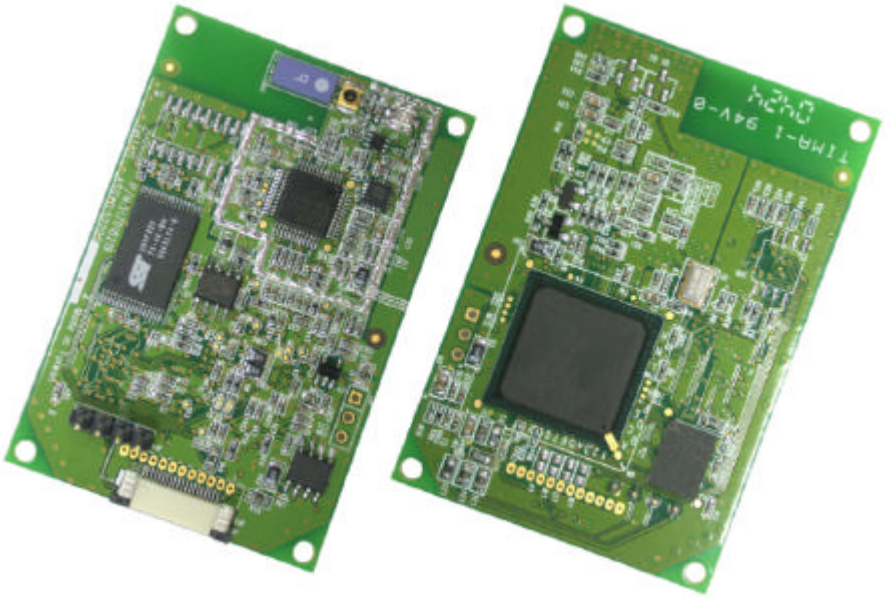
S103
WLAN Compact Serial Module

OEM Installation Guide



Version 1.0

WARNING - Disclaimer

Do not use this device in applications for which any failure of the wireless link or any data error may cause death, injury or damage of any kind.

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Statement of Conditions

The content described in this manual may be improved or changed at any time and it is subject to be changed without notice.

Manufacturer assumes no responsibility for errors contained herein or for direct, indirect, special, incidental or consequential damages with the furnishing, performance, or use of this manual or equipment supplied with it, even if manufacturer of its suppliers have been advised of the possibility of such damages.

Electronic Emission Notices

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.
2. This device will accept any interference received, including interference that may cause undesired operation.

FCC Radio Frequency 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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user need to correct the interference at his area. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Plug the equipment into an outlet that is on a different circuit from the television or radio.
- Change the direction of the television or radio antenna until the interference disappears.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.

To assure continued compliance, any changes or modifications not expressly approved by manufacturer could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

This device and its antenna must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End users must be provided with specific operating instructions for satisfying RF exposure compliance.

Regulatory information / Disclaimers

Installation and use of this Wireless LAN device must be in strict accordance with the instructions included in the user documentation provided with the product. Any changes or modifications (including the antenna) made to this device that are not expressly approved by manufacturer may void the user's authority to operate the equipment. The manufacturer is not responsible for any radio or television interference caused by unauthorized modification of this device, or the substitution or attachment of connecting cables and equipment other than manufacturer specified. It is the responsibility of the user to correct any interference caused by such unauthorized modification, substitution or attachment. Manufacturer and its authorized resellers or distributors will assume no liability for any damage or violation of government regulations arising from failing to comply with these guidelines.

Modular Approval

This device is intended only form OEM integrators under the following conditions:

1) **The antenna must be installed such that 20cm is maintained between the antenna and users, and**
2) **The transmitter module may not be co-located with any other transmitter or antenna.**

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in devices where the antenna may be installed such that 20 cm may be maintained between the antenna and users The final end product must be labeled in visible area with the following:

"Contains TX FCC ID: PB6-04051¨

End Product Manual Information

The user manual for end users must include the following information in a prominent location

“IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.”

Limited Warranty

This product is warranted by manufacturer to be free from defects in material and workmanship for one (1) year from the date of purchase unless otherwise stated.

During this period if this product is found to be defective in material or workmanship, manufacturer or one of its authorized service facilities will at its option either repair or replace this product without charge, subject to the following conditions, limitations and exclusions:

- This warranty extends to the original consumer purchaser only and is not assignable or transferable.
- This warranty shall not apply to any product which has been subjected to misuse, abuse, abnormal use, negligence, alteration or accident, or has had its serial number altered or removed.
- This warranty does not apply to any defects or damage directly or indirectly caused by or resulting from the use of unauthorized replacement parts and/or service performed by unauthorized personnel.
- This warranty does not apply to the software driver that accompanies this product.

This warranty is made expressly in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability of fitness for a particular purpose, and all other obligations on the part of Manufacturer provided, however, that if the disclaimer of implied warranties is ineffective under applicable law, the duration of any implied warranties arising by operation of law shall be limited to one (1) year from the date of purchase or such longer period as may be required by applicable law.

Manufacturer hereby disclaims any and all liabilities for consequential and incidental damages arising out of or in connection with any breach of this warranty or any other claim with respect to this product, including but not limited to claims of negligence, strict liability in tort or breach of contract.

**Statement:

The radio portion of this module has not been shielded. The module will be installed in the OEM device only. OEM integrator should apply FCC certification after the module installed to OEM device for meet FCC rules.

Table of Contents

1. Introduction

Thank you for purchasing this 802.11b WLAN serial module (hereafter we call this product as **The Module**).

The Module is designed for embedded into device that uses battery power and has very limited space. **The Module** will replace the device's RS232 cable that connects to host PC. Via IP network compatible wireless connection, **The Module** transfers byte stream between device and host PC. **The Module** is compliant with 802.11b protocol standard. It can operate at ad-hoc mode or infrastructure mode, and support 64/128-bits WEP security. The design goal for **The Module** is to provide an OEM embedded device with compact and small size, easy to use and low power consumption.

1.1 Features:

- Programmable baud rate (9600, 38400, 57600, 115200 bps)
- Full-duplex (serial data in, and serial data out)
- Hardware flow control
- Firmware upgrade through RS232 port
- Supports full mobility and seamless roaming from cell to cell
- Easy set up via Console or Desktop Utility
- LED status and activity indicators for easy installation, monitoring and diagnostics
- Link to WLAN Access Point (referred as infrastructure mode)
- Link to another WLAN station (referred as "ad hoc" mode)

1.2 Application

The Module provides the RS232 to WLAN converting function (Figure 1-1. For the device (especially the device) that needs to replace the RS232 cable with WLAN, **The Module** is the right choice.

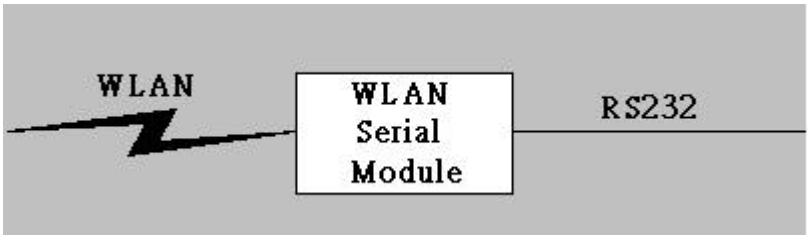


Figure 1-1 RS232 to WLAN conversion

The following figure (Figure 1-2) shows the traditional RS232 connection.

Figure 1-2 Tradition RS232 Connection

Few typical RS232 replacement (with WLAN) examples are shown in Figure 1-3 to Figure 1-6.

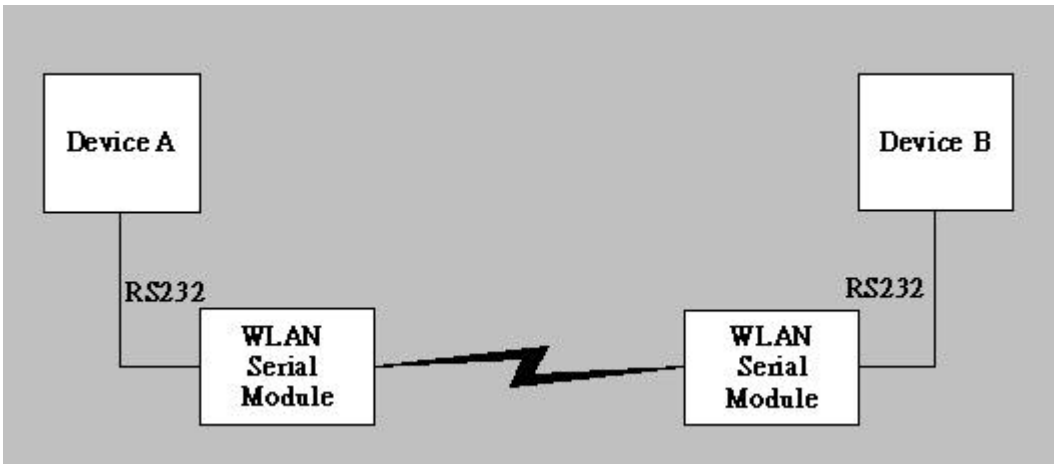


Figure 1-3 WLAN Pear to Pear connection

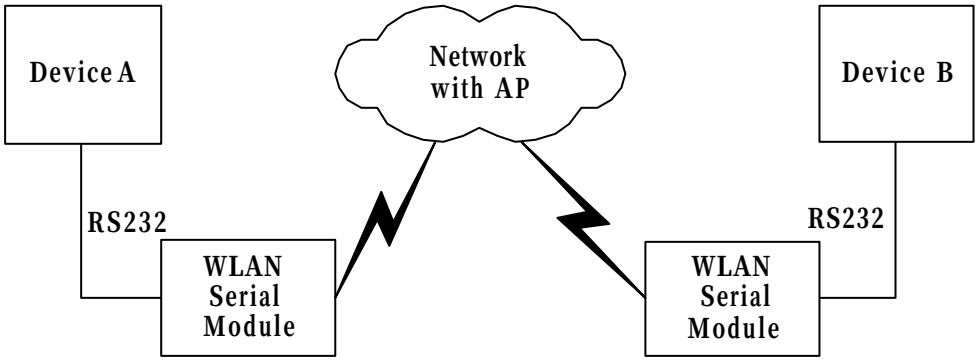


Figure 1-4 Two WLAN connections via AP

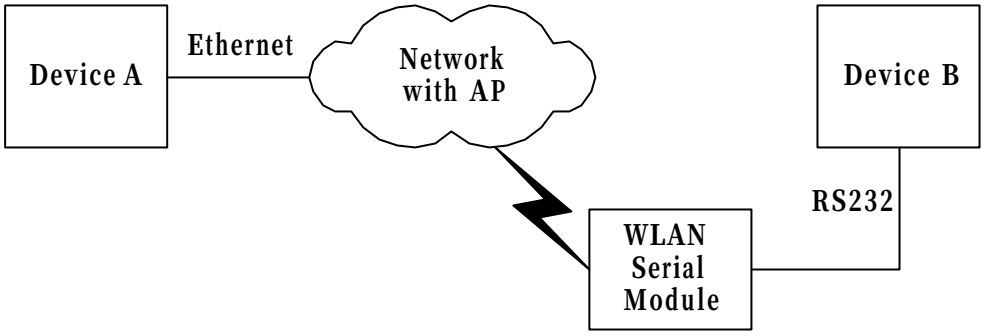


Figure 1-5 One WLAN connection via AP

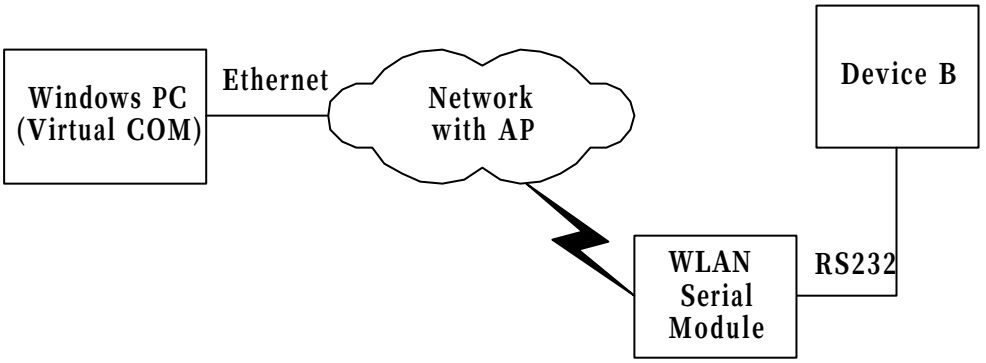


Figure 1-6 One WLAN connection via AP and Virtual COM

2. Installation

2.1 Package Contents

The Module is packed into the shipment box with partitioned multi-compartment.
The user manual, auto search and virtual COM utilities can be downloaded from http://www.tellus.com.tw or contact sales@tellus.com.tw.

2.2 Module Dimension

The size of **The Module** is shown below (Figure 2-1). [L: 60mm, W: 40 mm, H: 6 mm (including the connector and component height)]

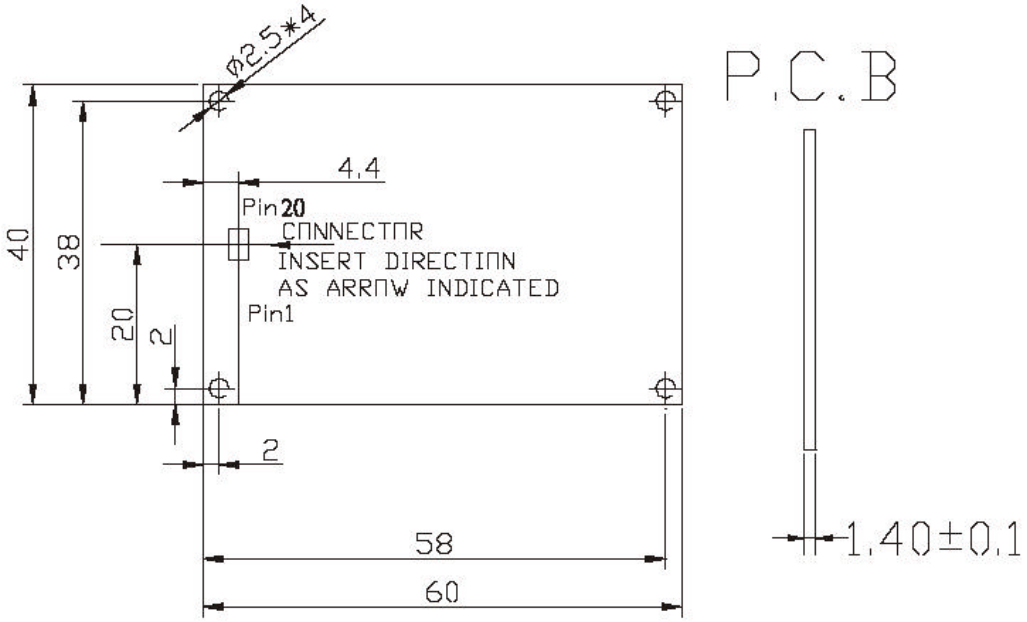


Figure 2-1 Module Dimension

The four small holes located at the four corners can be used to mount **The Module** into the device main board.

**Statement:
The radio portion of this module has not been shielded. The module will be installed in
the OEM device only. OEM integrator should apply FCC certification after the module
installed to OEM device for meet FCC rules.

2.3 Pin-Out Definition

The Module supports 20-pin connector. The pin out definition for this connector is shown in Figure 2-2

PIN 1&2=VCC5

PIN 7 = RESET (input)

PIN 8 = Status1 (output)

PIN 10 = RS-CTS (input)

PIN 11 = RS-TXD (output)

PIN 13 = RS-RTS (output)

PIN 14 = RS-RXD (input)

PIN 17 = Status0 (output)

PIN 19&20 = GND

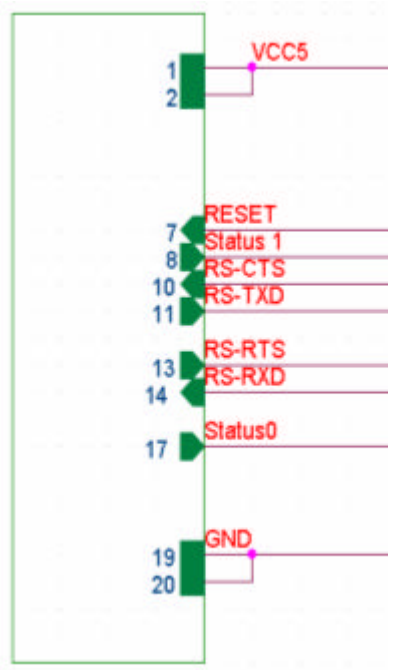


Figure 2-2 Pin Out Definition

2.4 Default Settings

The WLAN and RS232 default settings are shown in Table 1 and Table 2.

Table 1 WLAN Default Settings

Items	Default Setting
IP Address	**192.168.1.250**
IP Subnet Mask	**255.255.255.0**
Gateway IP Address	**192.168.1.254**
SSID	**wlandemo**
RF channel	**6**
WEP	**Disabled**
Authentication Type	**Auto**

Table 2 RS232 Default Settings

Items	Default Setting
Baud Rate	**38400** (1)
Data Length	**8 (fixed)**
Parity	**None (fixed)**
Stop Bit	**1 (fixed)**
Flow Control	**None**

Note (1): Baud rate can be 115200, 57600, 38400, 9600 bps.

Configuration – Web Browser

To configure **The Module**, there are two methods can be applied:

- Web Browser Configuration (This section)
- Command Mode Configuration (refer to section 3)

For Web Browser configuration, there are two methods to enter the web browser:

- **Direct Web Browser**

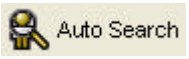
  Open the web browser and enter http://192.168.1.250 in the browser's address box. 192.168.1.250 is the default IP address (refer to 2.4).

  Note:

  You will need to configure the IP address of your computer to be within the same subnet as **The Module** and AP have for the initial configuration (please refer to Appendix A).

- **Auto Search Utility**

  The **Auto Search Utility** provides the locator function that allows you to find the available WLAN Serial Modules in the network. Follow the steps below to install the utility:

  - Stored the supplied Auto Search Utility file into your PC. Double Click "setup.exe"
  - Follow the InstallShield Wizard to install the utility.
  - When the installation is completed, click "**Start**", "**Programs**", "**Auto Search Switch**" icon. The following window Figure 0-1 will be displayed:
  - Click the Auto Search 

button at the top menu bar. When it finds **The Module**, it will show the corresponding IP inside the **IP list** box. Double click the IP address to enter the web browser for configuration. As shown in Figure 0-1, The Module IP address is 192.168.1.61.

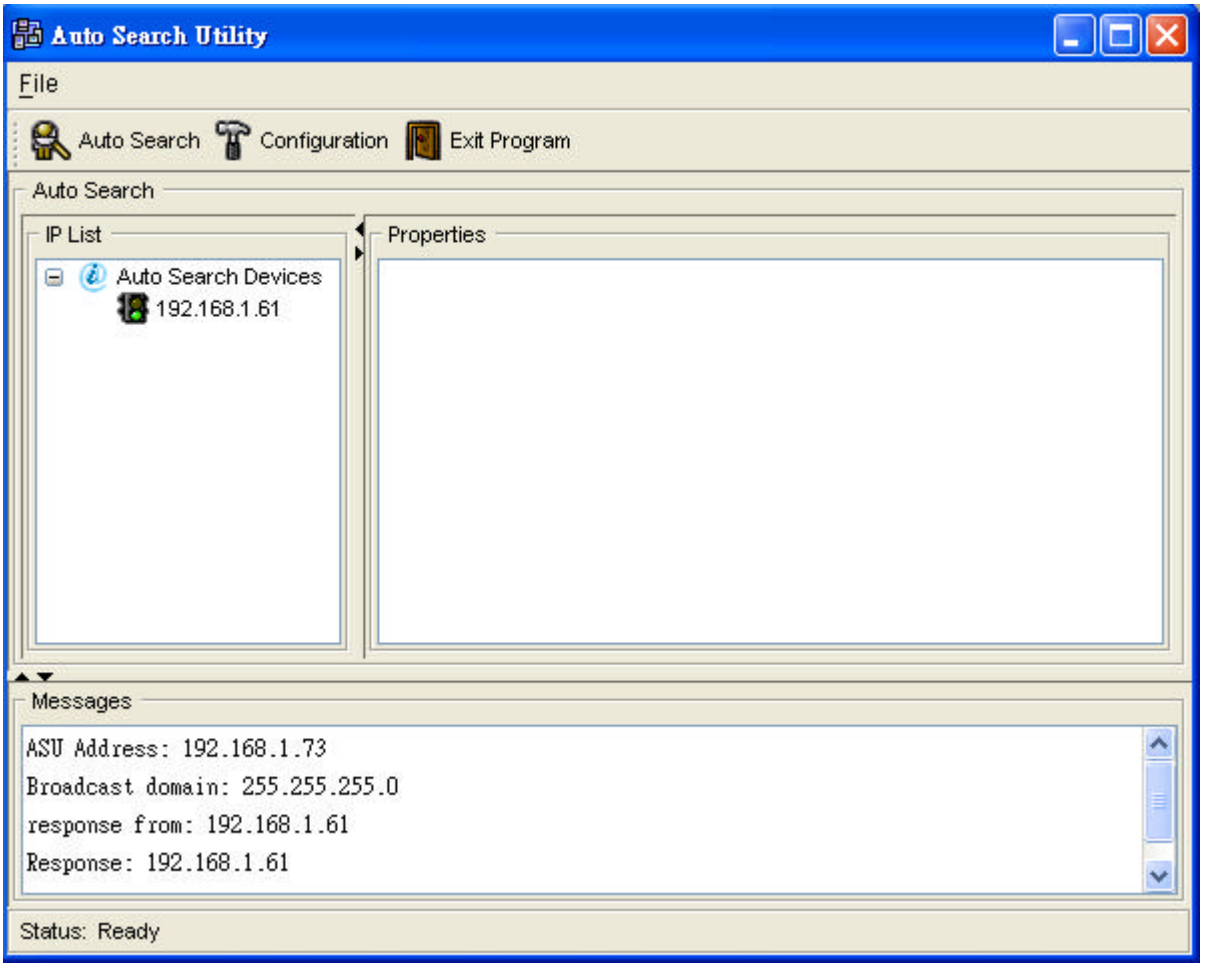


Figure 0-1 Auto Search Utility

2.5 Home Page

After login, the first page shown is the device **Home** page of **The Module** (See Figure 0-2). In this page, it provides the brief description for each subsequent web page.

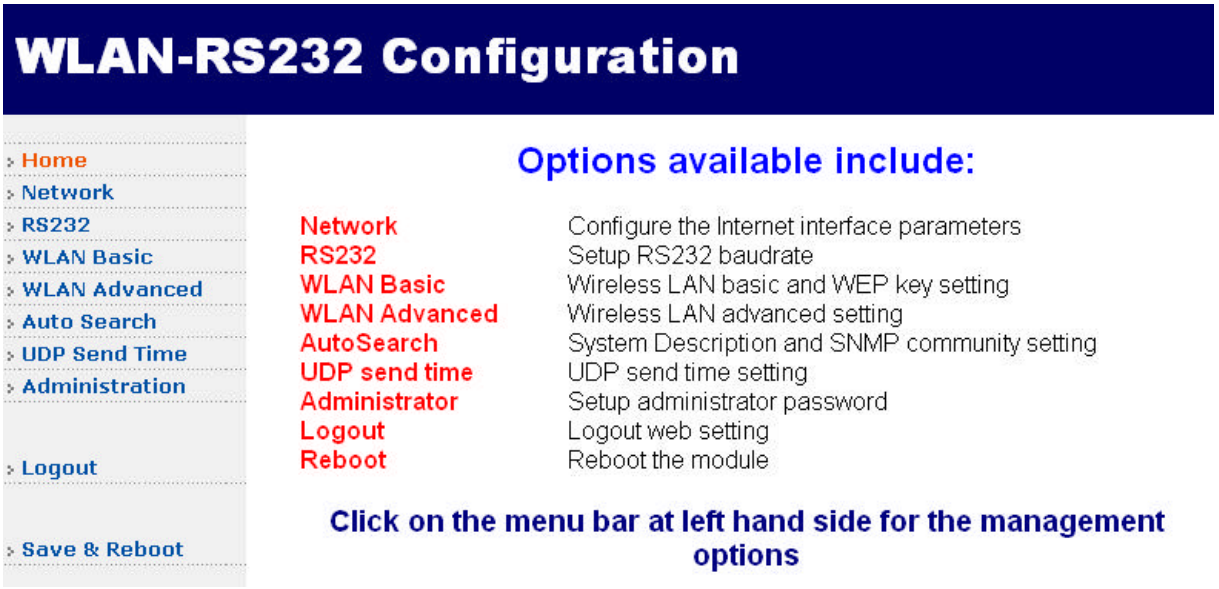


Figure 0-2 Home Page

2.6 Administration

Click the **Administration** option on the left menu frame to change the password setting (See Figure 0-3). By default, there is no password. So, it is strongly suggested to add the password for the first time access.

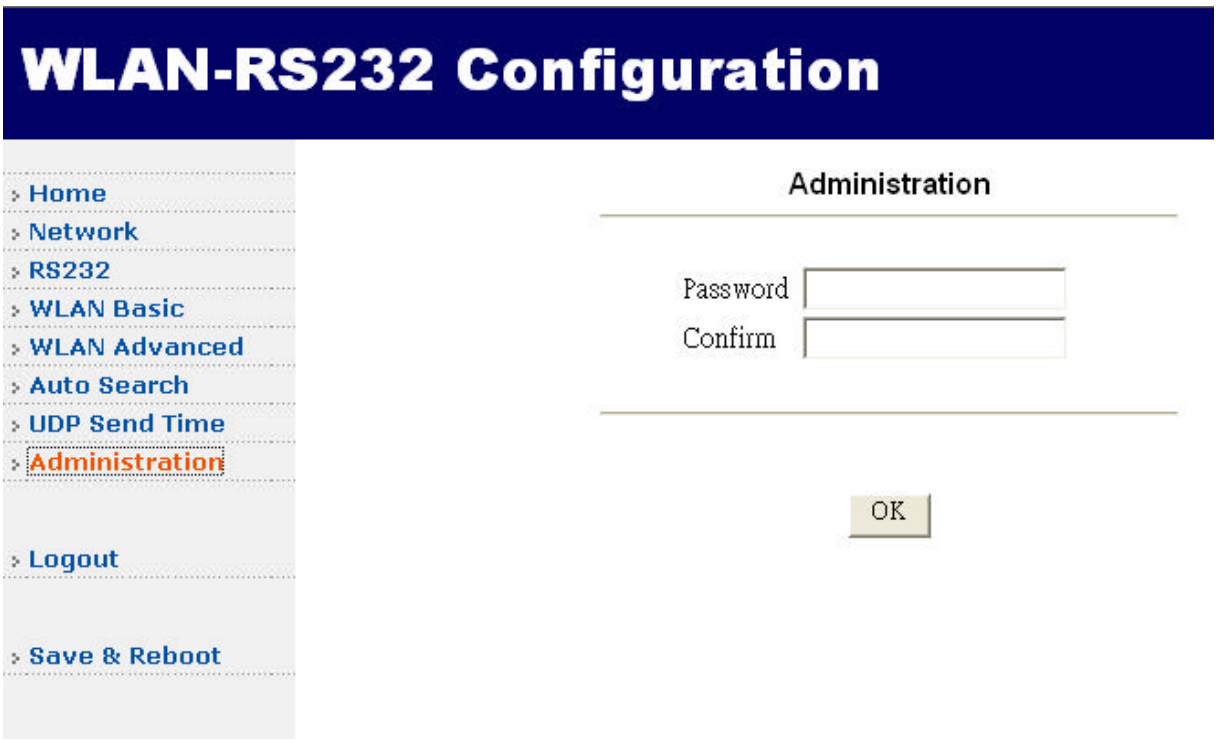


Figure 0-3 Administration

2.7 Network

Click the **Network** option on the left menu frame to change **The AP** IP address settings (See Figure 0-4

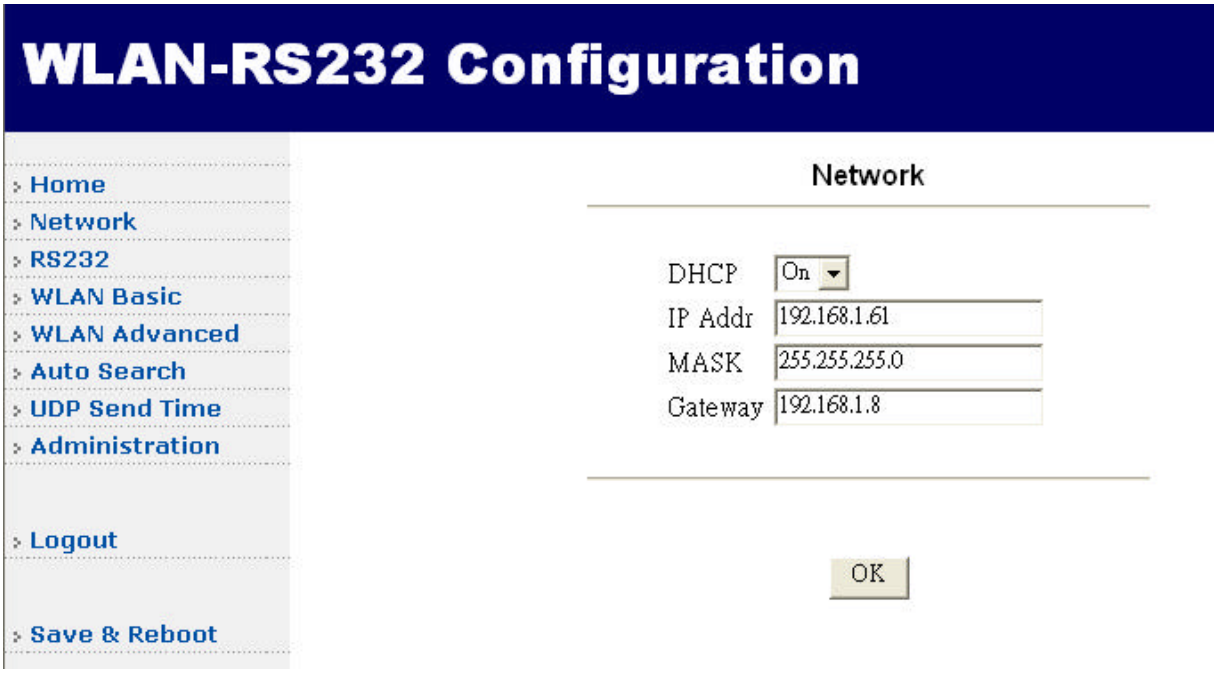


Figure 0-4 Network – IP address

There are two types of IP Address Mode – Static, DHCP client.

Static:

Enter the assigned IP address, subnet mask, gateway IP address and click **OK**.

DHCP:

DHCP client IP address mode means **The Module** will dynamically get its IP address and other settings from DHCP server on the Ethernet network.

2.8 RS232

There are four RS232 baud rate can be selected from the RS232 web page (see Figure 0-5).

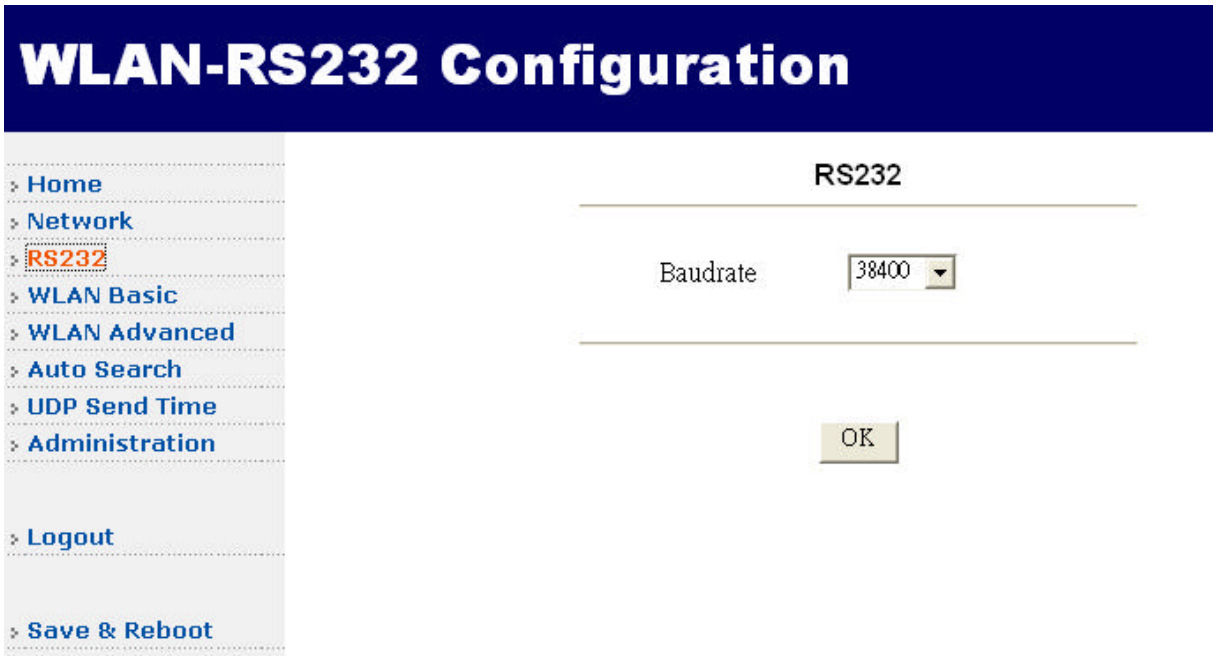


Figure 0-5 RS232

2.9 WLAN Basic

Click the **WLAN Basic** option on the left menu frame to change SSID, channel, operation mode and WEP key (See Figure 0-6)

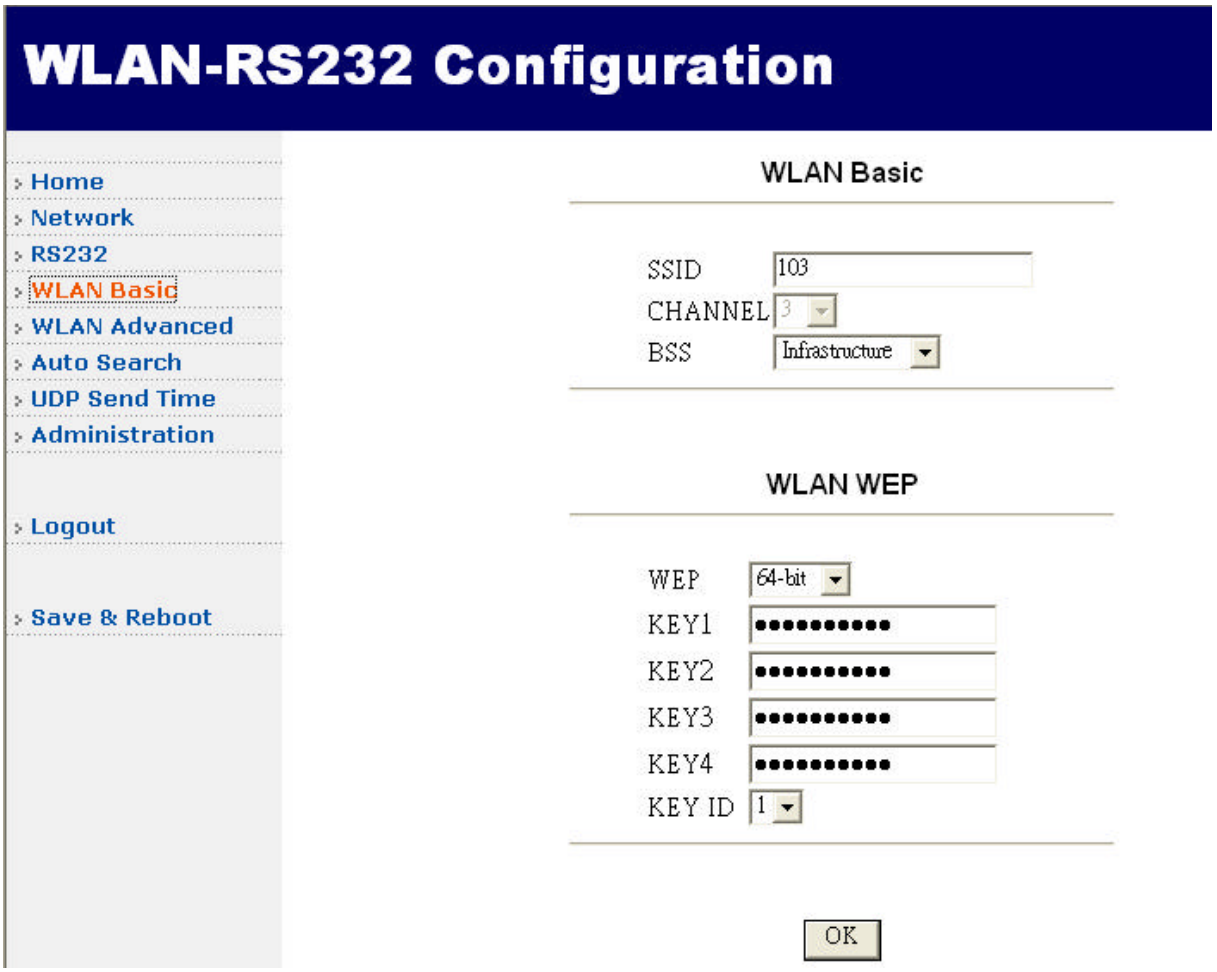


Figure 0-6 WLAN Basic

SSID (Service Set ID):

A unique ID shared by the same group Wireless Compact Serial Module and AP.

CHANNEL:

Radio channels used by **The Module**

BSS:

The Module can be operated in infrastructure mode or at AD-hoc mode.

WEP:

Enable/Disable the Wired Equivalent Privacy (WEP) mechanism based on the 64/128-bit shared key to secure the wireless communication.

WEP Key Length:

There are 2 WEP key lengths: 64-bit and 128-bit, encrypting transmitted data over the wireless network securely. The larger WEP key length is, the higther level of security becomes, but the lower throughput will be. You may disable (blank) to transmit data without encryption.

Note:

Be sure that the WEP setting in **The Module** shall be the same as that in AP, otherwise the communication is impossible.

KEY# (1 ~ 4):

For **64-bit** WEP encryption, a key of **10** hexadecimal characters in length must be filled in.
For **128-bit** WEP encryption, a key of **26** hexadecimal characters in length must be filled in.

Note:

Be sure that the key in The Module shall be the same as that in AP, otherwise the communication is impossible..

Key ID:

Selects one of four key sets to be used for encryption.

2.10WLAN Advanced

Click the **WLAN Advanced** option on the left menu frame to set WLAN related parameters (See Figure 0-7). You can change the values of **The Module** to have better interoperability with AP.

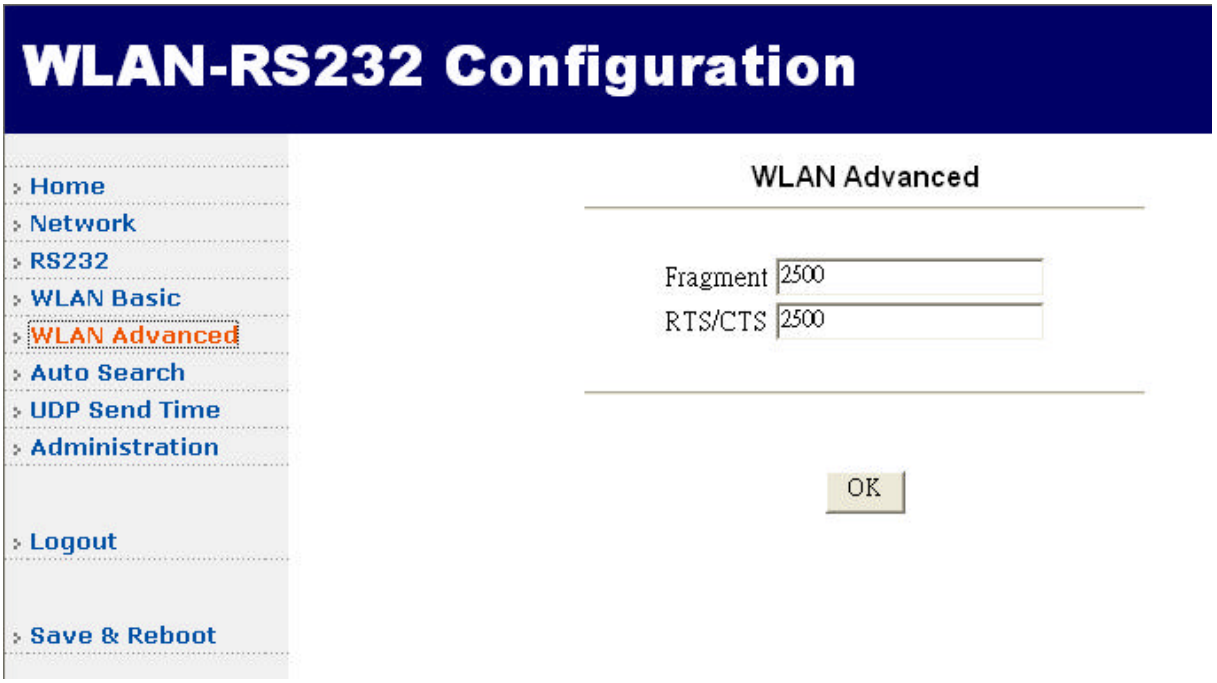


Figure 0-7 WLAN Advanced

Fragment:

This value specifies the maximum size for a packet before data is fragmented into multiple packets. It should remain at its default setting of 2500. Only minor reductions are recommended.

RTS/CTS:

This value should remain at its default setting of 2500. Only minor reductions are recommended.

2.11System Description for Auto Search

Click the **Auto Search** option on the left menu frame to enter the information about **The Module** (See Figure 0-10).

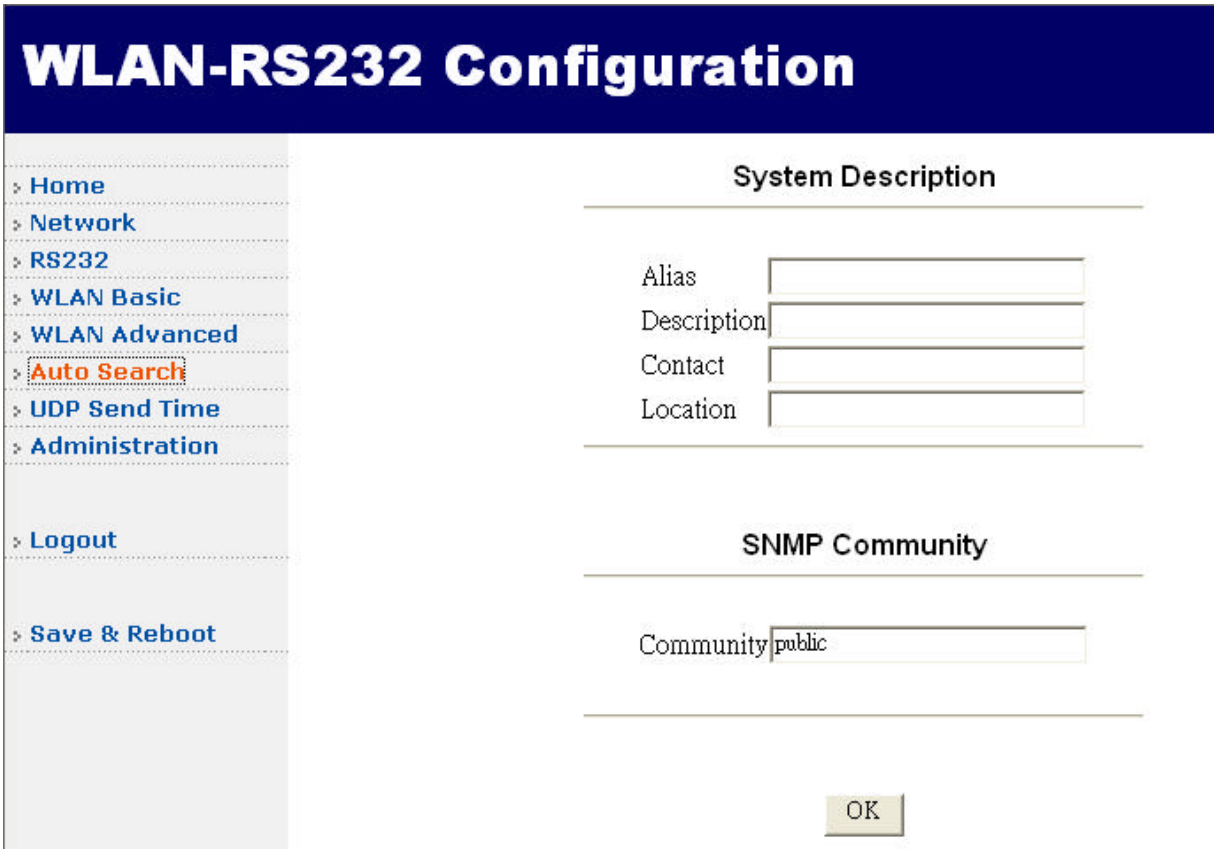


Figure 0-8 System Description for Auto Search

2.12UDP Send Time

Click the **UDP Send Time** option on the left menu frame to adjust the UDP send time (See Figure 0-9).

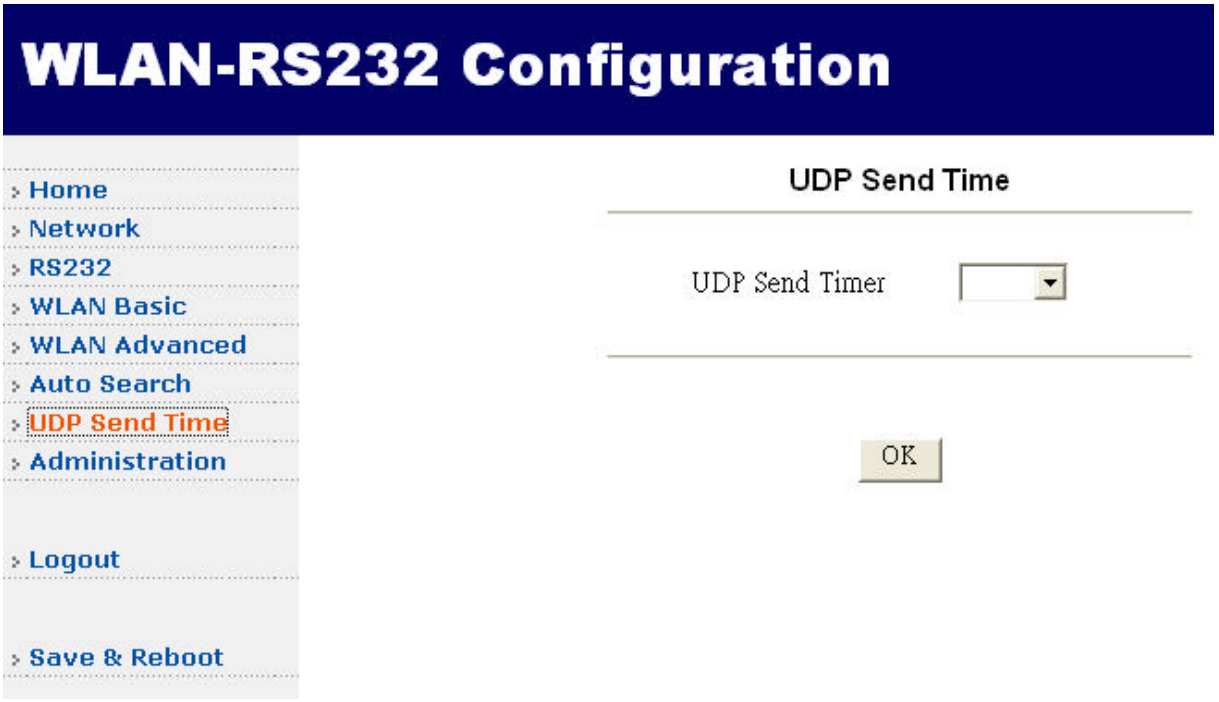


Figure 0-9 UDP Send Time

2.13 Logout

Click the **Logout** option on the left menu frame to logout the web page configuration. After the logout, it will ask you to enter the password if you want to re-login again (See Figure 0-10).

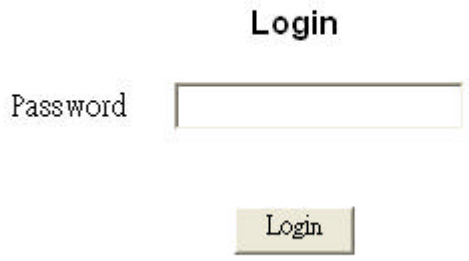


Figure 0-10 Logout

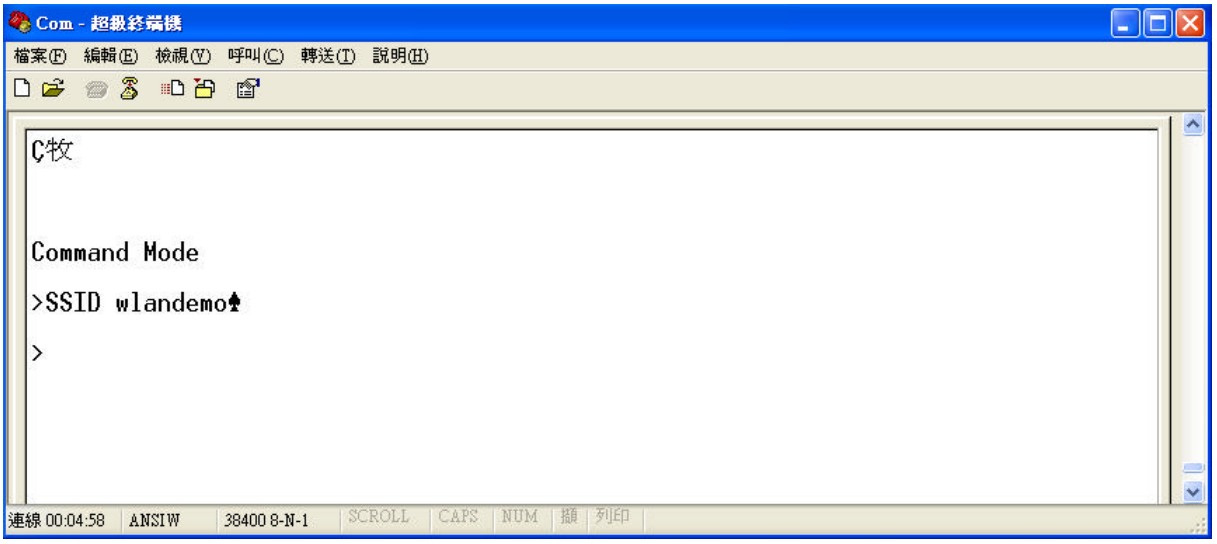
2.14 Save & Reboot

Click the **Save & Reboot** option on the left menu frame to set save the new settings and reboot it. (See Figure 0-2) Please wait until the reboot is completed.

3. Configuration – Command Mode

The Module can be configured via the command mode. The following are the steps to enter the command mode:

1). Connect **The Module** to your PC with RS232 cable
2). Plug the power adapter to **The Module**
3). From your PC, open the Windows HyperTerminal application program and set the COM port with the parameter as shown in section2.4
4). When the power is applied to **The Module**, press the "Backspace" key few times within 5 seconds. The following windows will be displayed:



5). Enter the commands as shown in Table 3.
For example, enter **"SSID wlandemo"** to set the SSID value as "**wlandemo**". **The Module** will respond the symbol ♠ if the command is accepted.

Table 3 Command List

Command	Parameters	Remark
For Wireless		
MODE	<[B]SS/[A]d-hoc/[P]seudoIBSS>	Set network mode
SSID	<SSID>	Set SSID
CHAN	<1-11>	Set channel
PSMODE	<1|0>	Power saving mode ON/OFF
RATE	<1/2/5/11>	Set Tx rate
WEP	<1|0>	WEP ON/OF
AA	<O|S|A>	Set Authentication Algorithm OPEN/SHARE/AUTO
WK	<1-4> <Key in Hex>	
WKID	<1-4>	Set WEP Key ID
For Network		
IP	<IP address>	Set IP
MASK	<IP address>	Set IP Mask
GW	<IP address>	Set Gateway IP
DHCP	<1|0>	Set DHCP client ON/OFF
For Operation		
DEFAULT		Restore to factory default settings
SAVE		Save changed configuration parameters to flash
EXIT		Exit without saving changed configuration parameters
SE		Save changed parameters and exit

4. Troubleshooting

This section provides possible solutions to problems regarding the installation and operation of **The Module**. Try to find answers here if there is any problem while you setup this device.

(1). Failed to configure The Module by using web browser via AP

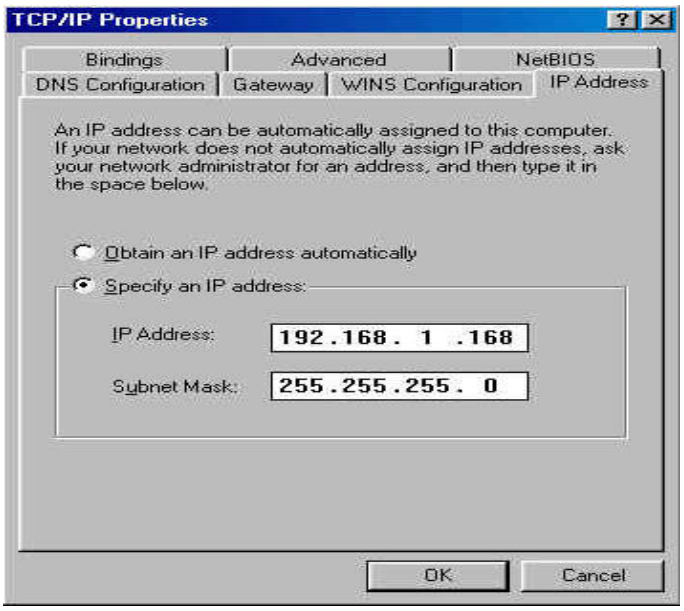
- Check **The Module** WLAN parameter (like SSID) are the same as the AP.
- Check WEP-64 or WEP-128 is enabled or not. If it is on, the key must be the same.
- Ensure that your PC, AP and **The Module** are on the same network segment.
- Check Subnet Mask value, it should be 255.255.255.0.

(2). Lost or forgot Administrator password.

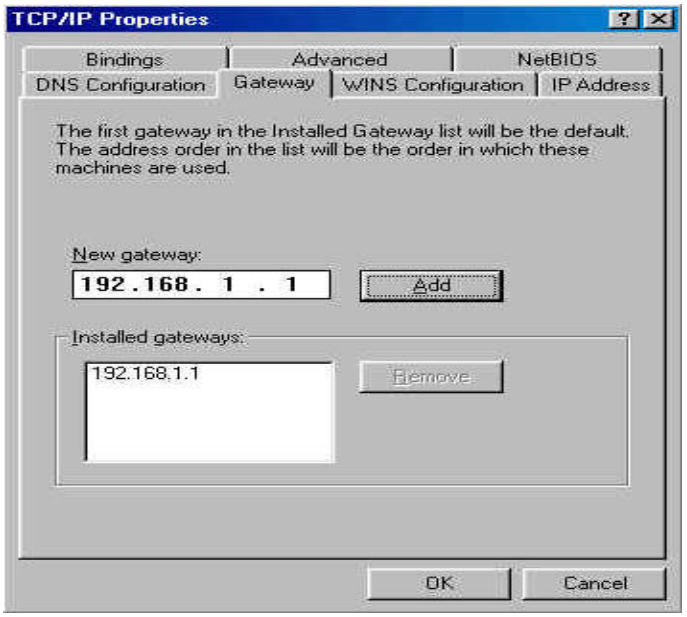
- Reset system by command.
- Re-configure **The Module** according to your previous setting.

Appendix A Configure Your Computer IP manually

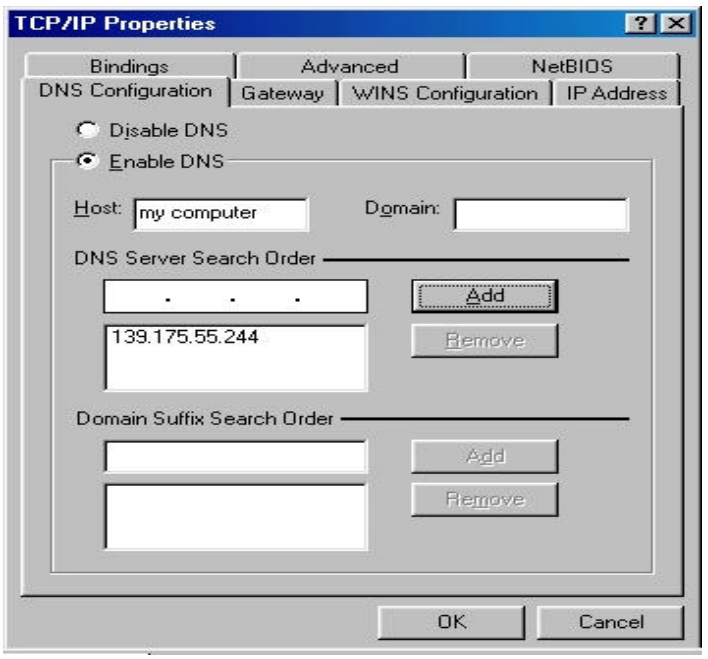
(a). Select **IP Address** tab, and then choose **Specify an IP Address**. Type in your customized IP address (the default IP address of this product is 192.168.1.100. So you just can type in one IP Address like 192.168.1.xxx.). Set the Subnet Mask as 255.255.255.0.



(b). Click **Gateway** tab, and add IP address of the router (e.g. the router's IP Address is 192.168.1.1).



(c). Change to **DNS Configuration** tab; enable DNS and add DNS values provided by your ISP into **DNS Server Search Order**.



(d). Click **OK** to finish.

Appendix B Technical Information

- **RS232 Features:**
  - Baud Rate Options: 115200, 57600, 38400, 9600 bps
  - Data Length Options: 8 bits
  - Parity options: None
  - Stop Bits Options: 1 bit
  - Flow Control: Hardware or none
  - Serial USART Buffer: 256 bytes input, 256 bytes output

- **WLAN Radio Features:**
  - Protocol Type: 802.11b standard compliant
  - Operating Range:
    Open Environment: 1000 ft./300m
    Office Environment: 100-330 ft./30-100m
  - Security:
    WEP (Wired Equivalent Privacy) 64 and 128 bit encryption
- **Radio Characteristics:**
  - Spread Spectrum Technology: DSSS
    (Direct Sequence Spread Spectrum)
  - RF Range: 2.4 ~ 2.4835 GHz
  - Data Rate: 11 / 5.5 / 2 / 1 Mbps
  - Modulation: DBPSK for 1 Mbps, DQPSK for 2 Mbps, CCK for 5.5 / 11 Mbps
  - Operation Channels: US - 11, Europe - 13, France - 4, Spain - 2, Japan - 14
  - RF Power Output (Typ.): 15±1 dBm
  - Receive Sensitivity (Typ. @BER 10E-5): -83 dBm@11Mbps
- **Power:**
  - Power Supply: 5 VDC Regulated
  - Current: Tx 325mA, Rx 210mA, Power Down 80mA
- **Software:**
  - Windows based Virtual Com Driver
  - Utility: User setup and device-search software run on Windows98 /Me /NT /2000 /XP
- **Mechanical:**
  - PCB or External Antenna
  - Dimensions: 60 x 40 x 4.7 mm
- **Environmental:**

- Temperature:
  Operating: 0 to+55°C / 32 to 133°F
  Storage: -20 to +65°C / -4 to +150°F
- Relative Humidity: 95% (non-condensing)

- **EMC Certifications:**
  - U.S.A. FCC Part 15, Sections 15.247, 15.205, 15.209