

# ARM Cortex A7 Series

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## **Automotive Box-PC 100 / 120, iMX6UL, 500MHz**

PKBA2000 / -1

PKBA2001 / -1

PKBA2002 / -1

PKBA2003 / -1

Version: 04.05.2017

## **Quick Start Guide**

## Release Notes

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Version	Release Date	Notes
1.0	October , 2016	Initial release
1.1	December, 2016	Remove T57 OBDII info

## Disclaimer

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# 1 Precautions

## 1.1 Safety Precautions

In order to use this product safely, please take special note of the following precautions.

- Read all product manuals and related documentation before using this product. Use this product correctly and safely. Follow all warnings.
- If operating or extending this product in a manner not described in this manual, please do so at your own risk. Be sure to fully read this manual and other technical information on our website and proceed safely and responsibly.
- Do not install this product in a place with a lot of water, moisture, dust or soot. This could cause product failure, fire, or an electric shock.
- Some parts of this product generate heat and can reach high temperatures. This may cause burns if it is improperly handled. Do not touch the electronic components or surrounding area while powered on or immediately after being turned off.
- Carry out any design and development only after you have thoroughly read and understood this manual and any other related technical materials on the website or in the data sheets. Test your product thoroughly for reliability and safety.
- This product is not intended for applications that require extremely high reliability, safety, functionality and accuracy: including but not limited to medical equipment, traffic control systems, combustion control systems, and safety equipment. This company is not liable for death or injury if used in such systems.
- This product uses semiconductor components designed for generic electronics equipment such as office automation, communications, measurement equipment and machine tools. Foreign noise or a power surge may cause this product to malfunction or fail.
- To ensure there is no risk of bodily harm or property damage, be sure to take all electrical safety precautions such as protection circuits, limit switches, fuse breakers, or redundant systems. Only use the device after sufficient reliability and safety measures are in place.

## 1.2 Write Prohibited Regions

Data stored by the EEPROM, i.MX6 electrical fuse (e-Fuse) is used by the software contained in this product. Do not write to these regions as this may cause the product stop working correctly. Purposely writing to these regions voids the product warranty.

## 1.3 Warranty

As described in the Product Warranty Policy provided with this product, the main board is covered by a one year replacement warranty starting from the time of purchase. Please note that the other included goods and software are not covered under this warranty. Some knowledge used by DELTA COMPONENTS is provided by third parties, and DELTA COMPONENTS makes no representation or warranty as to the accuracy of such information.

## 2 Overview

The Automotive Box-PC 100/120 is a communication gateway designed for in-vehicle applications or IOT (Internet of Things) applications. They offers some unique features, including the latest NXP iMX6UL (ARM Cortex-A7) application processor, a dual (or quad) band 3G modem and a ublox GPS receiver.

With the latest Linux kernel and tools, the Automotive Box-PC 100/120 allows users to design and deploy custom software for various applications, such as vehicle tracking, fleet management and IOT communication gateway.

### **Features**

- ARM processor / Linux enables quick software development and deployment
- 9-36V wide input voltage range for vehicle application
- Photo-coupled GPIO for vehicle sensor monitoring
- ([optional](#)) Bluetooth interface to support BT-based ([optional](#)) OBD2 module

### **Hardware Specifications**

- NXP iMX6UL ARM Cortex™-A7 core @ 500MHz
- 256MB DDR3 ; 512MB Flash
- 9V-36V DC power input
- ([optional](#)) DC power input with over-voltage protection
- USB 2.0 host port x2 ; USB 2.0 OTG port x1; Micro SD card socket x1
- GPS receiver x1; G-sensor x1; E-compass x1
- 3G (WCDMA) x1; SIM card socket x1
- RS485 port x1; RS232 port x1; CAN bus x1; I<sup>2</sup>C port x1
- Photo coupler GP Input x10; Photo coupler GP Output x2; Analog input x2
- 10/100 Mbps Ethernet (RJ-45) x1
- Audio (MIC and Headphone) ([optional](#))
- 802.11b/g/n Wifi and Bluetooth 4.0 ([optional](#))
- Dimension: 125mm x 147mm x 41mm (L/W/H)

### **Software Specifications**

- Yocto 1.8 (Linux kernel 3.14)

## 2.1 Automotive Box-PC 100/120 Package Contents

Standard package content:

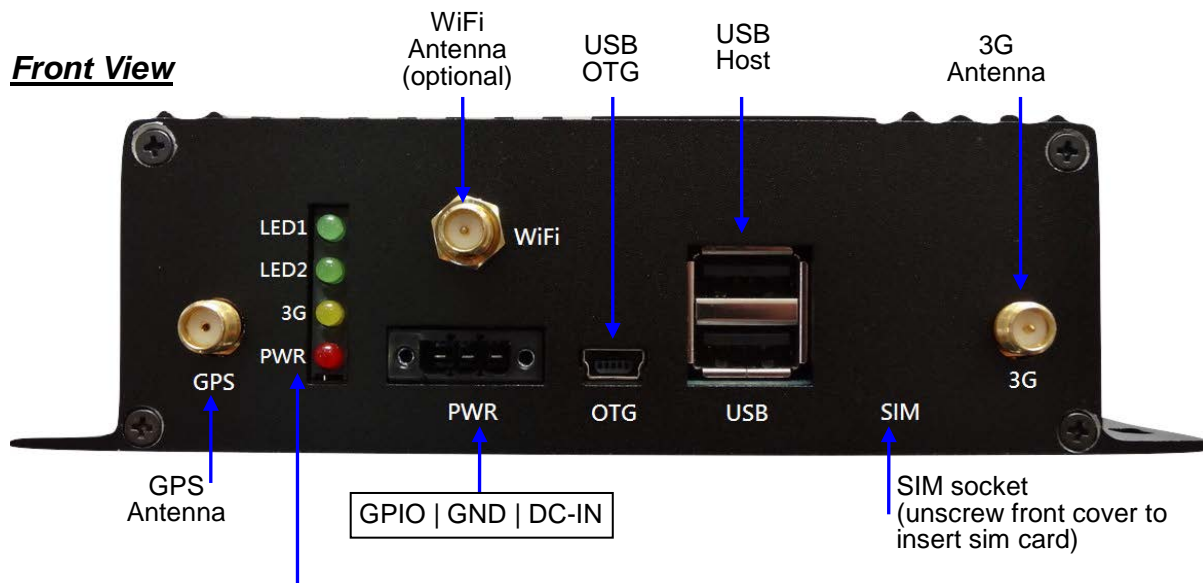
Item	Notes
Automotive Box-PC 100/120	---
CD	Software and User's Manual

Optional items:

Item	Notes
+12V Power adapter	---
WiFi/Bluetooth Module with Antenna	---
GPS Antenna	---
3G Antenna	---
C220 debug board/cables	For Automotive Box-PC 100/120 console, debug port

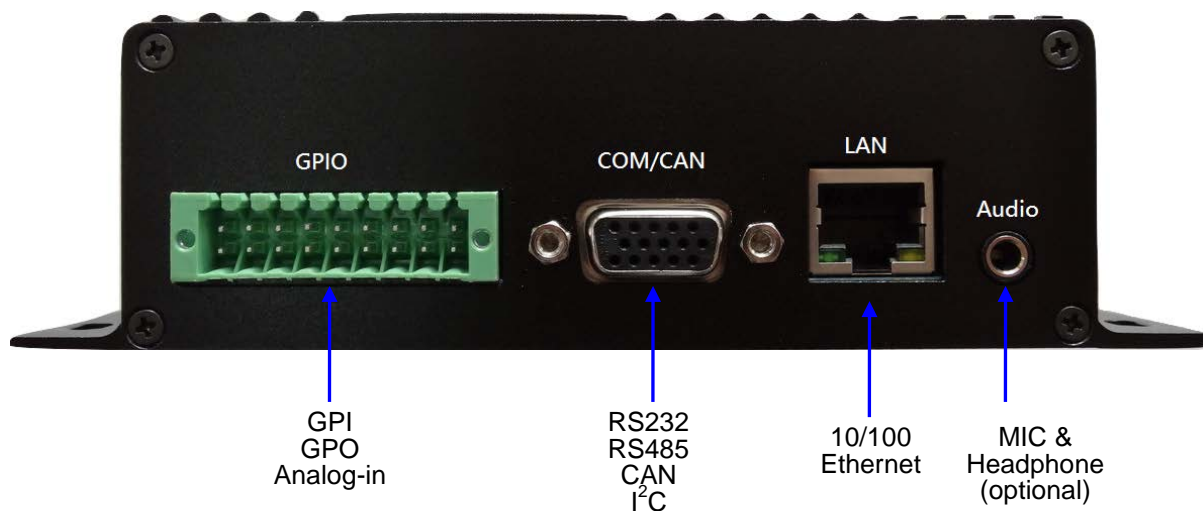
## 2.2 Automotive Box-PC 100/120 Connectors

### Front View



Label	Color	Status
LED1	Green	Can be set on/off by GPIO2_18
LED2	Green	Can be set on/off by GPIO2_19
3G	Yellow	When the device is connected to 3G network, the LED is ON. In searching 3G network, the LED keeps blinking.
PWR	Red	The LED is ON when the device is powered on.

### Rear View



For detailed descriptions of the Automotive Box-PC 100/120 connector functions, please refer to **"Reference Manual"**.



## 3 Automotive Box-PC 100/120 Installation

Automotive Box-PC 100/120 installation is divided into two portions, basic installation and full installation.

You are allowed to perform the following functions after completing basic installation:

- (1). A PC (or a mobile phone, a tablet with WiFi function) is connected to internet through Automotive Box-PC 100/120, and
- (2). A PC (or a mobile phone, a tablet with WiFi function) may communicate Automotive Box-PC 100/120 device manager using browser for enquiring various Automotive Box-PC 100/120 I/O settings, GPS coordinates, etc. For more information about detailed functions of Automotive Box-PC 100/120 device manager, please refer to Appendix A in this manual.

You are allowed to perform the following functions after completing full installation:

- (1). All functions completed under the basic installation
- (2). Automotive Box-PC 100/120 can send information (GPS, I/O, etc.) to remote Server OpenGTS
- (3). Automotive Box-PC 100/120 can read vehicle-related data through OBDII Dongle.

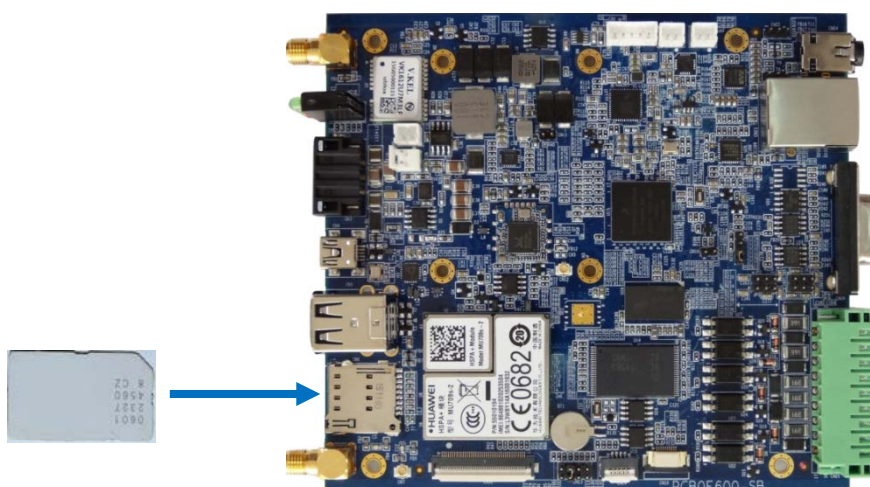
For more information about detailed installation, please refer to “Section 3.1 Basic Installation” and “Section 3.2 Full Installation”.

## 3.1 Basic Installation

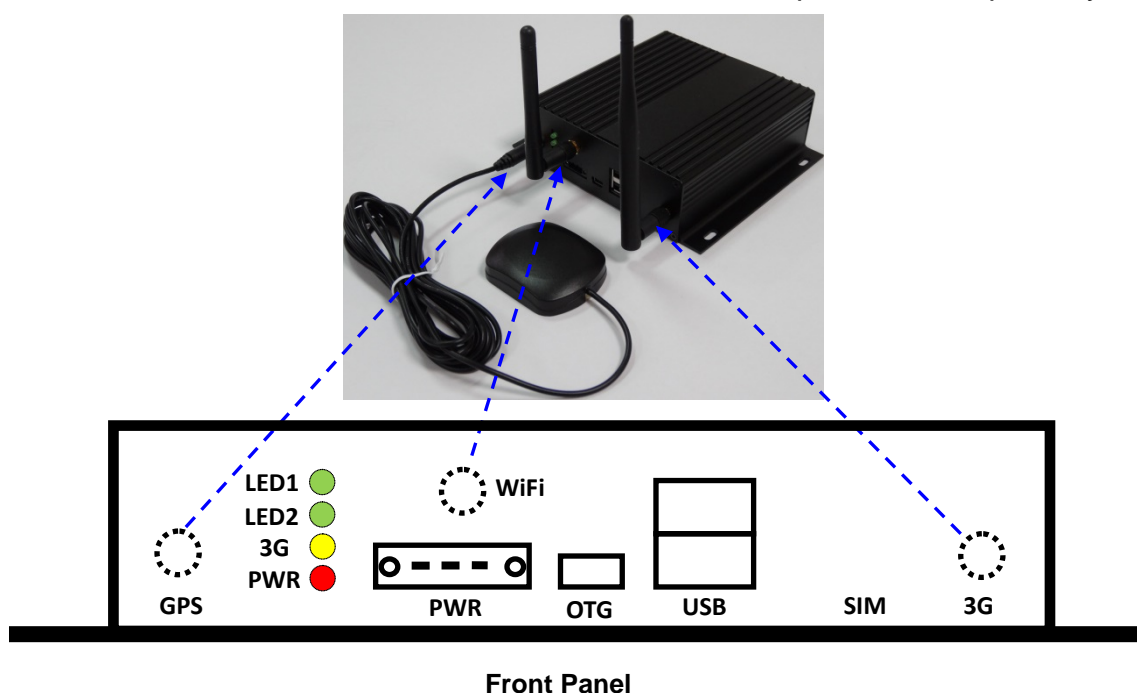
You need to prepare the following devices and accessories before basic installation:

- One Automotive Box-PC 100/120
- One 3G SIM Card
- One network cable and one PC (Windows), or
- One mobile phone/tablet/PC/NB device with WiFi function
  - Note: You have to additionally purchase WiFi module for Automotive Box-PC 100/120 while using a WiFi device to connect to Automotive Box-PC 100/120.

**Step 1 :** Inserting 3G sim card into sim card slot on Automotive Box-PC 100/120 (as shown below):



**Step 2 :** Connecting 3G, Wi-Fi, GPS antennas onto antenna connectors on Automotive Box-PC 100/120 (shown as dashed circles in the figure below). Note: WiFi module, 3G antenna, GPS antenna and WiFi antenna have to be purchased separately.



If you want to:

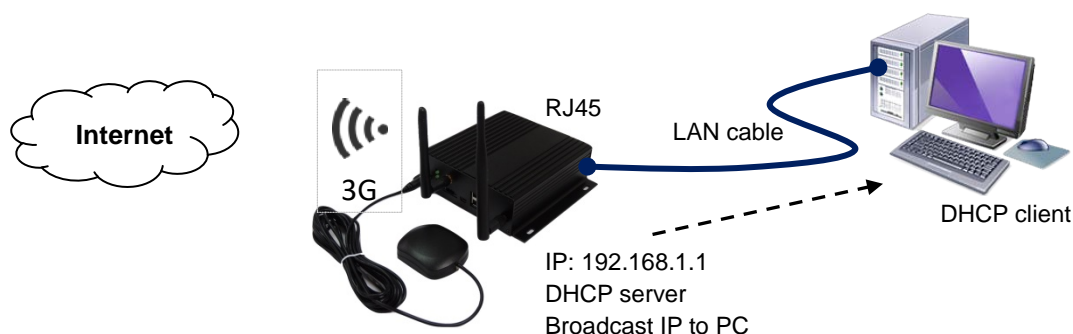
- Connect Automotive Box-PC 100/120 to PC with a network cable, go to **Step 3** ◦
- Connect Automotive Box-PC 100/120 to a mobile phone or tablet with WiFi function, go to **Step 4** ◦

**Step 3** : Connecting one end of a network cable to Automotive Box-PC 100/120 LAN port and connecting the other end to PC LAN port. Connect power line to PWR connector on it.

Note: PC is a DHCP client, and fixed IP setting is not allowed. In PC browser, type <http://192.168.1.1> to connect to Automotive Box-PC 100/120 device manager ◦

Network settings on Automotive Box-PC 100/120:

- Default LAN IP address is 192.168.1.1
- Username: admin & Password: 12345678.
- Automotive Box-PC 100/120 is a DHCP server and it will broadcast an IP address to PC (192.168.1.2 ~ 192.168.1.100).



**Step 4** : Setting the following wireless network settings on an available mobile phone or a tablet with WiFi function:

- WiFi AP SSID name for Automotive Box-PC 100/120: F600-AP
- WiFi frequency : Channel 4
- WPA mode: To activate Automotive Box-PC 100/120 device manager, enter <http://192.168.2.1> on mobile or tablet browser.

browser.

- Default WiFi IP address is 192.168.2.1
- Username: admin & Password: 12345678.
- Automotive Box-PC 100/120 is a DHCP server and it will broadcast an IP address to WiFi phone or tablet (192.168.2.2 ~ 192.168.2.100).



**Note:**

Automotive Box-PC 100/120 Ethernet default IP: 192.168.1.1

Automotive Box-PC 100/120 Ethernet DHCP server IP range: 192.168.1.2 ~ 192.168.1.100

Automotive Box-PC 100/120 WiFi default IP: 192.168.2.1

Automotive Box-PC 100/120 WiFi DHCP server IP range: 192.168.2.2 ~ 192.168.2.100

While connecting to its device manager, you can either type <http://192.168.1.1> or <http://192.168.2.1>. It has two IP addresses (for Ethernet and WiFi, 2 network devices). Two network segments 192.168.1.x and 192.168.2.x are bridged together in Automotive Box-PC 100/120.

**Step 5 :** If you complete above Step1~Step4 you have completed basic installation on Automotive Box-PC 100/120. After entering Automotive Box-PC 100/120 device manager on PC (or a phone or a tablet with WiFi function), you may connect to Internet through 3G modem. For more information about detailed Automotive Box-PC 100/120 device manager functions, refer to Appendix A.

## 3.2 Full Installation

You need to prepare the following devices and accessories before full installation:

- One Automotive Box-PC 100/120
- One 3G SIM Card
- One network cable and one PC (Windows), or
- One mobile phone/tablet/PC/NB device with WiFi function
  - Note: You have to additionally purchase WiFi module for Automotive Box-PC 100/120 while using a WiFi device to connect to Automotive Box-PC 100/120.
- One PC (Windows), which can be installed OpenGTS server software

Before starting full installation, make sure you have successfully completed the basic installation steps described in previous section.

If it is not properly installed, please complete basic installation first.

### ➤ **OpenGTS server Installtion**

Please refer to Appendix B or Appendix C for detailed OpenGTS server installation.

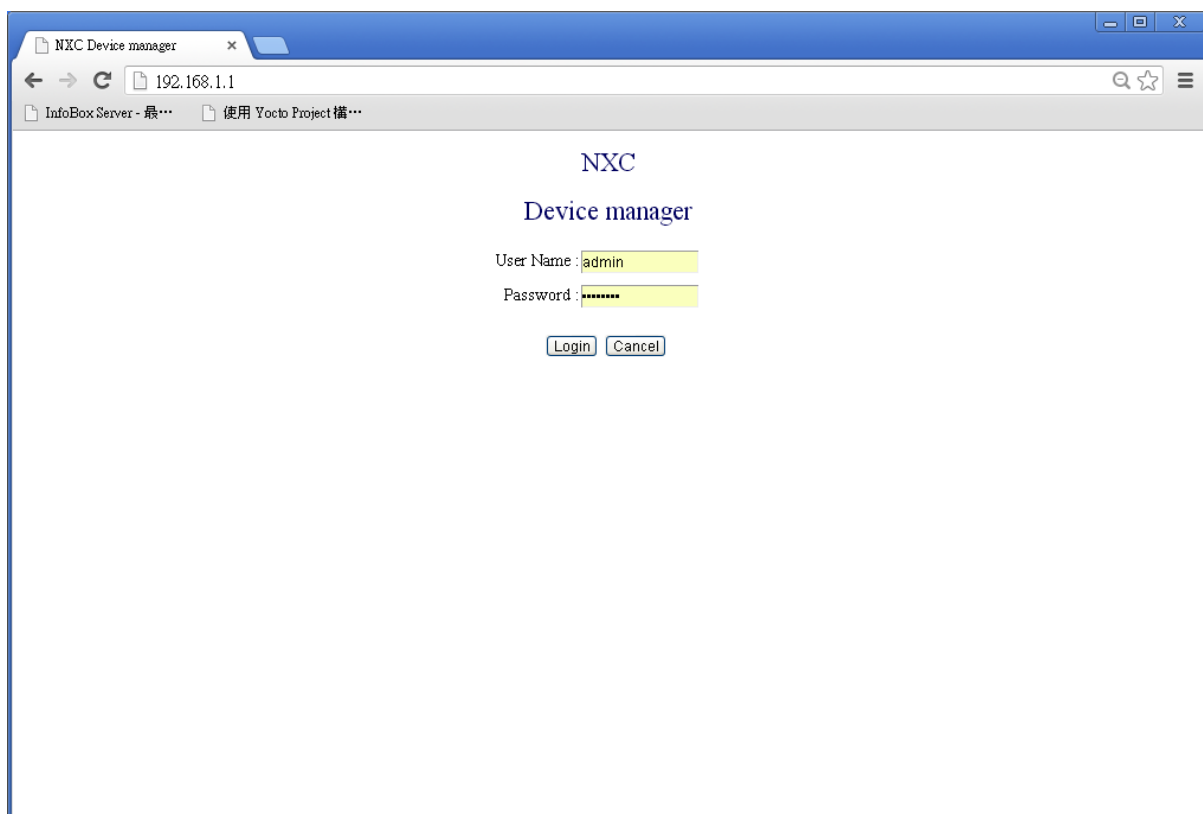
# Appendix A: Device Manager

The default IP address for Automotive Box-PC 100/120 is 192.168.1.1

In your browser's address bar, enter <http://192.168.1.1>.

Enter username & password (default username: admin, password: 12345678), and press Login to log into the system.

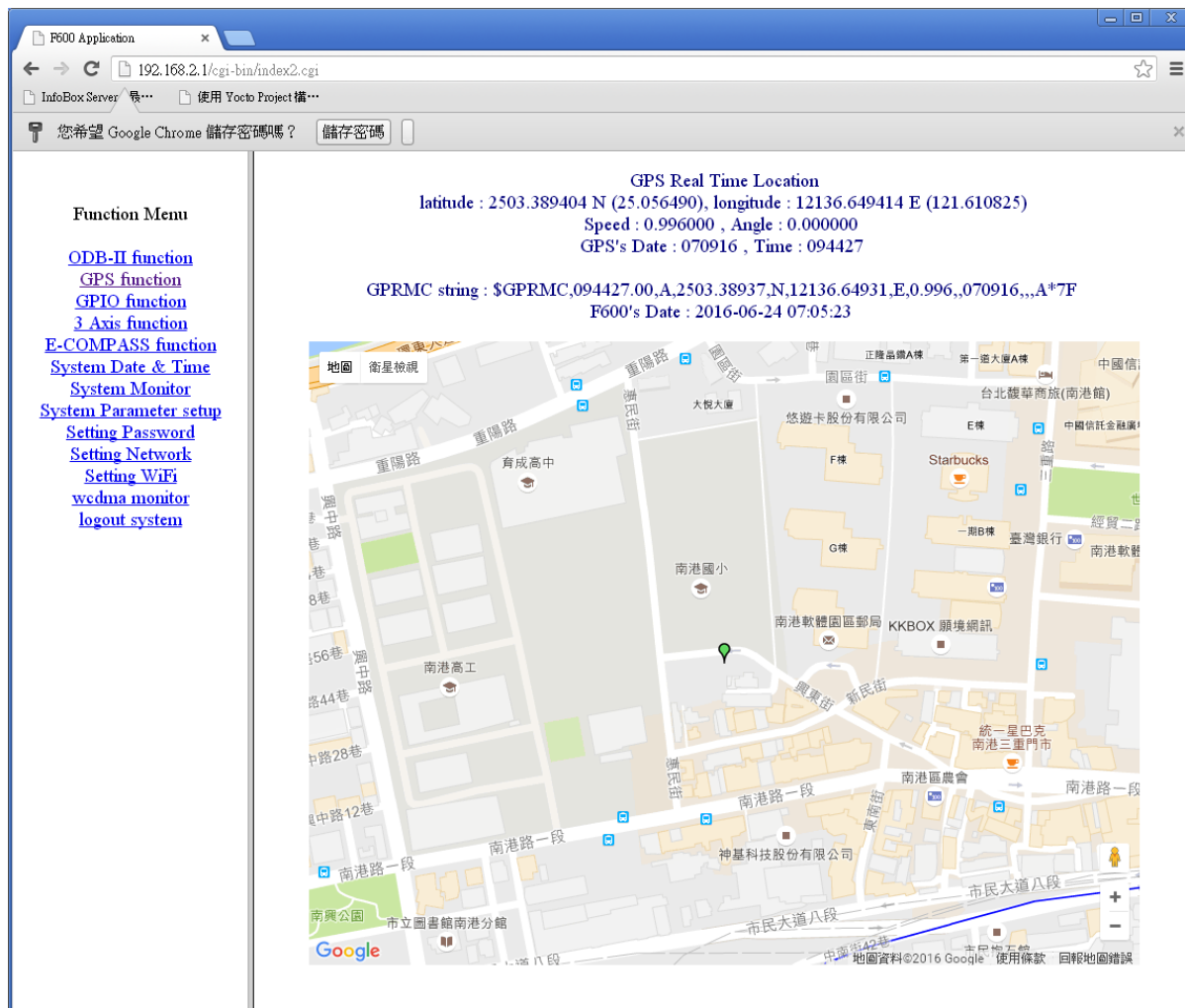
**NOTE: The source code of Automotive Box-PC 100/120 Device Manager is available for your modification after a purchase. For more information, please contact our sales representative.**



## A-1 GPS function

When GPS antenna is connected and with signal quality, Automotive Box-PC 100/120 device manager will display GPS coordinates at 1Hz frequency (refresh coordinates 1 time per second).

Note: The map used in device manager is Google Map. The PC (or mobile phone) must be connected to Internet for browser to show GPS coordinates with Google Map.



The screenshot shows a web browser window titled "F600 Application" displaying the "GPS Real Time Location" page. The page includes a "Function Menu" on the left with links to various system functions. The main content area displays the following information:

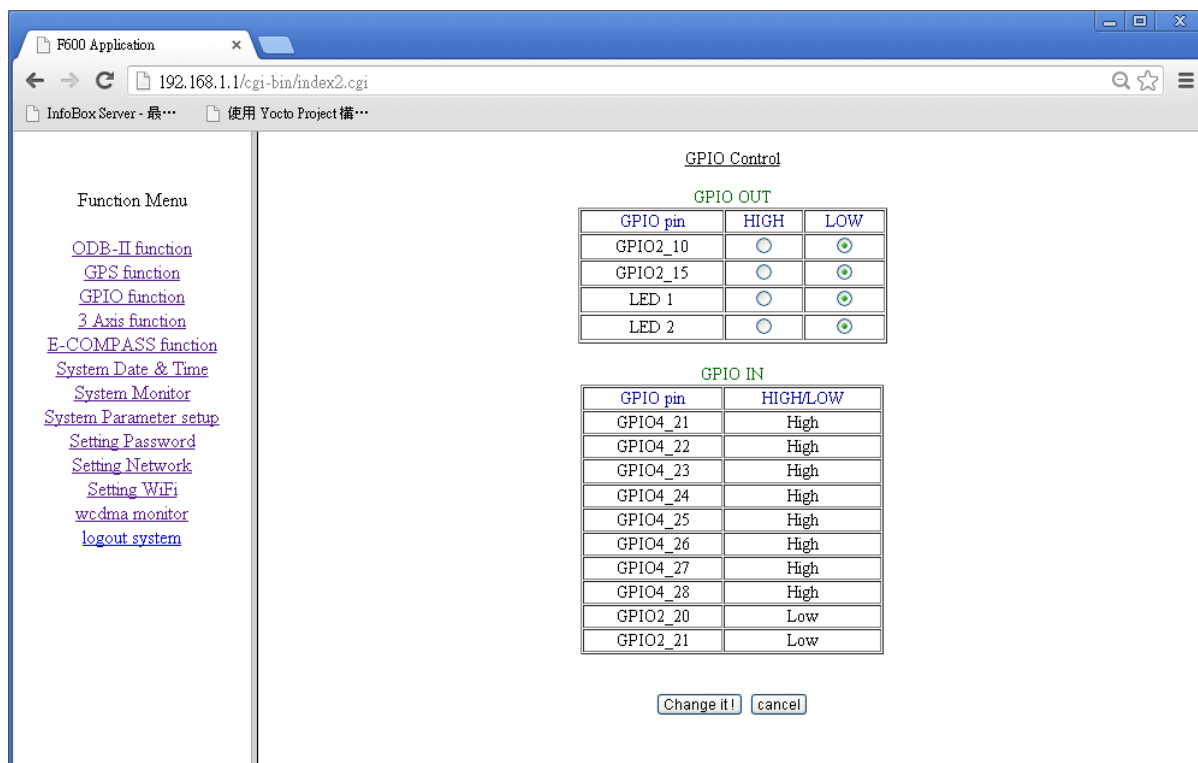
- GPS Real Time Location**
- latitude : 2503.389404 N (25.056490), longitude : 12136.649414 E (121.610825)
- Speed : 0.996000 , Angle : 0.000000
- GPS's Date : 070916 , Time : 094427
- GPRMC string : \$GPRMC,094427.00,A,2503.38937,N,12136.64931,E,0.996,,070916,,,A\*7F
- F600's Date : 2016-06-24 07:05:23

Below the text, a Google Map is displayed, showing the current location marked with a green pin. The map includes labels for various streets and landmarks in the Nantong area, such as "南港路一段", "南港路二段", "南港路三段", "南港路四段", "南港路五段", "南港路六段", "南港路七段", "南港路八段", "南港路九段", "南港路十段", "南港路十一段", "南港路十二段", "南港路十三段", "南港路十四段", "南港路十五段", "南港路十六段", "南港路十七段", "南港路十八段", "南港路十九段", "南港路二十段", "南港路二十一", "南港路二十二", "南港路二十三", "南港路二十四", "南港路二十五", "南港路二十六", "南港路二十七", "南港路二十八", "南港路二十九", "南港路三十", "南港路三十一", "南港路三十二", "南港路三十三", "南港路三十四", "南港路三十五", "南港路三十六", "南港路三十七", "南港路三十八", "南港路三十九", "南港路四十", "南港路四十一", "南港路四十二", "南港路四十三", "南港路四十四", "南港路四十五", "南港路四十六", "南港路四十七", "南港路四十八", "南港路四十九", "南港路五十", "南港路五十一", "南港路五十二", "南港路五十三", "南港路五十四", "南港路五十五", "南港路五十六", "南港路五十七", "南港路五十八", "南港路五十九", "南港路六十", "南港路六十一", "南港路六十二", "南港路六十三", "南港路六十四", "南港路六十五", "南港路六十六", "南港路六十七", "南港路六十八", "南港路六十九", "南港路七十", "南港路七十一", "南港路七十二", "南港路七十三", "南港路七十四", "南港路七十五", "南港路七十六", "南港路七十七", "南港路七十八", "南港路七十九", "南港路八十", "南港路八十一", "南港路八十二", "南港路八十三", "南港路八十四", "南港路八十五", "南港路八十六", "南港路八十七", "南港路八十八", "南港路八十九", "南港路九十", "南港路九十一", "南港路九十二", "南港路九十三", "南港路九十四", "南港路九十五", "南港路九十六", "南港路九十七", "南港路九十八", "南港路九十九", "南港路一百".

## A-2 GPIO function

GPIO OUT can set HIGH/LOW value and output it to GPO pin on Automotive Box-PC 100/120. For example, to enable (turn on) LED 1, select HIGH on device manager and press <Change it> to modify its setting. To disable (turn off) LED 1, select LOW on device manager and press <Change it> to modify its setting.

GPIO IN on device manager can display Automotive Box-PC 100/120 GPIO input values.



The screenshot shows a web browser window titled "F600 Application" with the address bar displaying "192.168.1.1/cgi-bin/index2.cgi". The page content is divided into a left sidebar and a main content area.

**Function Menu (Left Sidebar):**

- [ODB-II function](#)
- [GPS function](#)
- [GPIO function](#)
- [3 Axis function](#)
- [E-COMPASS function](#)
- [System Date & Time](#)
- [System Monitor](#)
- [System Parameter setup](#)
- [Setting Password](#)
- [Setting Network](#)
- [Setting WiFi](#)
- [wcdma monitor](#)
- [logout system](#)

**GPIO Control (Main Content Area):**

**GPIO OUT**

GPIO pin	HIGH	LOW
GPIO2_10	<input type="radio"/>	<input checked="" type="radio"/>
GPIO2_15	<input type="radio"/>	<input checked="" type="radio"/>
LED 1	<input type="radio"/>	<input checked="" type="radio"/>
LED 2	<input type="radio"/>	<input checked="" type="radio"/>

**GPIO IN**

GPIO pin	HIGH/LOW
GPIO4_21	High
GPIO4_22	High
GPIO4_23	High
GPIO4_24	High
GPIO4_25	High
GPIO4_26	High
GPIO4_27	High
GPIO4_28	High
GPIO2_20	Low
GPIO2_21	Low

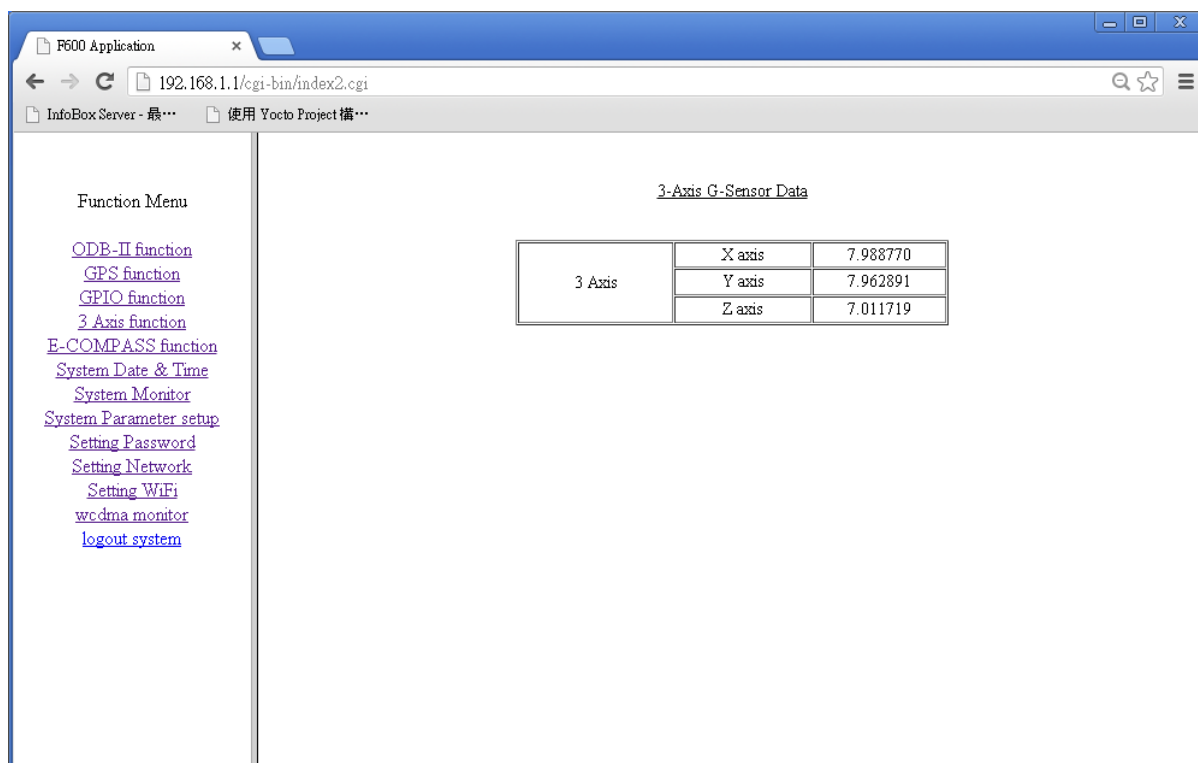
At the bottom of the main content area, there are two buttons: "Change it!" and "cancel".



## A-3 3-Axis G-sensor Data

This function of 3-axis micro accelerator can measure the changes of x, y, z axes based on the gravity.

In case the GPS signal quality is poor and this signal loses GPS navigation ability, the 3-axis information combined with E-compass can be used to establish a complementary azimuth computing system.



The screenshot shows a web browser window titled "F600 Application" with the address bar displaying "192.168.1.1/cgi-bin/index2.cgi". The browser's address bar also shows "InfoBox Server - 最..." and "使用 Yocto Project 構...". The main content area is titled "3-Axis G-Sensor Data" and displays a table with the following data:

3-Axis G-Sensor Data		
3 Axis	X axis	7.988770
	Y axis	7.962891
	Z axis	7.011719

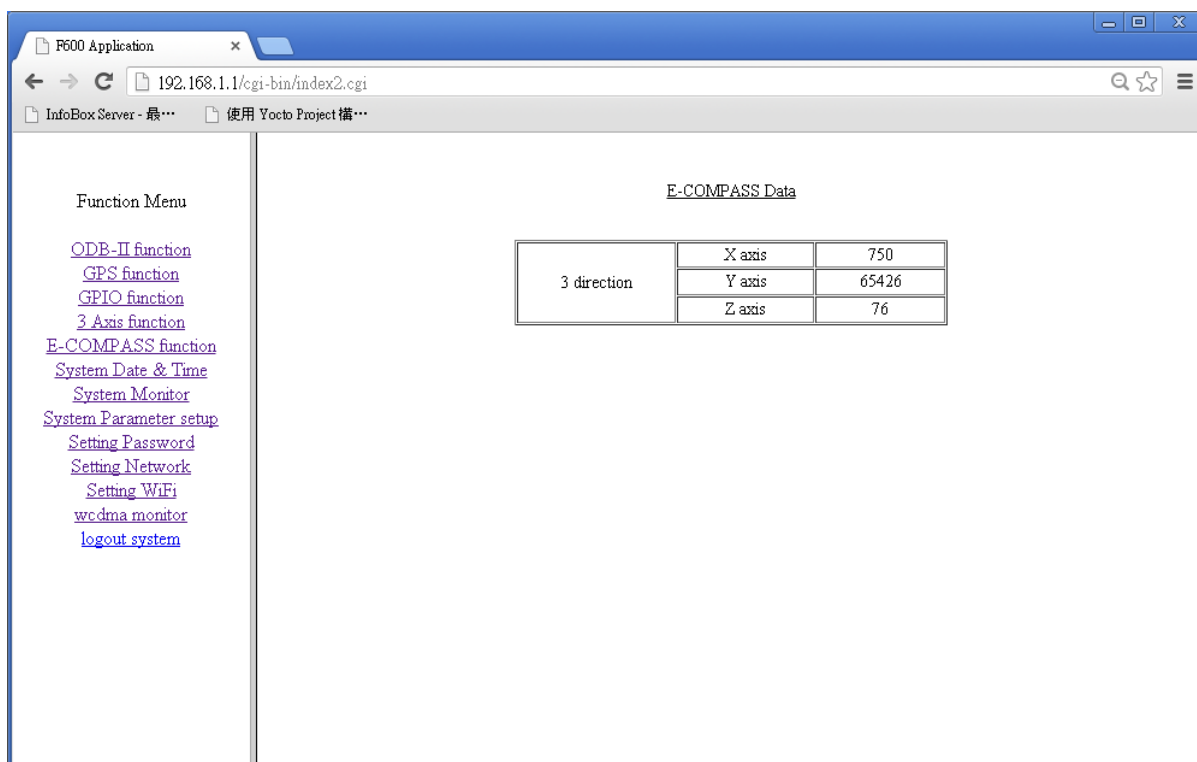
On the left side of the interface, there is a "Function Menu" with the following links:

- [ODB-II function](#)
- [GPS function](#)
- [GPIO function](#)
- [3 Axis function](#)
- [E-COMPASS function](#)
- [System Date & Time](#)
- [System Monitor](#)
- [System Parameter setup](#)
- [Setting Password](#)
- [Setting Network](#)
- [Setting WiFi](#)
- [wcdma monitor](#)
- [logout system](#)

## A-4 E-compass function

This page displays Automotive Box-PC 100/120 on-board E-compass 3-axis (x, y, z) data. E-compass reports the data by measuring the direction of the Earth's magnetic field.

This function can be used to show your present vehicle direction.



The screenshot shows a web browser window titled "F600 Application" with the address bar displaying "192.168.1.1/cgi-bin/index2.cgi". The page has a sidebar menu on the left and a main content area on the right.

**Function Menu**

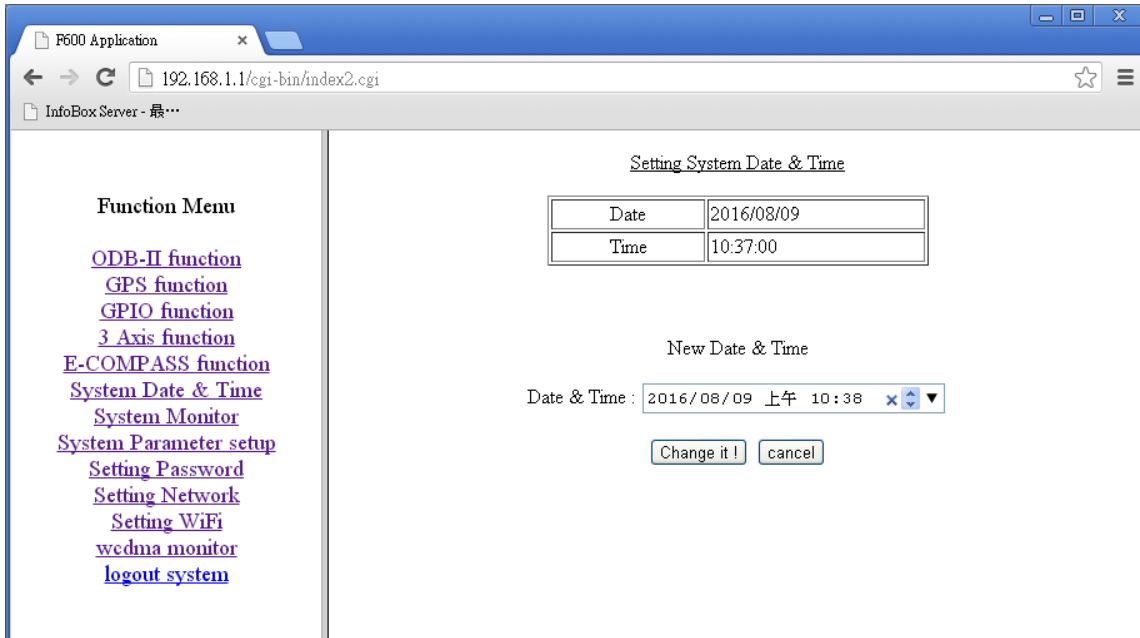
- [ODB-II function](#)
- [GPS function](#)
- [GPIO function](#)
- [3 Axis function](#)
- [E-COMPASS function](#)
- [System Date & Time](#)
- [System Monitor](#)
- [System Parameter setup](#)
- [Setting Password](#)
- [Setting Network](#)
- [Setting WiFi](#)
- [wcdma monitor](#)
- [logout system](#)

**E-COMPASS Data**

3 direction	X axis	750
	Y axis	65426
	Z axis	76

## A-5 System Date & Time

This function allows user to set system date and time. In lower portion of user interface, you may use New Date & Time to set system date and time, and click <Change it> to change the present time to new system date and time.



**Function Menu**

- [ODB-II function](#)
- [GPS function](#)
- [GPIO function](#)
- [3 Axis function](#)
- [E-COMPASS function](#)
- [System Date & Time](#)
- [System Monitor](#)
- [System Parameter setup](#)
- [Setting Password](#)
- [Setting Network](#)
- [Setting WiFi](#)
- [wedma monitor](#)
- [logout system](#)

**Setting System Date & Time**

Date	2016/08/09
Time	10:37:00

**New Date & Time**

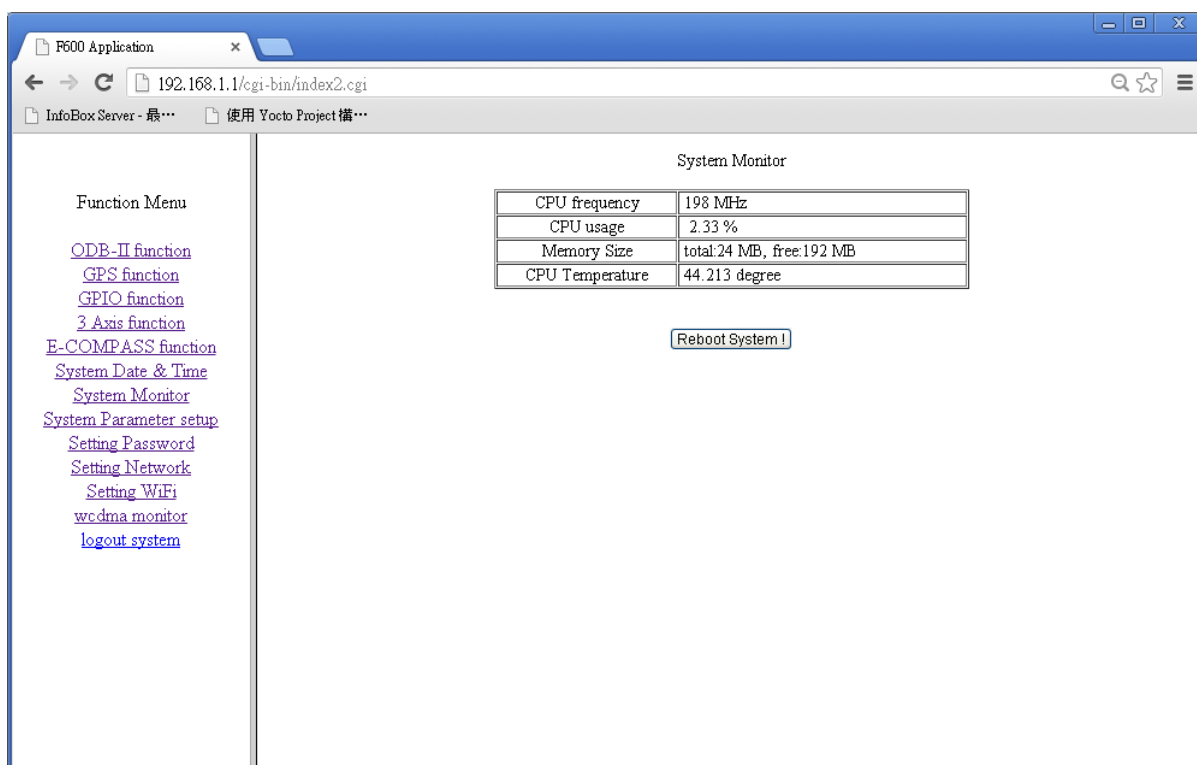
Date & Time : 2016/08/09 上午 10:38

## A-6 System Monitor

This System Monitor function can display current usage of CPU & memory on Automotive Box-PC 100/120.

- CPU frequency: For showing present processor operating frequency
- CPU usage: For showing present processor usage (loading)
- Memory Size
  - Total: For showing total system memory capacity
  - Free: For showing free system memory capacity
- CPU Temperature: For showing present processor temperature

If you need to reboot system, please click <Reboot System > (when you set/update new system parameters or password, use this button to reboot system).



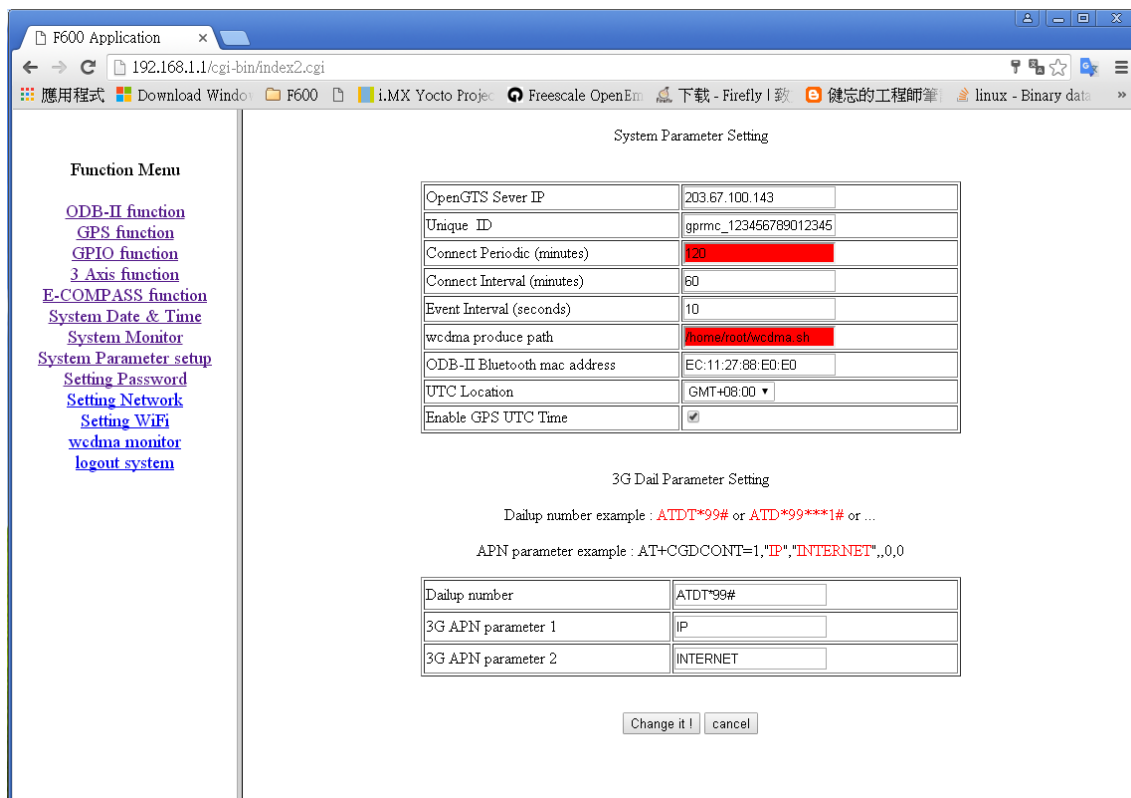
## A-7 System Parameter setup

This function allows you to set some system parameters:

- OpenGTS Sever IP: for setting OpenGTS Server TCP/IP information
- Unique ID: It sets present device ID. User can setup device ID for this device. Do not use the same ID on multiple devices (ID must be UNIQUE).
- Connect Periodic: for showing connection time (in minutes).
- Connect Interval: for setting the connection interval of auto-retry (in minutes).
- Event Interval: It sets the time interval to send event signal to the device (in minutes) , in case the connection is failed.
- WCDMA produce path: for showing a directory storing batch command for 3G connection, and this directory is unchangeable.
- ODB-II Bluetooth MAC address: for setting Bluetooth MAC address of ODBII dongle.
- UTC Location: for setting the current time zone of the device location.
- Enable GTS UTC Time: for using GPS standard time and updating system time after it is checked.
- 3G Dial-up Parameter Setting: for setting 3G dial-up parameters (Note: For more information about APN parameters, please consult your local telecommunication service provide or visit Internet at <http://www.imei.info/faq-apn/> .

After completing all settings, click <Change it> to update system parameter settings.

Note: You MUST reboot your system to activate all parameters.



The screenshot shows the 'System Parameter Setting' web interface. On the left is a 'Function Menu' with links: ODB-II function, GPS function, GPIO function, 3 Axis function, E-COMPASS function, System Date & Time, System Monitor, System Parameter setup (selected), Setting Password, Setting Network, Setting WiFi, wcdma monitor, and logout system. The main area contains two sections: 'System Parameter Setting' and '3G Dial Parameter Setting'.

**System Parameter Setting**

OpenGTS Sever IP	203.67.100.143
Unique ID	gprmc_123456789012345
Connect Periodic (minutes)	120
Connect Interval (minutes)	60
Event Interval (seconds)	10
wcdma produce path	/home/root/wcdma.sh
ODB-II Bluetooth mac address	EC:11:27:88:E0:E0
UTC Location	GMT+08:00
Enable GPS UTC Time	<input checked="" type="checkbox"/>

**3G Dial Parameter Setting**

Dialup number example : ATDT\*99# or ATD\*99\*\*\*1# or ...

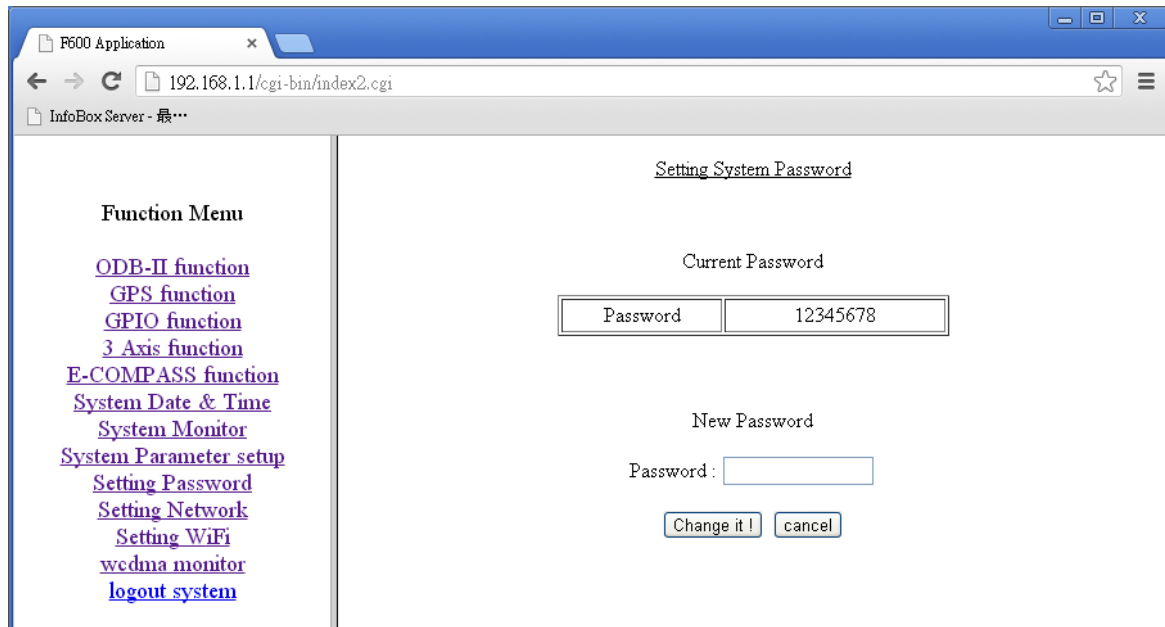
APN parameter example : AT+CGDCONT=1,"IP","INTERNET",0,0

Dialup number	ATDT*99#
3G APN parameter 1	IP
3G APN parameter 2	INTERNET

Buttons: Change it | cancel

## A-8 Setting Password

Enter your new system login password in New Password field, and click <Change it> to update your old password to the new one.



**Function Menu**

- [ODB-II function](#)
- [GPS function](#)
- [GPIO function](#)
- [3 Axis function](#)
- [E-COMPASS function](#)
- [System Date & Time](#)
- [System Monitor](#)
- [System Parameter setup](#)
- [Setting Password](#)
- [Setting Network](#)
- [Setting WiFi](#)
- [wcdma monitor](#)
- [logout system](#)

Setting System Password

Current Password

Password

New Password

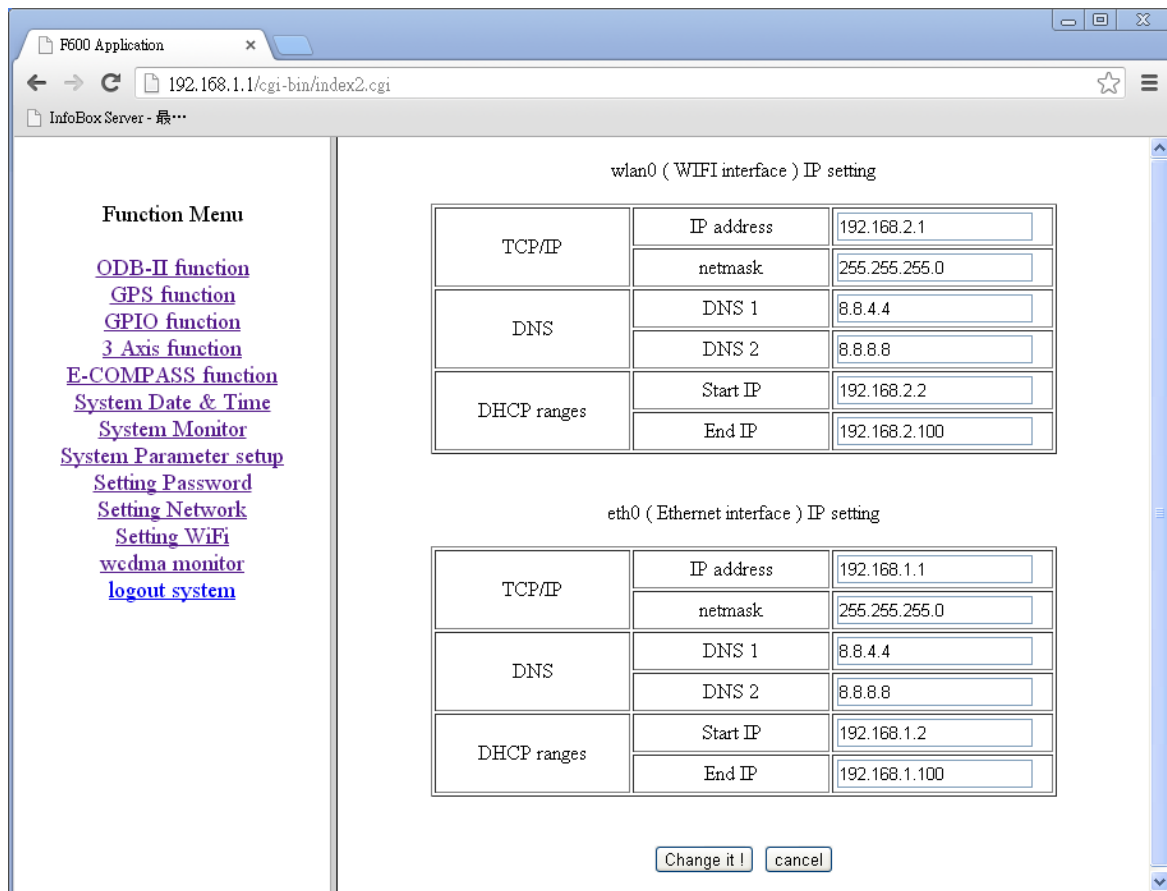
Password :

## A-9 Setting Network

Wlan0(WiFi interface) IP setting: for showing and/or setting present TCP/IP, DNS, DHCP for WiFi network.

Eth0(Ethernet interface) IP setting: for showing and/or setting present TCP/IP, DNS, DHCP for Ethernet.

After completing all network settings, click <Change it> to save them.



The screenshot shows a web browser window titled "F600 Application" with the address bar displaying "192.168.1.1/cgi-bin/index2.cgi". The page content is divided into a left sidebar and a main content area.

**Function Menu (Left Sidebar):**

- [ODB-II function](#)
- [GPS function](#)
- [GPIO function](#)
- [3 Axis function](#)
- [E-COMPASS function](#)
- [System Date & Time](#)
- [System Monitor](#)
- [System Parameter setup](#)
- [Setting Password](#)
- [Setting Network](#)
- [Setting WiFi](#)
- [wcdma monitor](#)
- [logout system](#)

**wlan0 ( WIFI interface ) IP setting**

TCP/IP	IP address	192.168.2.1
	netmask	255.255.255.0
DNS	DNS 1	8.8.4.4
	DNS 2	8.8.8.8
DHCP ranges	Start IP	192.168.2.2
	End IP	192.168.2.100

**eth0 ( Ethernet interface ) IP setting**

TCP/IP	IP address	192.168.1.1
	netmask	255.255.255.0
DNS	DNS 1	8.8.4.4
	DNS 2	8.8.8.8
DHCP ranges	Start IP	192.168.1.2
	End IP	192.168.1.100

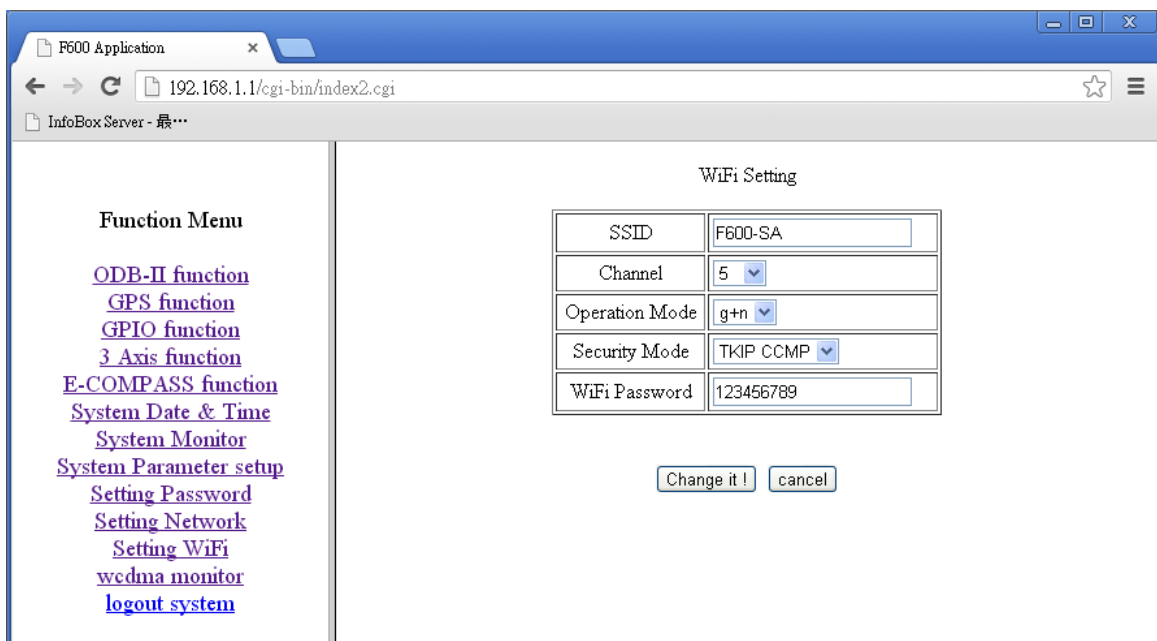
At the bottom of the main content area, there are two buttons: "Change it !" and "cancel".

## A-10 Setting WiFi

WiFi Access Point Parameters Setting:

- SSID: for setting WiFi Access Point name.
- Channel: for setting WiFi channel.
- Operation Mode: WiFi standard/protocol (b/g/n).
- Security Mode: for setting WiFi encryption protocol.
- WiFi Password: for setting WiFi password.

After completing all settings, click <Change it> to update system settings.



The screenshot shows a web browser window titled 'F600 Application' with the address bar displaying '192.168.1.1/cgi-bin/index2.cgi'. The page is titled 'WiFi Setting' and contains a form with the following fields:

SSID	F600-SA
Channel	5
Operation Mode	g+n
Security Mode	TKIP CCMP
WiFi Password	123456789

Below the form are two buttons: 'Change it !' and 'cancel'.

The left sidebar contains a 'Function Menu' with the following links:

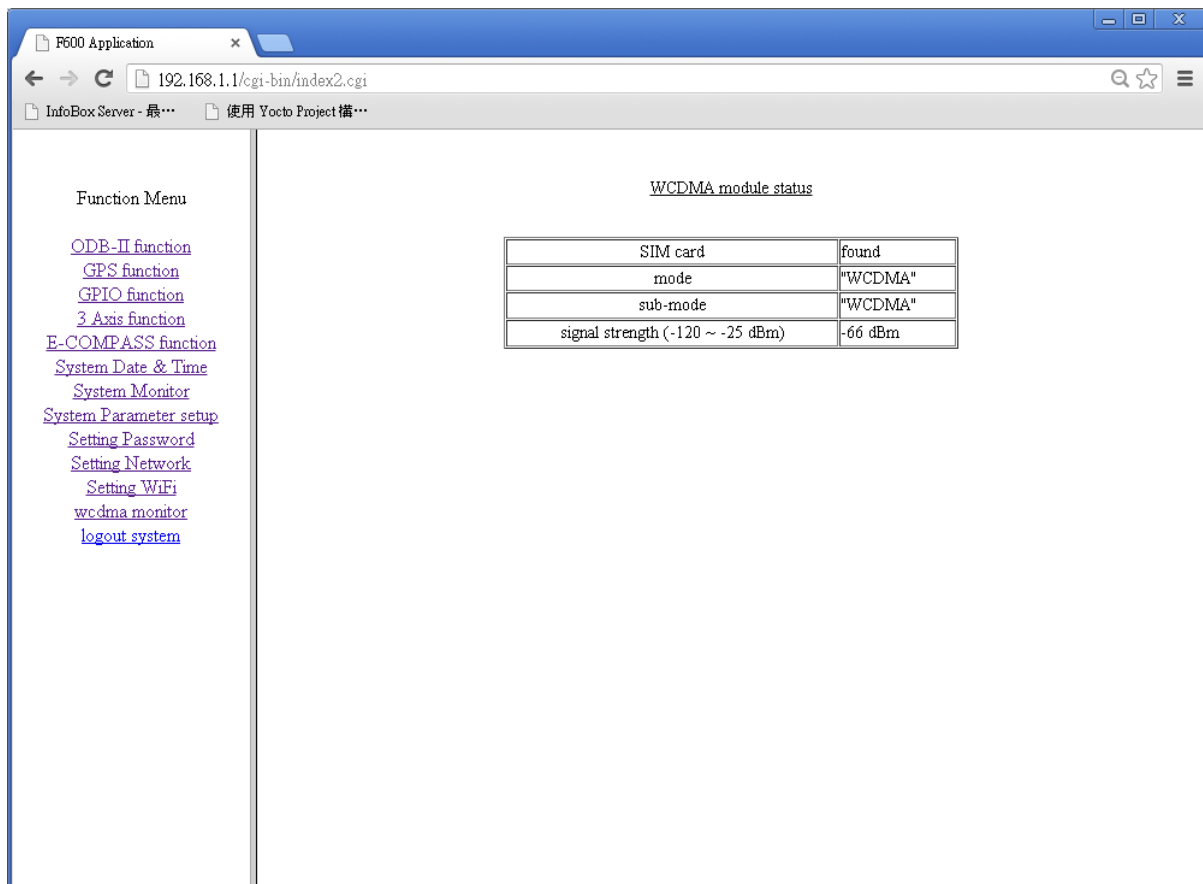
- [ODB-II function](#)
- [GPS function](#)
- [GPIO function](#)
- [3 Axis function](#)
- [E-COMPASS function](#)
- [System Date & Time](#)
- [System Monitor](#)
- [System Parameter setup](#)
- [Setting Password](#)
- [Setting Network](#)
- [Setting WiFi](#)
- [wedma monitor](#)
- [logout system](#)



## A-11 wcdma monitor

This function is to show the status of 3G (GSM/WCDMA) modem.

- SIM card: for showing a message about whether SIM card is detected.
- Mode: for showing SIM card transmission mode for wireless transmission (GSM(2G), WCDMA(3G))
- sub-mode: for showing SIM card transmission mode for wireless transmission (GSM/GPRS/EDGE/HSDPA/HSUPA/HSPA/HSPA+)
- signal strength: for showing 3G connection signal strength.



The screenshot shows a web browser window titled "P600 Application" with the address bar displaying "192.168.1.1/cgi-bin/index2.cgi". The left sidebar contains a "Function Menu" with links: ODB-II function, GPS function, GPIO function, 3 Axis function, E-COMPASS function, System Date & Time, System Monitor, System Parameter setup, Setting Password, Setting Network, Setting WiFi, wcdma monitor, and logout system. The main content area displays the "WCDMA module status" table.

SIM card	found
mode	"WCDMA"
sub-mode	"WCDMA"
signal strength (-120 ~ -25 dBm)	-66 dBm

# Appendix B: OpenGTS Installation (Windows)

OpenGTS is a web server based system created with Java (Open source) so you are required to install a web server (Tomcat). For recording vehicle traveling status, you need to additionally install a MySQL database. Because the web server will connect to MySQL, you need to install MySQL JDBC Driver. OpenGTS has a function to inform user by mail in case of the occurrence of any event so you also need to install Java mail API.

**Note:** OpenGTS software and its trademark are not part of Automotive Box-PC 100/120 products. For more information, visit web site at <http://www.opengts.org/>

## B-1 Hardware Requirements

- 1.) Windows 20XX, Windows vista, Windows 7 or windows 10
- 2.) CPU: Intel i3 or later
- 3.) RAM size: 4G bytes
- 4.) HDD: at least 5G bytes free space

## B-2 Software Requirements

- 1.) Oracle JDK 8 ( Java Compiler for OpenGTS source code )
- 2.) Sun Java Mail API ( mail event to user by OpenGTS system )
- 3.) Apache Ant tool ( Java Build tool for Java Compiler )
- 4.) Apache Tomcat ( Web Server for OpenGTS System )
- 5.) MySQL (Database Server for OpneGTS )
- 6.) MySQL JDBC ( Database driver for Java & Tomcat )
- 7.) OpenGTS

## B-3 Steps to Install OpenGTS

### 1.) Installing Oracle JDK 8

Download : JDK 8 ( jdk-8u91-windows-i586.exe )

Download Link : <http://www.java.com/en/download/manual.jsp>

You simply launch jdk-8u91-windows-i586.exe, and it will start to install JDK & JRE. Before installing, you NEED to create two file folders -- C:\Program File( x86)\Java\jdk1.8.0\_91\ and C:\Program File( x86)\Java\jre1.8.0\_91\, because Ant Tool Build does not allow you to leave them blank while installing.

Setup folders and system parameters:

In Windows desktop, click **Start** → **Programs** → **Accessories** and right click on “**Command Line Tool**”, and select “**Run as Administrator**” to run Windows command line tool. In command line tool, enter below commands:

- md C:\ProgramData\Oracle\Java\javapath\
- cd c:\ProgramData\Oracle\Java\javapath\
- mklink /D JDK “C:\Program File( x86)\Java\jdk1.8.0\_91\”

In Windows desktop, click **Start** → **Setup** → **Console** and click **System** → **Advanced** → **Environment Variable**. In Environment Variable, add a system variable JAVA\_HOME.

Setting this system environment variable as below:

JAVA\_HOME → C:\ProgramData\Oracle\Java\javapath\

## 2.) Installing Sun JavaMail API

Download : javax.mail.jar

Download Link : <http://www.oracle.com/technetwork/java/index-138643.html>

In Windows desktop, click **Start** → **Programs** → **Accessories** and right click on “**Command Line Tool**”, and select “**Run as Administrator**” to run Windows command line tool. Copy javax.mail.jar to the following two file folders:

- copy c:\your download path\ javax.mail.jar C:\Program File(x86)\Java\jdk1.8.0\_91\jre\lib\ext\
- copy c:\your download path\ javax.mail.jar C:\Program File(x86)\Java\jre1.8.0\_91\lib\ext\

## 3.) Installing Apache Ant Build Tool

Download : apache-ant-1.9.4-bin.zip

Download Link : <https://ant.apache.org/bindownload.cgi>

After downloading this archive file, decompress it and all files will be extracted to this folder D:\ apache-ant-1.9.4 (disk D:\ preferred), and also assign D:\ apache-ant-1.9.4\bin to your system variable PATH.

(To change PATH variable, in Windows desktop click **Start** → **Setup** → **Console**, and then click **System** → **Advanced** → **Environment Variables** to edit system variable PATH )

## 4.) Installing Tomcat v7.x (DO NOT install V8 version)

Download : apache-tomcat-7.0.69.exe

Download Link : <https://tomcat.apache.org/download-70.cgi>

After downloading, run apache-tomcat-7.0.69.exe with default configuration option. Disk D:\ is preferred for target installation. After completing installation, you also need to add system variable.

In Windows desktop, click **Start** → **Setup** → **Console** and then click **System** → **Advanced** → **Environment Variables**.

In system environment variables, add a system variable CATALINA\_HOME. Set the system environment variable CATALINA\_HOME to D:\Tomcat 7.0

## 5.) Installing MySQL v5.X.X

Download : mysql-essential-5.1.45-winx64.msi

Download Link : <http://dev.mysql.com/downloads/mysql/> or <http://www.eisafe.com/safe/x64/>

After downloading, simply run mysql-essential-5.1.45-winx64.msi. During installation, be sure to click checkbox to set PATH for MySQL bin (for MySQL executable files).

## 6.) Installing MySQL JDBC Driver

Download : mysql-connector-java-5.1.38.zip

Download Link : <https://dev.mysql.com/downloads/connector/j/>

After downloading & unzipping, in Windows desktop click **Start** → **Programs** → **Accessories** and right click on “**Command Line Tool**” and select "Run as Administrator" to enter command line tool. Copy mysql-connector-java-5.1.38-bin.jar to the following two folders:

- ① C:\Program File(x86)\Java\jdk1.8.0\_91\jre\lib\ext\
- ② C:\Program File(x86)\Java\jre1.8.0\_91\lib\ext\

## 7.) Installing and Compiling OpenGTS

Download : OpenGTS\_2.6.1.zip

Download Link : <http://www.opengts.org/>

After downloading, unzip the file and extract them to folder D:\OpenGTS\_2.6.1 (disk D:\ preferred).

In Windows desktop, click **Start** → **Setup** → **Console** and click **System** → **Advanced** → **Environment Variables**.

In system environment variables, add a system variable GTS\_HOME.

Set this system environment variable GTS\_HOME to D:\OpenFTS\_2.6.1

Before compiling, verify all environment variables again to make sure they are all correct (including path setting):

- ① JAVA\_HOME
- ② ANT\_HOME

- ③ CATALINA\_HOME
- ④ GTS\_HOME

To starting your compilation, click windows **Start** → **Programs** → **Accessories** in Windows desktop and click on **"Command Prompt"** and select "Run as Administrator" to open a command prompt, and type the following commands:

```
C:\> D:
D:\> cd OpenGTS_2.6.1
D:\ OpenGTS_2.6.1> ant all
```

The following files will be created under the "build" folder if commands are properly executed:

- ① "lib/gtsutils.jar" – This jar contains the base utilities and db access tools.
- ② "lib/gtsdb.jar" – This jar contains the database access utilities and table definition.
- ③ "lib/gtsdmtp.jar" – This jar contains the SQL db data store wrappers around the OpenDMTP server.
- ④ "lib/tools.jar" – This jar contains miscellaneous system check and administrative tools.
- ⑤ "track.war" – This "war" file (web-archive) contains the web-interface 'Track' servlet.
- ⑥ "events.war" – This "war" file contains the web accessible EventData access servlet.
- ⑦ "mologogo.war" – This "war" file contains the Mologogo device servlet.
- ⑧ "gc101.war" – This "war" file contains support for the Sanav GC-101 device.
- ⑨ "gprmc.war" – This "war" file contains a servlet support server for a generic http-based device server.

## 8.) Initializing OpenGTS in MySQL Database

Creating a database on OpenGTS, and its name is gts.

In the folder D:\OpenGts\_2.6.1, execute the following command:

```
bin\initdb.bat "-rootUser:root" "-rootPass:userPass"
(userPass: use your own password, for example. bin\initdb.bat
"-rootUser:root" "-rootPass:icn" , password is icn)
```

MySQL Server should be running now. If not, you should manually launch it

and thus a database gts and the following data tables will be created:

- ① **Account** - Account owner table
- ② **User** - User table
- ③ **UserAcl** - User Access-Control-List table
- ④ **Device** - Device information table
- ⑤ **EventData** - Received Event data
- ⑥ **Geozone** - Geozone/Geofence definitions
- ⑦ **EventTemplate** - Custom event packet templates (DMTP only)
- ⑧ **PendingPacket** - Packets pending transmission to device (DMTP only)

Checking Your Installation Status:

In the folder D:\OpenGts\_2.6.1, execute the following command:

```
bin\checkInstall.bat
```

Creating Administrator Account on OpenGTS:

In the folder D:\OpenGts\_2.6.1, execute the following command to create administrator account:

```
bin\admin.bat Account -account:sysadmin -pass:password --create  
(Set the administrator password at -pass , e.g. bin\admin.bat Account  
-account:sysadmin -pass:test --create , password is test)
```

## 9.) Installing \*.war to Tomcat sever

In D:\OpenGts\_2.6.1\build folder, execute the following commands:

```
copy *.war D:\Tomcat 7.0\webapps  
(*war including track.war, events.war, gprmc.war)
```

If any event occurs and you must send out a notification mail, you should find SMTP settings in the file D:\OpenGTS\_2.6.1\config.conf and then change it to your SMTP server IP and launch ant all (compile.opengts) to copy \*.war to the folder D:\Tomcat 7.0\webapps.

## 10.) Testing OpenGTS server

To test OpenGTS on the local server (the PC installed with OpenGTS), type either one of the following two URL address in browser:

<http://localhost:8080/track/Track> or <http://127.0.0.1:8080/track/Track>

You will see the OpenGTS login screen. In Account field, enter your account,

and in Password field, enter your password  
(Account and Password are created by executing the command  
bin\admin.bat Account -account:sysadmin -pass:password –create).

# Appendix C: OpenGTS Installation (Linux)

**Note:** OpenGTS is used as a demonstration server to work with Automotive Box-PC 100/120. It is not part of this product. Please check below link for more information on OpenGTS: <http://www.opengts.org/>

## C-1 Host Computer

Setup a Linux host computer with the following minimum software and hardware requirements:

- Ubuntu version 12.04 or later
- 120GB hard drive free space (for X11 backend)

## C-2 OpenGTS Installation procedures

- Install ubuntu 10.04 server + LAMP + Java Tomcat  
    sudo aptitude update  
    sudo aptitude safe-upgrade
- Remove apparmor  
    sudo /etc/init.d/apparmor stop  
    sudo update-rc.d -f apparmor remove  
    sudo aptitude remove apparmor apparmor-utils
- Install package  
    sudo aptitude install binutils cpp fetchmail flex gcc libarchive-zip-perl libc6-dev  
    libcompress-zlib-perllibdb4.6-dev libpcre3 libpopt-dev lynx m4 make ncftp  
    nmap openssl perl perl-modules unzip zip zlib1g-dev autoconf automake1.9  
    libtool bison autotools-dev g++ build-essential
- Edit /etc/mysql/my.cnf  
    bind-address = 127.0.0.1 → #bind-address = 127.0.0.1
- Edit /etc/apache2/mods-available/dir.conf  
    DirectoryIndex index.html index.htm index.shtml index.cgi index.php  
    index.php3 index.pl index.xhtml



```
sudo a2enmod ssl
sudo a2enmod rewrite
sudo a2enmod suexec
sudo a2enmod include
sudo a2enmod dav_fs
sudo a2enmod dav
sudo /etc/init.d/apache2 restart
```

- Disable ruby

```
sudo vi /etc/mime.types
#application/x-ruby
/etc/init.d/apache2 restart
```

- Install Perl modules

```
sudo aptitude install libhtml-parser-perl libdb-file-lock-perl libnet-dns-perl
libnetaddr-ip-perl libarchive-tar-perl
```

- Add & Install repository and Java

```
sudo apt-get install python-software-properties
sudo add-apt-repository "deb http://archive.canonical.com/ lucid partner"
sudo apt-get update
```

- Install java open-jdk-6

```
sudo apt-get install default-jdk
```

- Setup Tomcat

```
vi /etc/tomcat6/tomcat-users.xml
add following line :
<role rolename="manager"/>
<role rolename="admin"/>
<user username="admin" password="admin" roles="admin,manager"/>
```

- Install ANT

```
sudo apt-get install ant
```

- Setup environment

```
add following line to /etc/environment :
export JAVA_HOME=/usr/lib/jvm/java-6-openjdk
export ANT_HOME=/usr/share/ant
export CATALINA_HOME=/usr/share/tomcat6
```

```
export GTS_HOME=/usr/local/OpenGTS
```

- Setup mysql JDBC

```
wget -c
http://dev.mysql.com/get/Downloads/Connector-J/mysql-connector-java-5.1.18.tar.gz
tar xzvf mysql-connector-java-5.1.18.tar.gz
sudo cp mysql-connector-java-5.1.18-bin.jar $JAVA_HOME/jre/lib/ext/
sudo ln -s /usr/local/OpenGTS_2.6.0 /usr/local/OpenGTS
```

- Download OpenGTS :

```
Download OpenGTS from http://www.opengts.org/
unzip OpenGTS_2.6.0.zip
sudo cp OpenGTS_2.6.0 /usr/local
```

- Then we **ant** all files and deploy **track.war** file.

```
ant all
ant track.war
use tomcat manager to deploy:
(assuming your PC IP address is 192.168.200.150)
http://192.168.200.150:8080/manager/html
deploy path /var/lib/tomcat6/webapps
```

- Initialize OpenGTS database

```
cd /usr/local/OpenGTS_2.6.0/bin
./initdb.sh -rootUser=root -rootPass=root
(Note: -rootPass is root password, you can change it if you want)
```

- Create Admin account

```
./admin.sh Account -account=admin --create
./admin.sh Account -account=admin --edit
./admin.sh Account --list
```

- Setup link

```
cd /usr/local
sudo ln -s $JAVA_HOME java
sudo ln -s $CATALINA_HOME tomcat
sudo ln -s $GTS_HOME gts
```

- Run Device server

```
bin/runserver.sh -s gtsdmt
```

- Show java process  
\$GTS\_HOME/bin/psjava
- Installing "events.war"  
ant events  
use tomcat manager to deploy  
(assuming your PC IP address is 192.168.200.150)  
<http://192.168.200.150:8080/manager/html>
- HTTP Based Device Communication Servers (using the "gprmc" servlet)  
Building the "gprmc" Servlet:  
ant gprmc  
use tomcat manager to deploy  
(assuming your PC IP address is 192.168.200.150)  
<http://192.168.200.150:8080/manager/html>
- List running task  
\$GTS\_HOME/bin/psjava

## C-3 Change OpenGTS map provider to Google Map

edit build/track/WEB-INF/private.xml

Apply **google map API key** from Google.

Find <MapProvider name="openLayers"> tag

```
active="${Domain.MapProvider.active=false}"  
??/span>
```

...

```
<MapProvider name="googleMaps"  
  active="${Domain.MapProvider.active=true}"  
  class="org.opengts.war.maps.jsmap.GoogleMaps"  
  key="${Domain.MapProvider.key=AlzaSyBc1Y4npcHdkkQYT1NopchLcu-N  
  RMgcrfl}"  
  rtPropPrefix="Domain.MapProvider.">
```

Then rebuild track and deploy again.