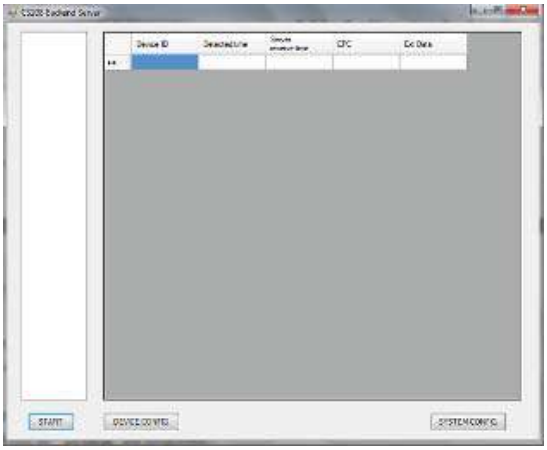
7. In **Options**, set the Capture File destination with filename (*.pcapng). The captured data will be written to the file created.



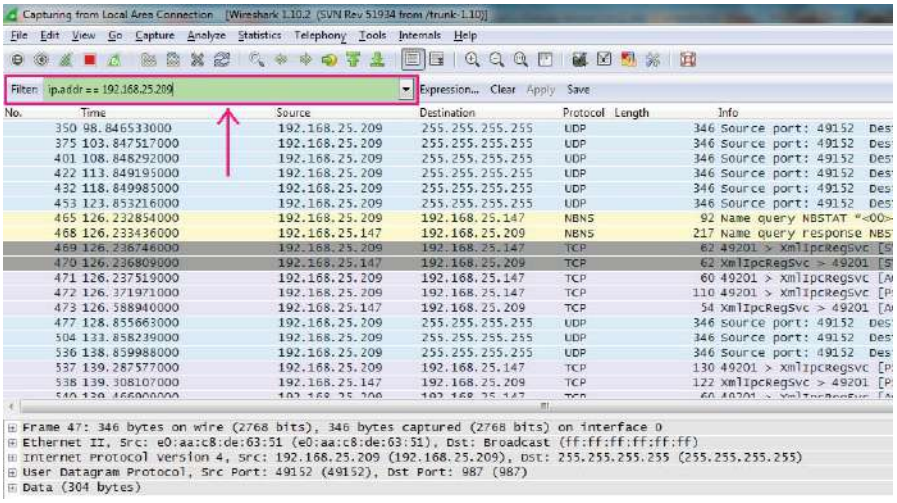
8. Press "Start" button in **Options**. Wireshark starts capture data of IP packet exchanges.



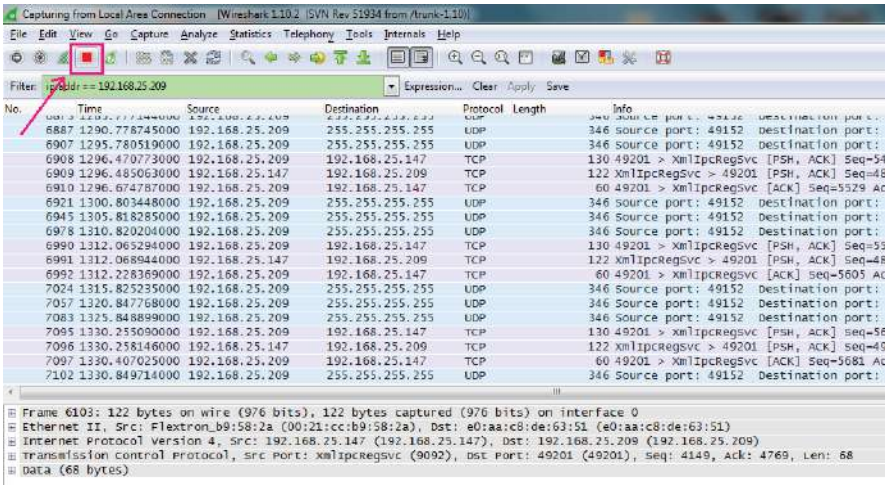
9. Power on RFID Reader. Check the IP of reader is set and recorded before use.
10. Turn on demo app software for CS208 RFID reader (CS208BackendServer.exe).



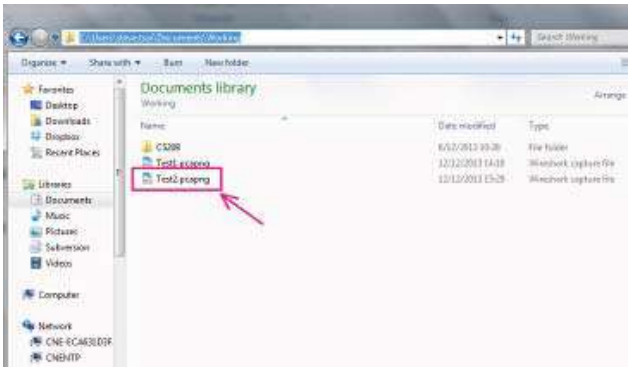
11. In Wireshark, set “ip.addr == 192.xxx.xxx.xxx (CS208 device IP address)” in the Filter box, the IP packet exchanges data record of RFID reader and PC is seen. Column “Source” shows the IP address of RFID reader (IP address = 192.168.25.209 in the example below) and PC (IP address = 192.168.25.147 in the example below).



12. User can press “Stop” icon to stop data capture when necessary.



13. User can find the saved capture file (*.pcapng) in the directory user defined in Step 4.



7.2 Port Forwarding

(To be defined)

8 Regulatory Information

8.1 Federal Communications Commission Interference Statement

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

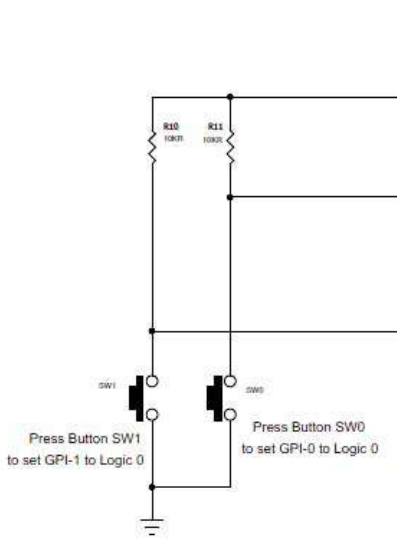
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 1m between the radiator & your body.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter. This product must be installed by a professional technician/installer.

Appendix A. CS208 GPIO Simple Test Circuit

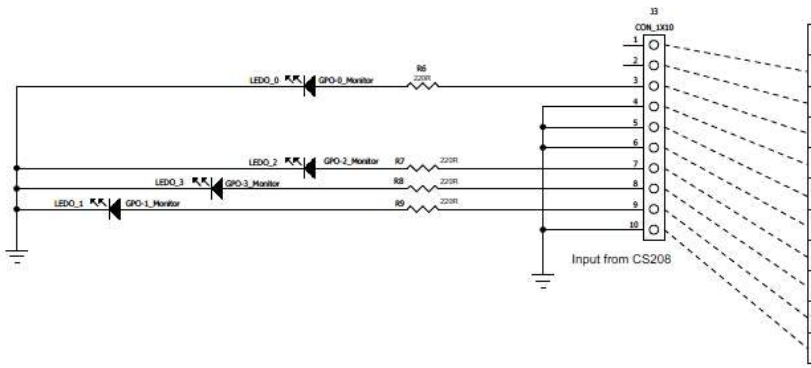
GPI Test Circuit



GPI Cable Configuration

PIN No.	Description	Wire Color
1	+5V	Red
2	NC	Orange
3	GPI-0	Yellow
4	GND	Green
5	GND	Black
6	GND	Blue
7	NC	Purple
8	NC	White
9	GPI-1	Brown
10	NC	Gray

GPO Test Circuit



GPO Cable Configuration

PIN No.	Description	Wire Color
1	+5V	Red
2	NC	Orange
3	GPO-0	Yellow
4	GND	Green
5	GND	Black
6	GND	Blue
7	GPO-2	Purple
8	GPO-3	White
9	GPO-1	Brown
10	GND	Gray

Appendix B. SMS ERROR code list

1 - "Unassigned (unallocated) number"
This cause indicates that the destination requested by the Mobile Station cannot be reached because, although the number is in a valid format, it is not currently assigned (allocated).

8 - "Operator determined barring"
This cause indicates that the MS has tried to send a mobile originating short message when the MS's network operator or service provider has forbidden such transactions.

10 - "Call barred"
This cause indicates that the outgoing call barred service applies to the short message service for the called destination.

21 - "Short message transfer rejected"
This cause indicates that the equipment sending this cause does not wish to accept this short message, although it could have accepted the short message since the equipment sending this cause is neither busy nor incompatible.

27 - "Destination out of service"
This cause indicates that the destination indicated by the Mobile Station cannot be reached because the interface to the destination is not functioning correctly. The term "not functioning correctly" indicates that a signalling message was unable to be delivered to the remote user; e.g., a physical layer or data link layer failure at the remote user, user equipment off-line, etc.

28 - "Unidentified subscriber"
This cause indicates that the subscriber is not registered in the PLMN (i.e. IMSI not known).

29 - "Facility rejected"
This cause indicates that the facility requested by the Mobile Station is not supported by the PLMN.

30 - "Unknown subscriber"
This cause indicates that the subscriber is not registered in the HLR (i.e. IMSI or directory number is not allocated to a subscriber).

38 - "Network out of order"

This cause indicates that the network is not functioning correctly and that the condition is likely to last a relatively long period of time; e.g., immediately reattempting the short message transfer is not likely to be successful.

41 - "Temporary failure"
This cause indicates that the network is not functioning correctly and that the condition is not likely to last a long period of time; e.g., the Mobile Station may wish to try another short message transfer attempt almost immediately.

42 - "Congestion"
This cause indicates that the short message service cannot be serviced because of high traffic.

47 - "Resources unavailable, unspecified"
This cause is used to report a resource unavailable event only when no other cause applies.

50 - "Requested facility not subscribed"
This cause indicates that the requested short message service could not be provided by the network because the user has not completed the necessary administrative arrangements with its supporting networks.

69 - "Requested facility not implemented"
This cause indicates that the network is unable to provide the requested short message service.

81 - "Invalid short message transfer reference value"
This cause indicates that the equipment sending this cause has received a message with a short message reference which is not currently in use on the MS-network interface.

95 - "Invalid message, unspecified"
This cause is used to report an invalid message event only when no other cause in the invalid message class applies.

96 - "Invalid mandatory information"
This cause indicates that the equipment sending this cause has received a message where a mandatory information element is missing and/or has a content error (the two cases are indistinguishable).

97 - "Message type non-existent or not implemented"

This cause indicates that the equipment sending this cause has received a message with a message type it does not recognize either because this is a message not defined or defined but not implemented by the equipment sending this cause.

98 - "Message not compatible with short message protocol state"
This cause indicates that the equipment sending this cause has received a message such that the procedures do not indicate that this is a permissible message to receive while in the short message transfer state.

99 - "Information element non-existent or not implemented"
This cause indicates that the equipment sending this cause has received a message which includes information elements not recognized because the information element identifier is not defined or it is defined but not implemented by the equipment sending the cause. However, the information element is not required to be present in the message in order for the equipment sending the cause to process the message.

111 - "Protocol error, unspecified"
This cause is used to report a protocol error event only when no other cause applies.

127 - "Interworking, unspecified"
This cause indicates that there has been interworking with a network which does not provide causes for actions it takes; thus, the precise cause for a message which is being send cannot be ascertained.

0...127 - Other values in this range are reserved, defined by GSM 04.11 Annex E-2 values

128 - Telematic interworking not supported x
129 - Short message Type 0 not supported x x
130 - Cannot replace short message x x
143 - Unspecified TP-PID error x x
144 - Data coding scheme (alphabet) not supported x
145 - Message class not supported x
159 - Unspecified TP-DCS error x x
160 - Command cannot be actioned x
161 - Command unsupported x
175 - Unspecified TP-Command error x
176 - TPDU not supported x x
192 - SC busy x

193 - No SC subscription x
194 - SC system failure x
195 - Invalid SME address x
196 - Destination SME barred x
197 - SM Rejected-Duplicate SM x
198 - TP-VPF not supported X
199 - TP-VP not supported X
208 - SIM SMS storage full x
209 - No SMS storage capability in SIM x
210 - Error in MS x
211 - Memory Capacity Exceeded X
212 - SIM Application Toolkit Busy x x
255 - Unspecified error cause

128...255 - Other values in this range are reserved, defined by GSM 03.40 subclause 9.2.3.22 values

300 - ME failure
301 - SMS service of ME reserved
302 - operation not allowed
303 - operation not supported
304 - invalid PDU mode parameter
305 - invalid text mode parameter
310 - SIM not inserted
311 - SIM PIN required
312 - PH-SIM PIN required
313 - SIM failure
314 - SIM busy
315 - SIM wrong
316 - SIM PUK required
317 - SIM PIN2 required
318 - SIM PUK2 required
320 - memory failure
321 - invalid memory index
322 - memory full
330 - SMSC address unknown
331 - no network service
332 - network timeout

340 - no +CNMA acknowledgement expected

500 - unknown error

256...511 - Other values in this range are reserved

512... - manufacturer specific

Appendix C. Technical Support

System integrators setting up the CSL CS208 Integrated Reader may encounter some problems. To quickly solve that, they are welcome to send the symptoms and configuration files back to techsupport@convergence.com.hk for support. Please send the following:

1) CS208 Factory Serial Number - best to take a photo of the label at the back of the reader and send the photo to CSL technical support team.
2) Current firmware versions of reader.
3) Current library version on PC side.
4) Brief description of problems.
5) Check Firewall setting in user PC. Turn it off when test RFID reader.
6) Capture the IP packet exchanges using Wireshark (See "5.1 Wireshark - network protocol analyzer"). Save the captured file (*.pcagng) and send to CSL.
7) Screen capture of command window of Control Port and Debug Port.
8) Screen capture of CS208 Back End Server window.
9) Photos of the overall site (if that can be released).

Send the above sets of data to techsupport@convergence.com.hk

Appendix D. RFID Basics

Passive tag RFID technology involves the reader, the antenna and the tag.

The reader sends out energy in the relevant frequency band to the antenna via RF cables, and the antenna radiates the energy out. This energy impinges on an RFID tag.

The RFID tag consists of an antenna coupled to an RFID IC. This IC converts the AC voltage it receives at the antenna port to DC voltage that in turn is used to empower the digital circuit inside.

The digital circuit then turns on and off some components connected to the antenna port, thereby changing its scattering behavior, in a pre-designed clock rate.

This changing of antenna port parameters then causes a “modulation” of the back-scattered RF energy.

This modulated back-scattered energy is detected by the reader and the modulation is captured and analyzed.

Appendix E. Operation Profiles for RFID

Region 2: FCC

Profile	0	1	2	3	4	5
R-T Modulation	DSB-ASK	DSB-ASK	PR-ASK	PR-ASK	DSB-ASK	PR-ASK
Tari (μs)	25.00	12.50	25.00	25.00	6.25	25.00
R-T speed (kbps)	40	80	40	40	160	40
PIE	2:1	2:1	1.5:1	1.5:1	1.5:1	1.5:1
Pulse Width (uS)	12.50	6.25	12.50	12.50	3.13	12.50
T-R LF (kbps)	40	160	250	300	400	250
T-R Modulation	FM0	Miller-2	Miller-4	Miller-4	FM0	Miller-2
Divide Ratio	8	8	64/3	64/3	8	64/3
T-R Data Rate (kbps)	40	80	62.5	75	400	125

Appendix F. RFID channels

Region 2: FCC

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
1	902.75	18	911.25	35	919.75
2	903.25	19	911.75	36	920.25
3	903.75	20	912.25	37	920.75
4	904.25	21	912.75	38	921.25
5	904.75	22	913.25	39	921.75
6	905.25	23	913.75	40	922.25
7	905.75	24	914.25	41	922.75
8	906.25	25	914.75	42	923.25
9	906.75	26	915.25	43	923.75
10	907.25	27	915.75	44	924.25
11	907.75	28	916.25	45	924.75
12	908.25	29	916.75	46	925.25
13	908.75	30	917.25	47	925.75
14	909.25	31	917.75	48	926.25
15	909.75	32	918.25	49	926.75
16	910.25	33	918.75	50	927.25
17	910.75	34	919.25		