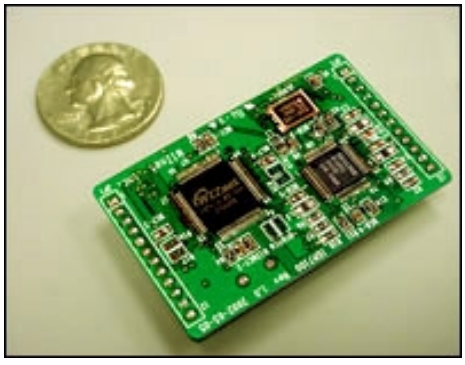
@Web SEG32
Serial-to-Ethernet Gateway Module

User's manual

Version 2.0A



DOCUMENTATION & TECHNICAL SUPPORT

Product Ordering Information: ATWebSEG-32

E-Mail: micro@nto.atmel.com

Web Site: www.atmel.com

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Wiznet Setup Tool of @Web SEG32 : IGM7100

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@Web Hardwired Ethernet Product Derivatives

Development Kits	Description	Ordering Information
@Web LAN51H	Development Kit For Ethernet Connectivity with Hardwired TCP/IP	ATWEBDVK-02
@Web LAN51H RC	Remote Control Application with Ethernet Connectivity	ATWEBDVK-02RC
@Web LAN51H WC	Network Web Camera Application with Ethernet Connectivity	ATWEBDVK-02WC
@Web LAN51H VOIP	Voice Transmission Application with Ethernet Connectivity	ATWEBDVK-02VOIP

Modules and Evaluation Kits	Description	Ordering Information
@Web SEG32	Serial to Ethernet Gateway Module	ATWEBSEG-32
@Web CEG32	CAN to Ethernet Gateway Module	ATWEBCEG-32
@Web SEG32 EVK	Evaluation Kit for Serial to Ethernet Gateway Module	ATWEBEVK-05
@Web CEG32 EVK	Evaluation Kit for CAN to Ethernet Gateway Module	ATWEBEVK-06

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1. Read First

1.1. Product Contents

-@WEB SEG32 module

-@WEB SEG32 Evaluation board

-User's manual

-@WEB SEG32 Evaluation board schematic

-Adaptor:5V,500mA

-Serial cable

-LAN cable (cross over cable)

-CD

1.2. Product Specification

1.2.1. @WEB SEG32 Module

-Microcontroller: AT89C51RC2 - 32K Self-Programming Flash MCU

-Memory: 32K Flash (inside MCU), 32K SRAM

-Interface: 2x12 2mm TTL

-Protocol: TCP, UDP, IP, ARP, ICMP, Ethernet MAC

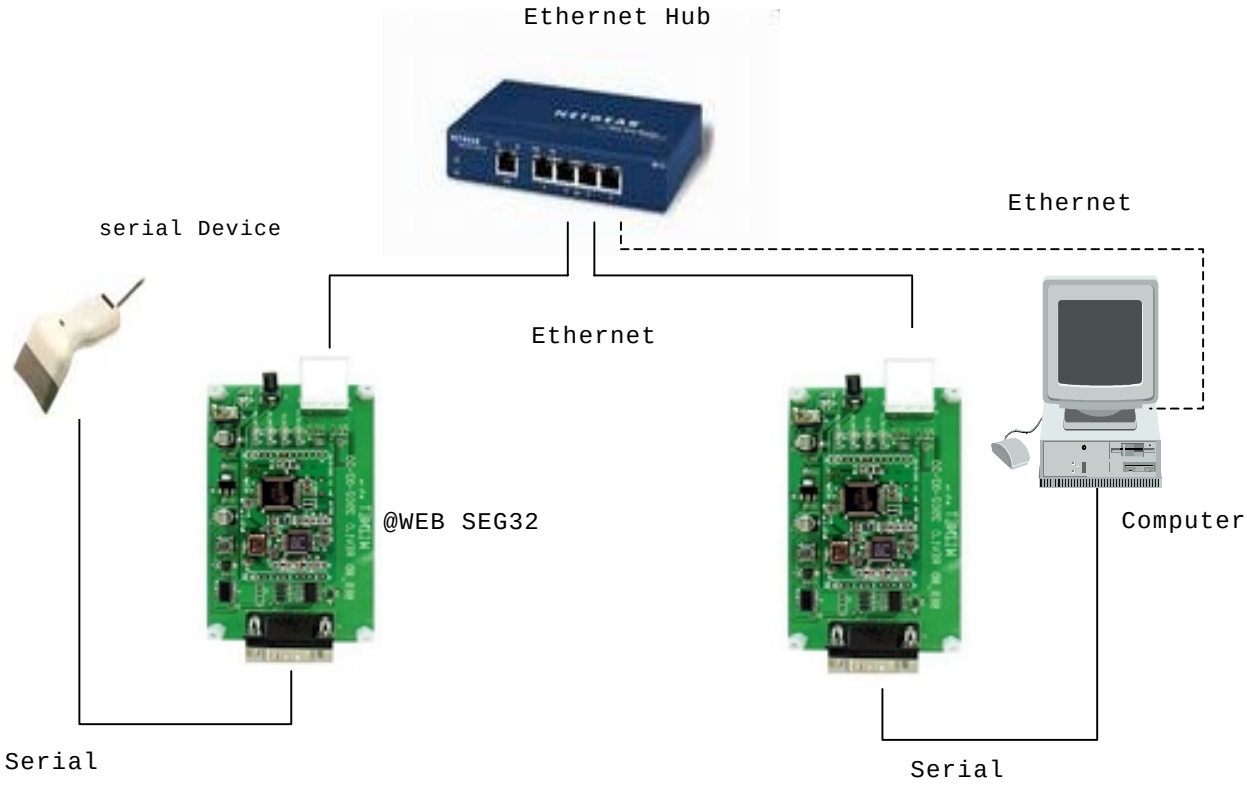
-Power: 3.3V, 150mA

1.2.2. @WEB SEG32 Evaluation board

Interface:DB9(RS-232), RJ-45 (transformer embedded)

2 Overview

@WEB SEG32 is a gateway module that converts RS-232 protocol into TCP/IP protocol. It enables remote gauging, managing and control of a device through the network based on Ethernet and TCP/IP by connecting to the existing equipment with RS-232 serial interface. In other words, @WEB SEG32 is a protocol converter that transmits the data sent by serial equipment as TCP/IP data type and converts back the TCP/IP data received through the network into serial data to transmit back to the equipment.



[Image 2-1] @WEB SEG32 Evaluation board connected to serial device and PC

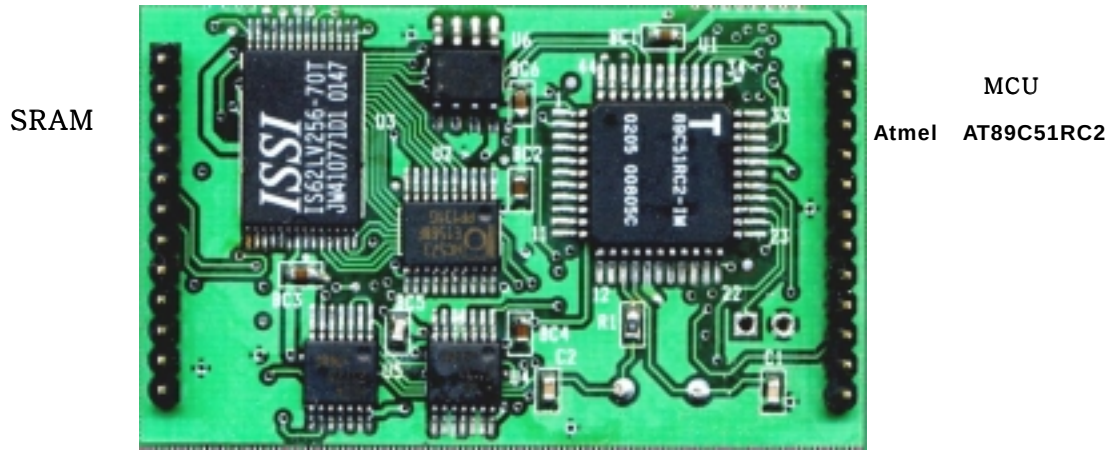
Category	Specification
Protocol	TCP, UDP, IP, ARP, ICMP, Ethernet MAC
Network interface	10/100 Base-T Ethernet (Auto detection)
Serial port	1 RS-232 port (TTL type)
CPU	Atmel AT89C51RC2-RLTCM (8bit MCU and 32K Self-Programming Flash)
Serial line format	8data, 1stop, none parity
Serial flow control	XON/XOFF, RTS/CTS
Serial signal	TXD, RXD, RTS, CTS, DTR, DSR, GND
Software	Remote download and configuration possible
Transmission speed	1200bps ~ 230Kbps
Memory	32K Flash (inside MCU), 32K SRAM
Temperature	10'C ~ 80'C (Operating), -40~85'C (Storage)
Humidity	10~90%
Power	3.3V, 150mA
Connector type	2 x 12 Pin header array (2 mm high)
Size	50mm x 30mm x 10mm

[Table 2-1] @WEB SEG32 Module Specification

3 Hardware Specification

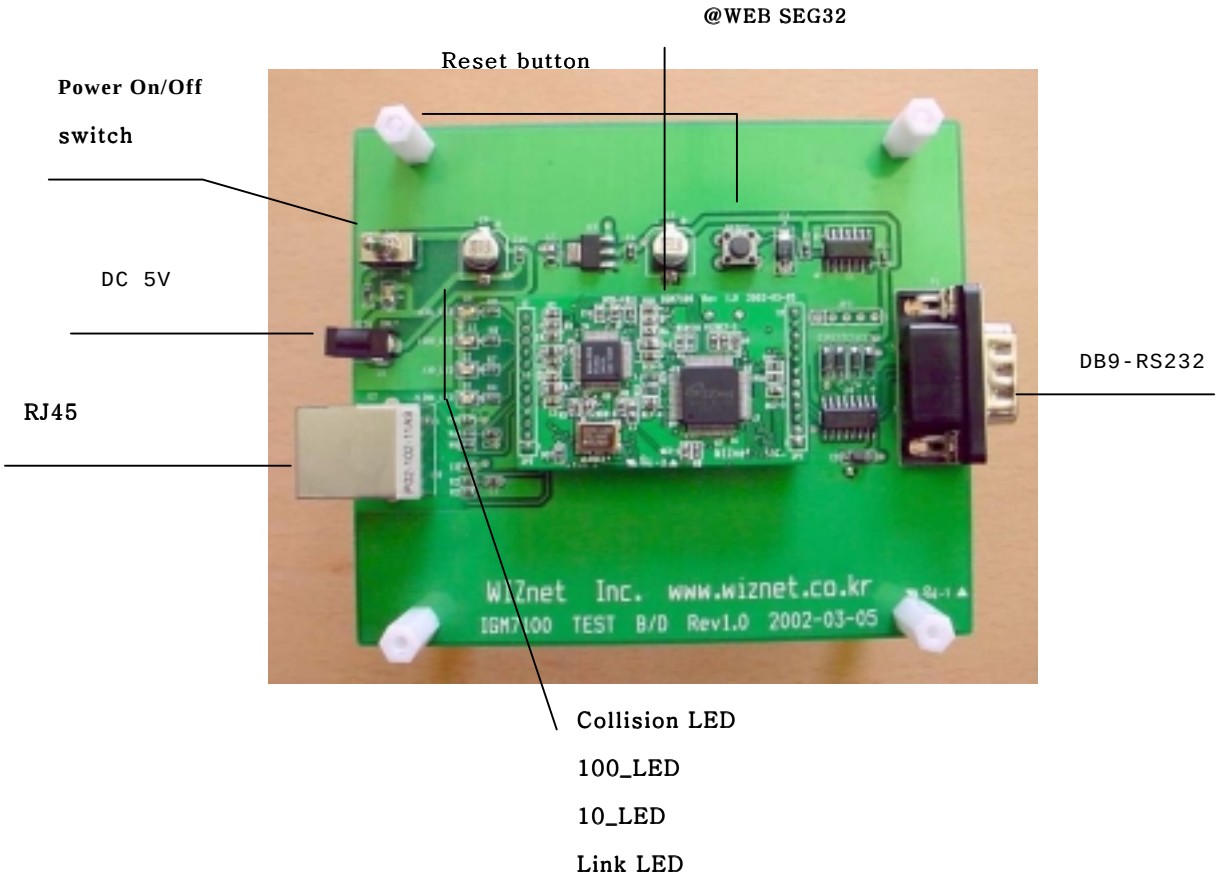
3.1. @WEB SEG32 Module (Part number: ATWebSEG-32)

[Image 3-1] @WEB SEG32 Module Frontal View



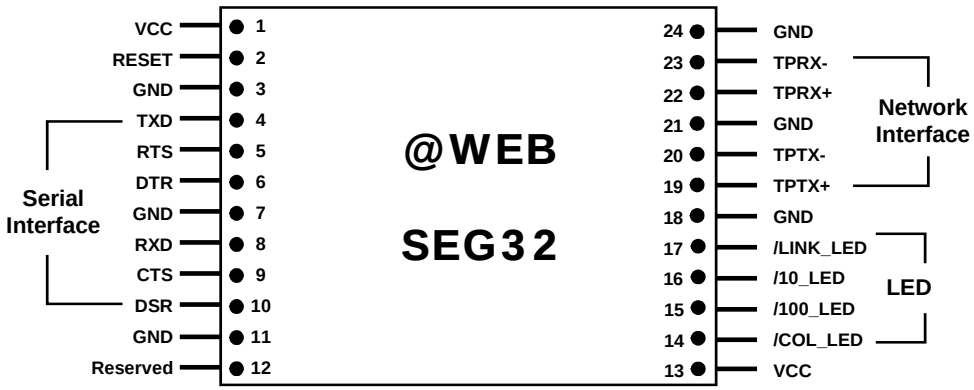
[Image 3-2] @WEB SEG32 Module Rear View

3.2. @WEB SEG32 Evaluation board (Part Number: ATWebEVK-05)



[Image 3-3] @WEB SEG32 Evaluation board

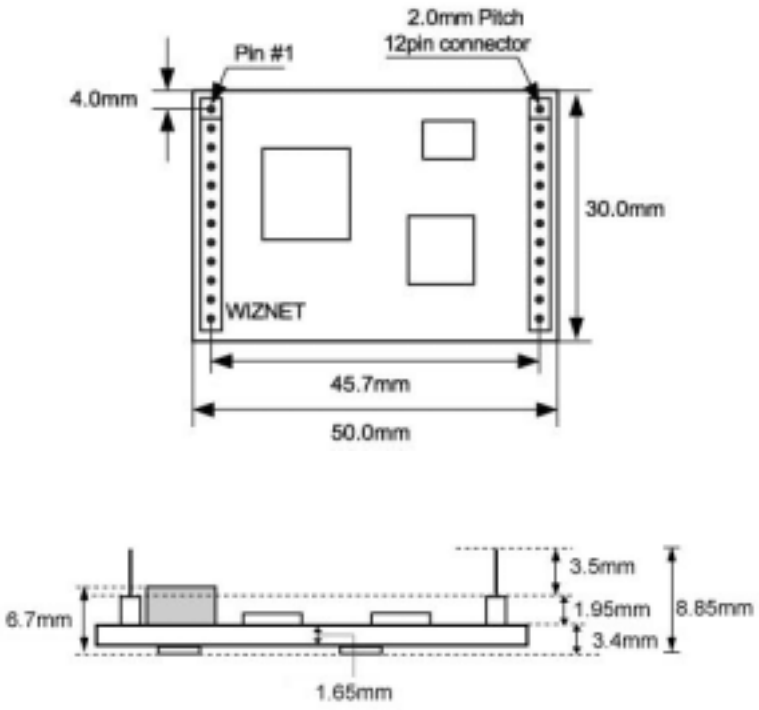
3.3. Pin Assignment and Dimension



[Image 3-4] @WEB SEG32 Module Pin Assignment

PIN NAME	Functions	I/O	Remark
RESET	Reset (Active High)	Input	
TXD	RS-232 Data Output	Output	
RTS	RS-232 Request To Send	Output	
DTR	RS-232 Data Terminal Ready	Output	
RXD	RS-232 Data Input	Input	
CTS	RS-232 Clear To Send	Input	
DSR	RS-232 Data Set Ready	Input	
TPRX-	Ethernet Differential Input-	Input	
TPRX+	Ethernet Differential Input+	Input	
TPTX-	Ethernet Differential Output-	Output	
TPTX+	Ethernet Differential Output+	Output	
/LINK_LED	Link LED	Output	
/10_LED	10 Mbps LED	Output	
/100_LED	100 Mbps LED	Output	
/COL_LED	Collision LED	Output	
VCC	3.3V Power	Power	

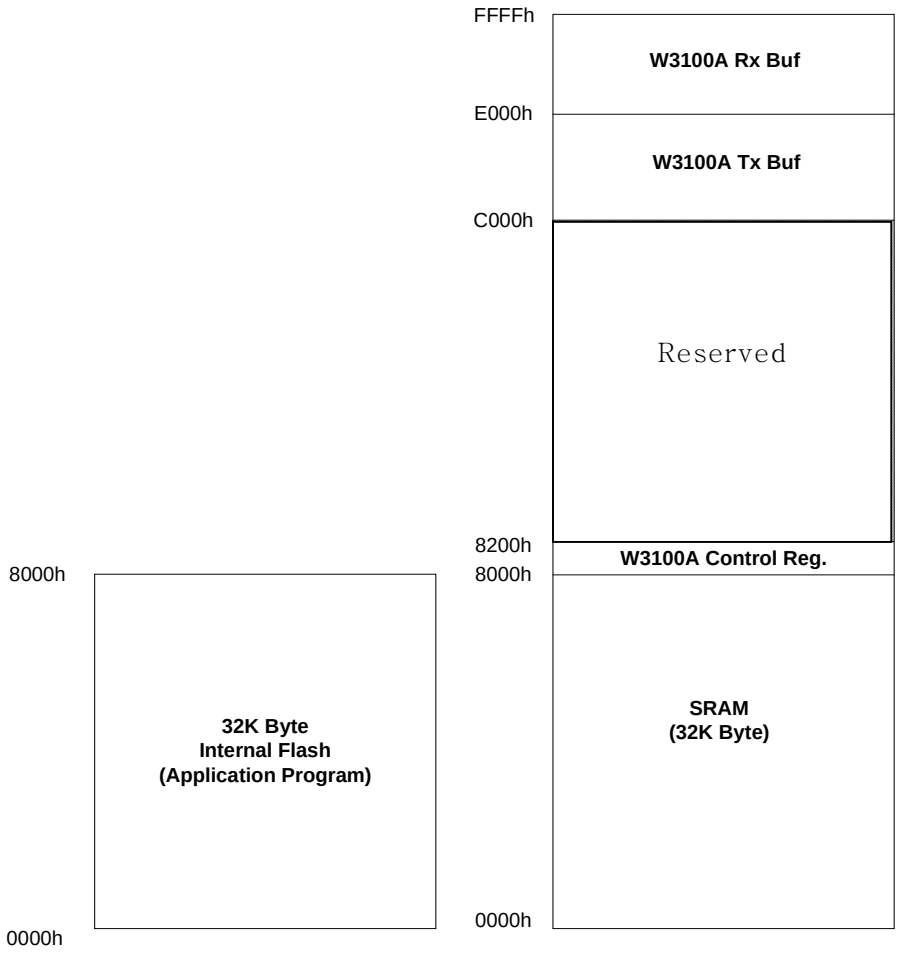
[Table 3-1] @WEB SEG32 Module Pin Functions



[Image 3-5] @WEB SEG32 Module Dimension

3.4 Memory map

Memory Map of IGM
(ATMEL Version)



3.4 Miscellaneous (@WEB SEG32 Evaluation board)

3.5.1. Ethernet Interface

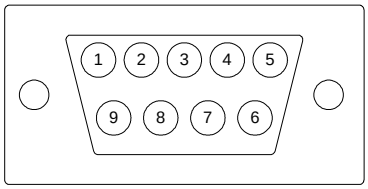
-TCP/IP and Ethernet MAC

: W3100A, Hardwired TCP/IP Chip (WIZnet)

-Ethernet Physical Layer : RTL8201 (RealTek)

-Connector : RJ-45 (transformer embedded)

3.5.2. Serial Interface



[Image 3-6] Serial Pin Assignment of @WEB SEG32 Evaluation board

PIN Number	Signal	Description	Function
1	NC	Not Connected	
2	RxD	Receive Data	Data Input
3	TxD	Transmit Data	Data Output
4	DTR	Data Terminal Ready	
5	GND	Ground	
6	DSR	Data Set Ready	
7	RTS	Request To Send	
8	CTS	Clear To Send	
9	NC	Not Connected	

[Table 3-2] Serial Pin Description

3.5.3. LED

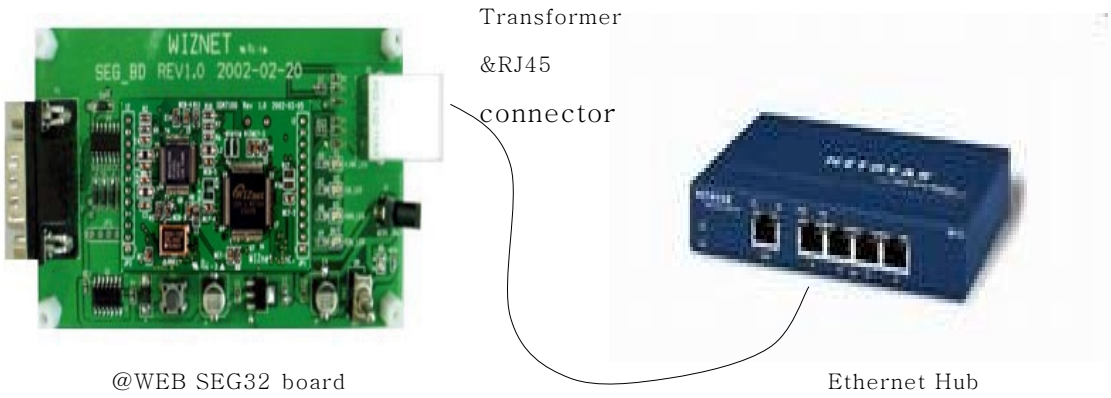
- Power LED: displays power status of @WEB SEG32
- Link LED: indicates network link is established
- 10 LED: indicates network speed is 10M bps
- 100 LED: indicates network speed is 100M bps
- Collision LED: indicates a packet transmitted from the Ethernet controller to the network has collided with another packet

4. Installation

4.1. Hardware Connection

4.1.1. Network connection

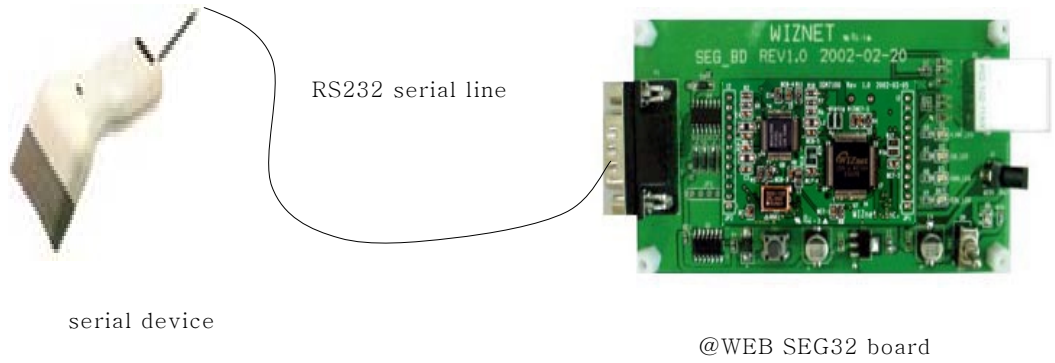
Connect the @WEB SEG32 Evaluation board RJ-45 connector (transformer embedded) to the Ethernet hub.



[Image 4-1] @WEB SEG32 Evaluation board Network Connection

4.1.2. Serial Connection

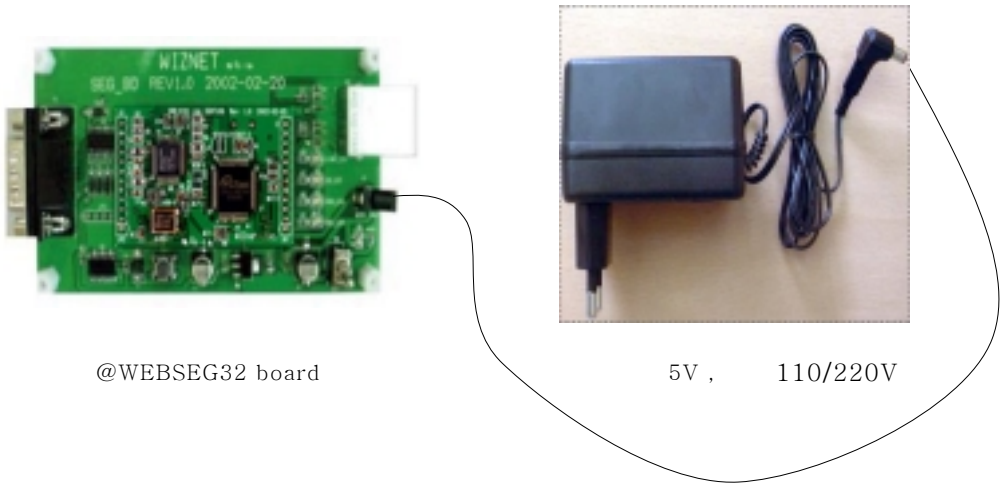
Connect the @WEB SEG32 Evaluation board DB9 jack and serial device with RS-232 serial line.



[Image 4-2] @WEB SEG32 Evaluation board and Serial Device Connection

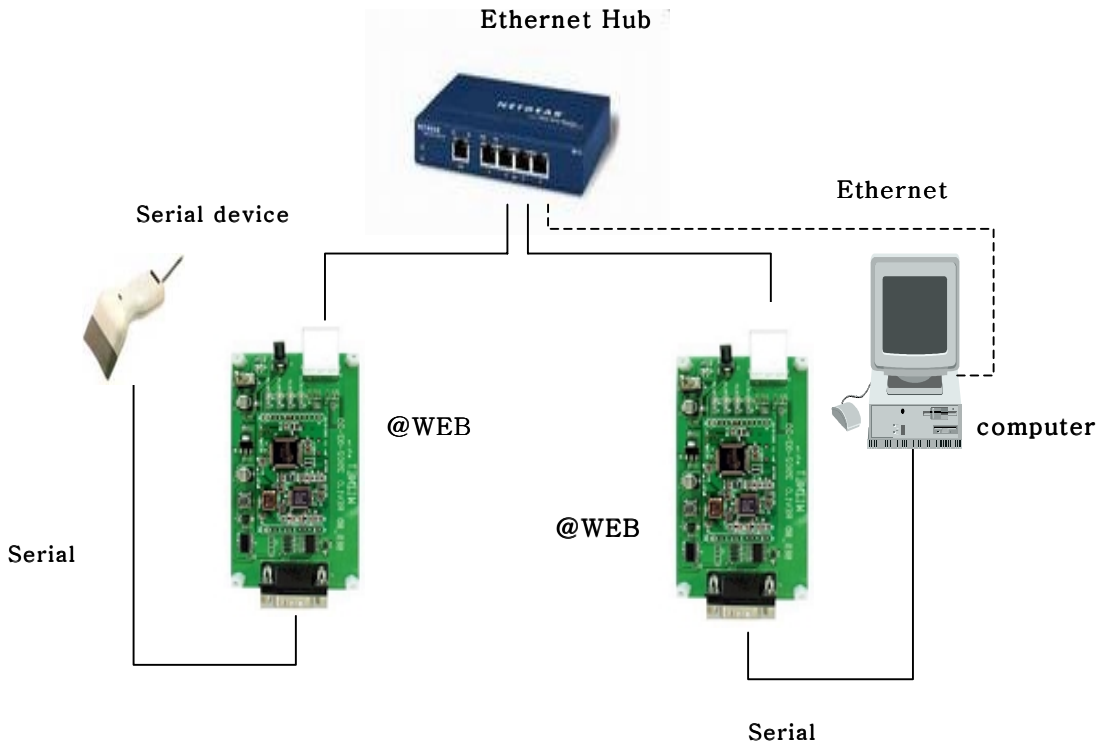
4.1.3. Power Connection

Connect the 5V (500mA) DC power adaptor to the @WEB SEG32 Evaluation board. For reference, the power used for @WEB SEG32 is 3.3V.



[Image 4-3] @WEB SEG32 Evaluation board Power Connection

4.1.4. Entire System Connection



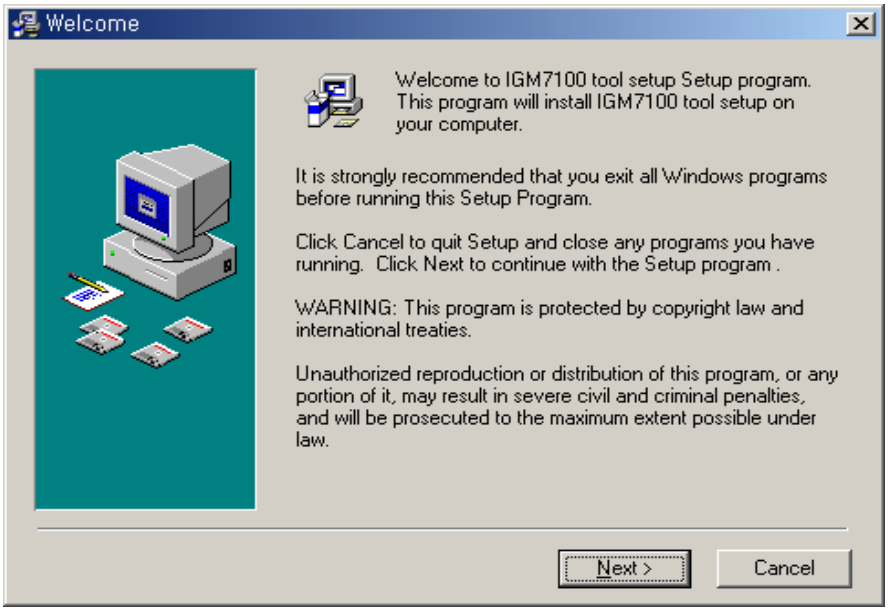
[Image 4-4] Network Configuration

4.2. Software Installation

4.2.1. Installation Process

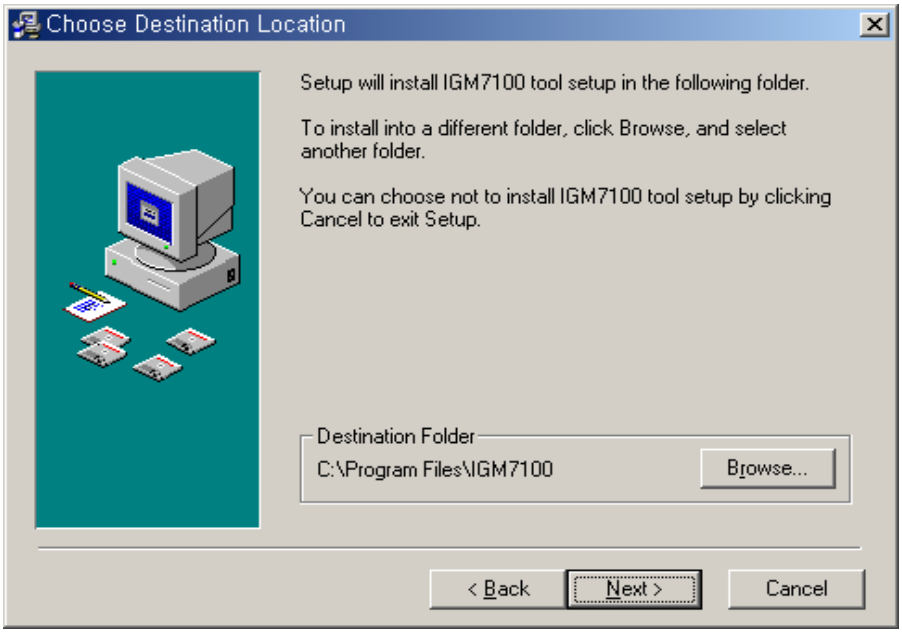
The two types of software required to test the @WEB SEG32 are IGM_Cfgtool.exe. “IGM_Cfgtool.exe” is the environment setting and management program for the @WEB SEG32 that comes with the @WEB SEG32 Evaluation board. Another program that comes with the @WEB SEG32 Evaluation board is “IGM_PCutil.exe”, a PC program that monitors and verifies the operation of @WEB SEG32.

Install @WEBSEG32.exe on the PC. The installation method of “IGM_Cfgtool.exe” and “IGM_PCutil.exe” is described below.



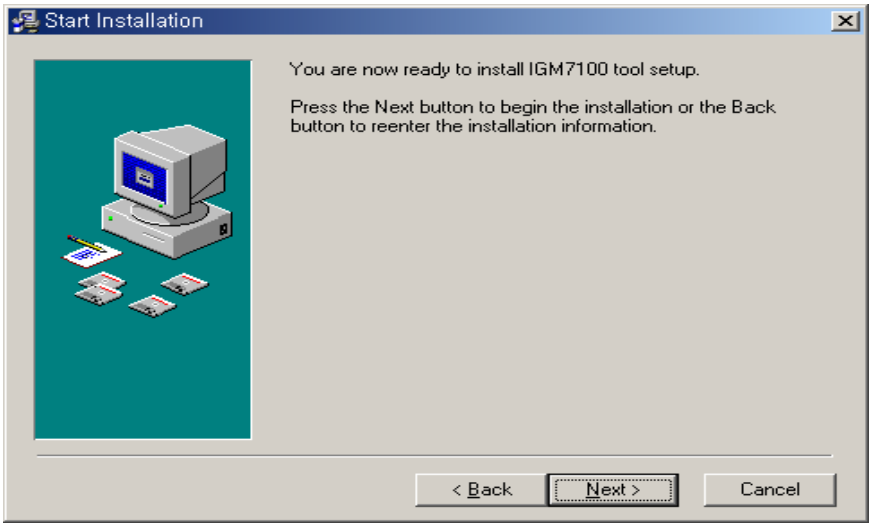
[Image 4-5] Initialization window to install @WEB SEG32 utility

This setup program will create a new folder, IGM7100, two types of program will be installed, called “IGM_Cfgtool.exe” and “IGM_PCutil.exe”

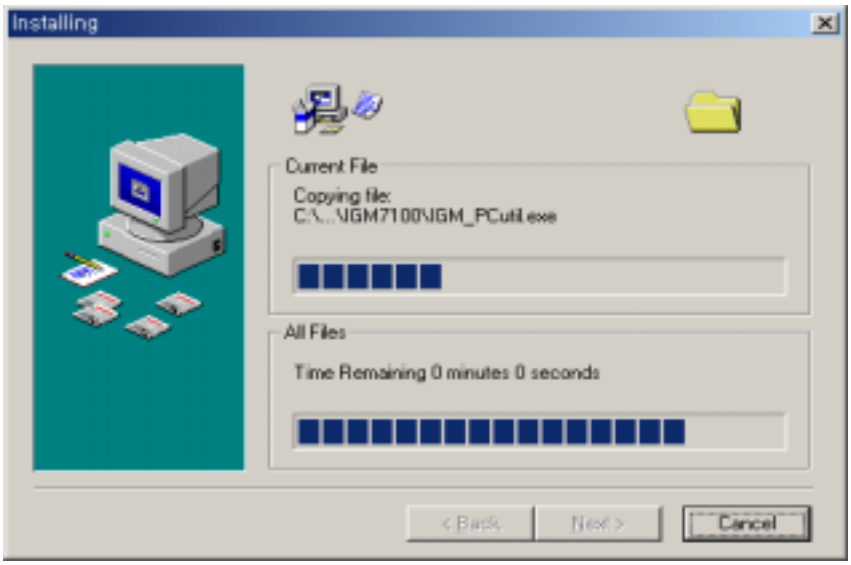


[Image 4-6] Installation folder selection window(1)

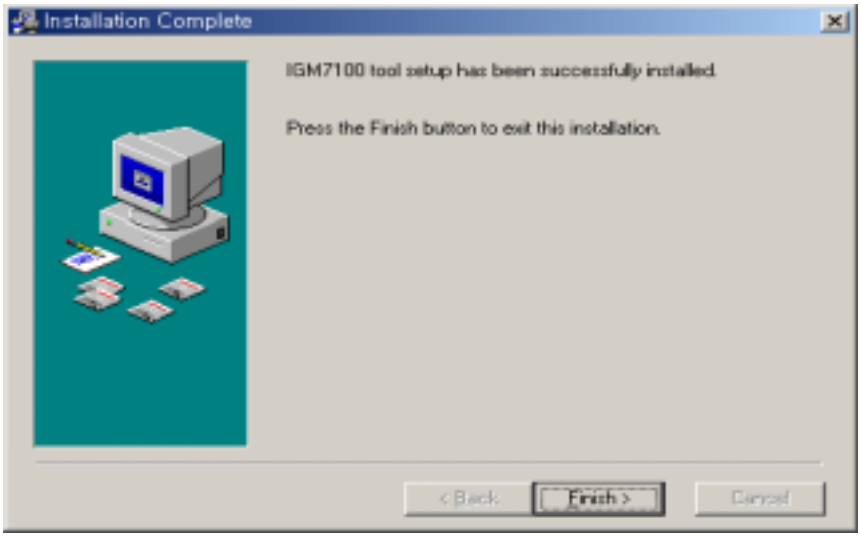
[Image 4-7] Installation Folder selection window(2)



[Image 4-8] Installation start window

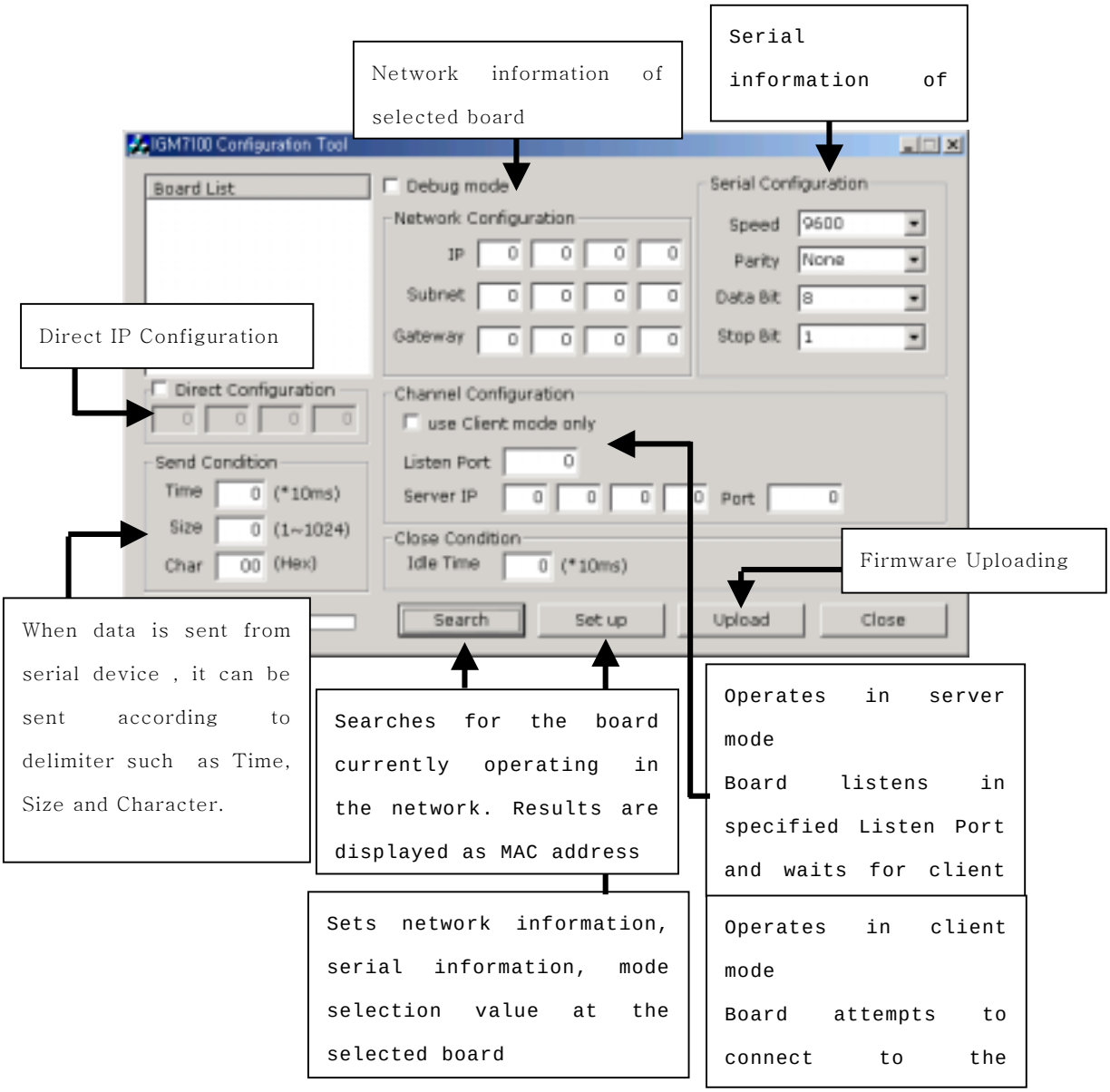


[Image 4-9] Installing window



[Image 4-10] Installation finish window

4.2.2. “IGM_Cfgtool.exe” Features



[Image 4-11] “IGM_Cfgtool.exe” Initialization Window

- Board List

Click “Find Board” button and when @WEB SEG32 Evaluation board connected to the network is found, the located board is displayed as MAC address in the “Board List” of [Image4-11].

① Send condition

A. Time: When data is sent from serial device, it’s not sent until there’s no input time.

B. Size: When data is sent from serial device, it’s not sent until there’s no input size.

C. Char: When data is sent from serial device, it’s not sent until there’s no input character.(It’s available only Hex.)

② Direct configuration

When input IP and click ‘search’, if @WEB SEG32 is compatible with the IP, it appears Mac address ‘Board List’.

③ Debug mode

If this mode is checked, you can monitor the status and socket message of @WEB SEG32(listen OK, connect fail etc.) through terminal. If not, it’s not need to check.

- Network Configuration

Network information of selected @WEB SEG32 Evaluation board is displayed. The board’s network information can be inserted and revised here.

- Serial Configuration

Serial information of selected @WEB SEG32 Evaluation board is displayed. The board’s serial information can be inserted and revised here.

- Mode Selection

A. Not check “Use Client mode only”

Set the @WEB SEG32 to operate in the server mode, listens in the specified Listen Port and waits for the client connection. When the data is sent from serial device, if it’s not established connection of socket, try to connect server IP and port, send the data.

B. Check “Use Client mode only”

Set the @WEB SEG32 to operate in the client mode and attempts to connect to the specified IP address and port of the server.

④ Close condition

After established connection of socket, if there is not data transmission within input time in ‘Close condition’, the connection is

dismissed automatically.

- Search

Searche for operating @WEB SEG32 currently connected to the network, and the results are displayed as MAC address on the board list.

- Set up

Insert the network information of the @WEB SEG32 Evaluation board, the serial information of the serial device, and mode selection value to set the selected board.

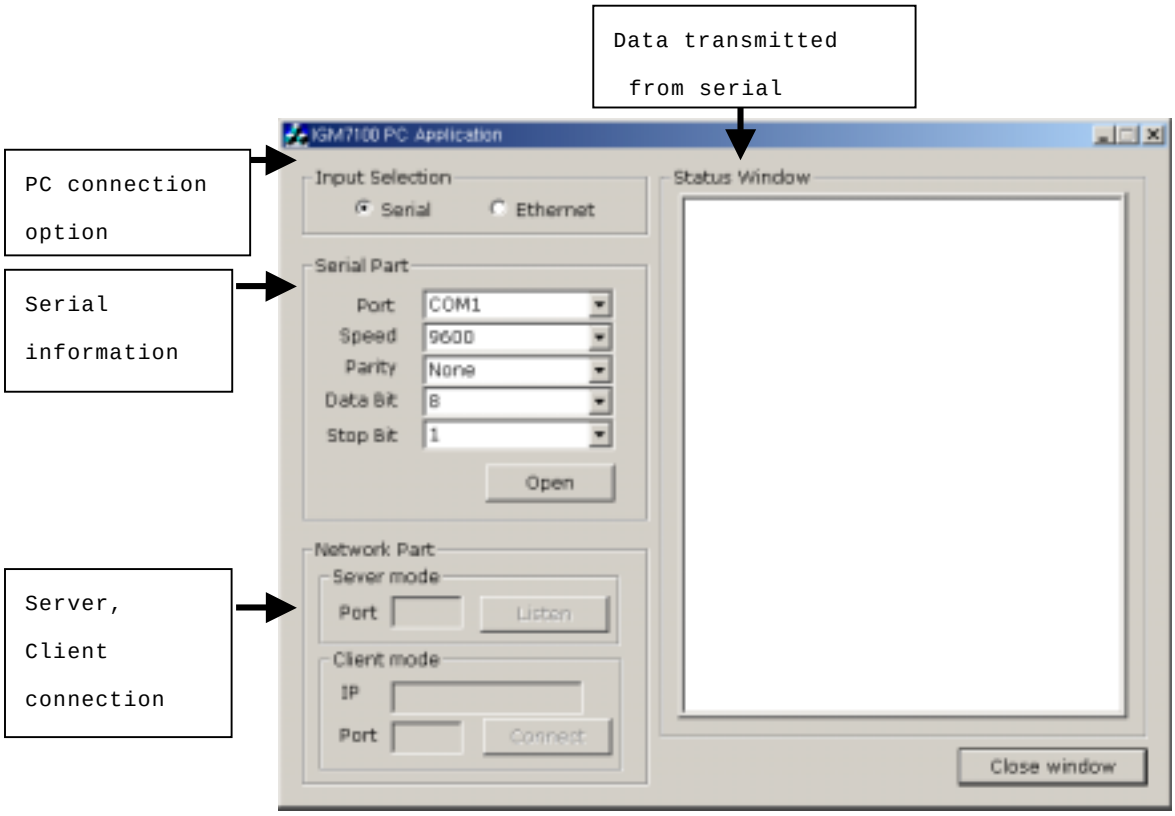
- Upload

Upload the firmware through the network.

- Close

Close the IGM_Cfgtool.exe program.

4.2.3 “IGM_PCutil.exe” Features



[Image 4-12] “IGM_PCutil.exe” Initialization Window

- Input Selection

Select connection option for PC to monitor and verify @WEB SEG32 operation in the network

- Serial part

Insert the serial information for serial connection to PC

- Network part

A. Server Mode

In case that networked @WEB SEG32 operates in client mode, insert the port number which was specified when setting the @WEB SEG32 as client mode in the server mode.

B. Client Mode

In case that networked @WEB SEG32 operates in server mode, insert the @WEB SEG3 IP address and port number in the client mode.

- Status Window

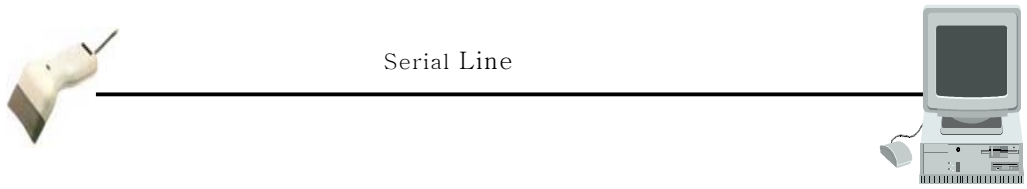
Display the status information and data from the networked @WEB SEG32.

- Close Window

Close the “IGM_PCutil.exe” program.

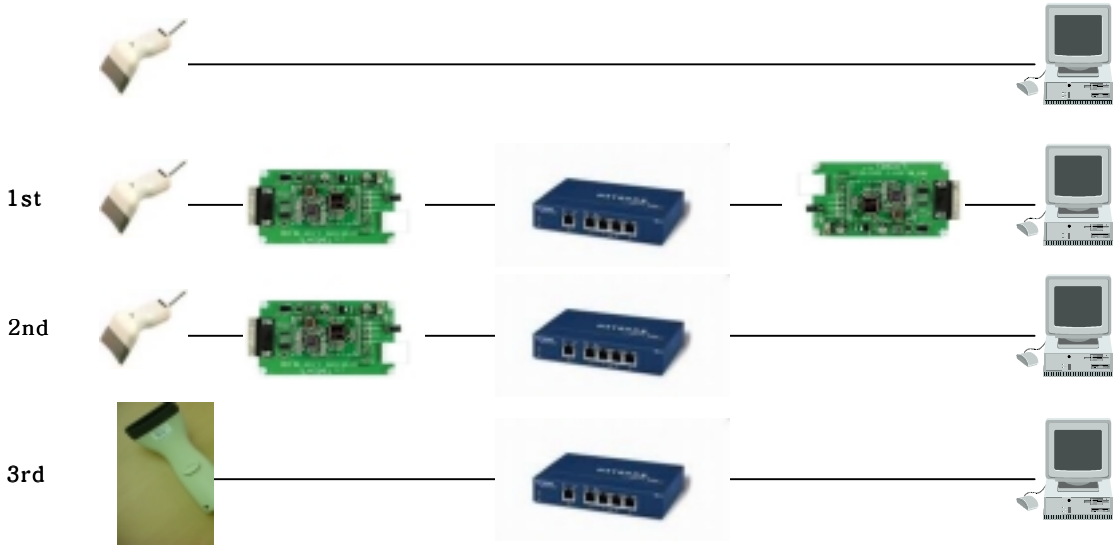
5 Test Operation

[Image 5-1] shows traditional network configuration of RS-232 based serial communication system.



[Image 5-1] RS-232 based serial communication system

System development method for data transmission and reception with serial equipment through the Ethernet instead of serial communication, in other words the design step can be categorized into 3 steps as described below.

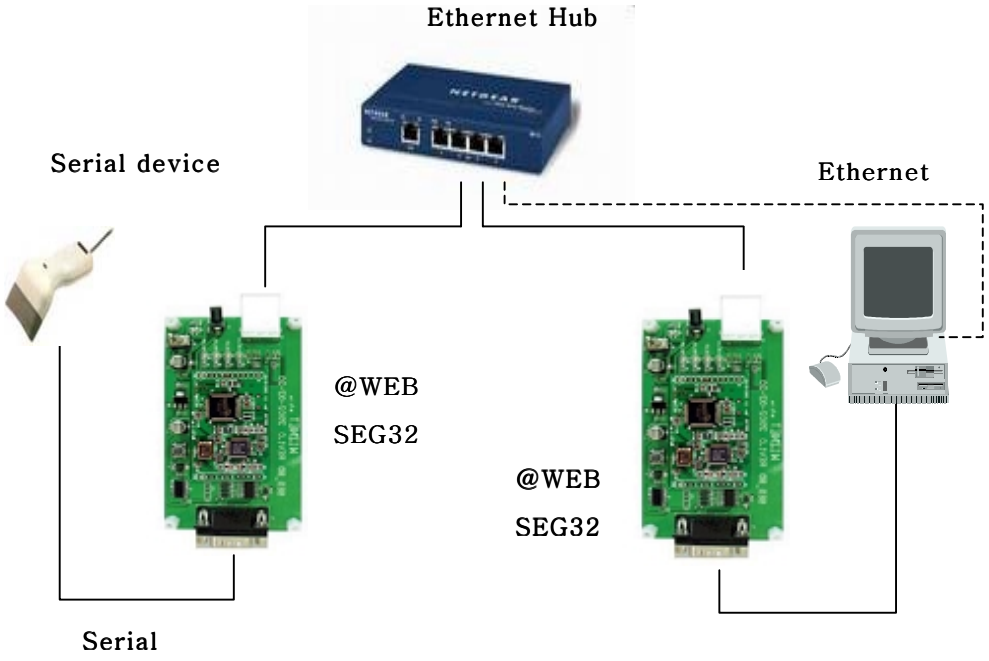


[Image 5-2] Design Step

5.1 Step 1

5.1.1 Network configuration

[Image 5-3] shows that information can be transferred between the computer and serial device through the network with two @WEB SEG32 modules with no changes made to the existing serial communication system.

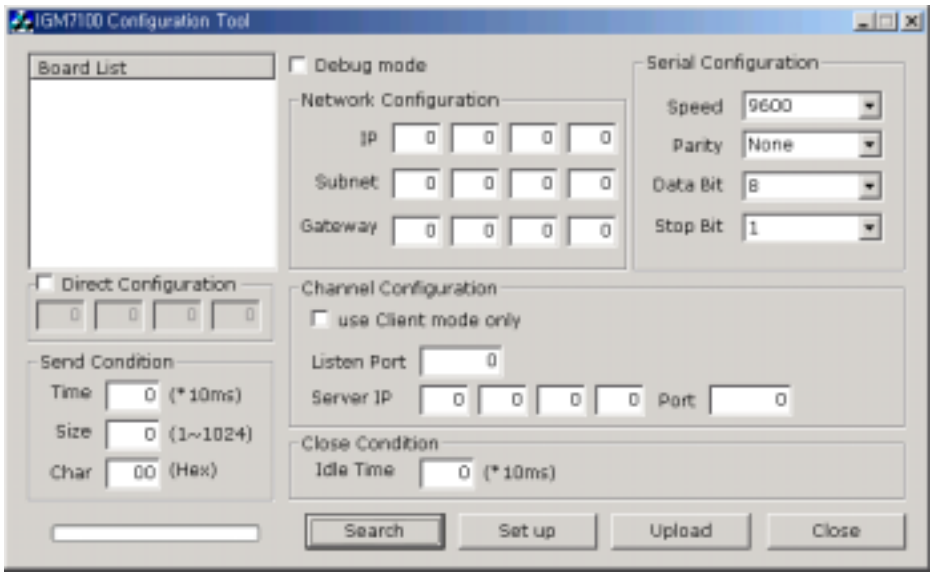


[Image 5-3] Step 1 Network Configuration

- Connect the computer and @WEB SEG32 Evaluation board (“Board A”) by using RS-232 as shown in [Image 5-3].
- Connect the serial device to a @WEB SEG32 Evaluation board (“Board B”) also using RS-232.
- Connect Board A and Board B to the hub.
- Connect the computer to the hub (required for environment setting of the @WEB SEG32 module)
- Set the switch to ON position after connecting power to each Board A and Board B.

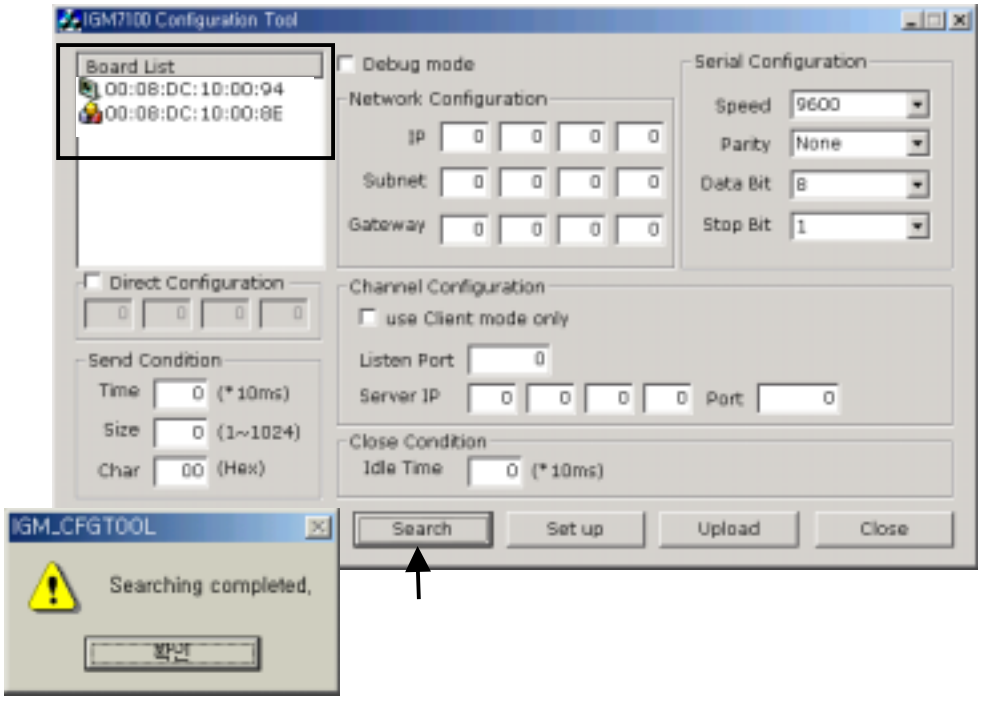
5.1.2 @WEB SEG32 Environment Setup

- Run “IGM_Cfgtool.exe”.



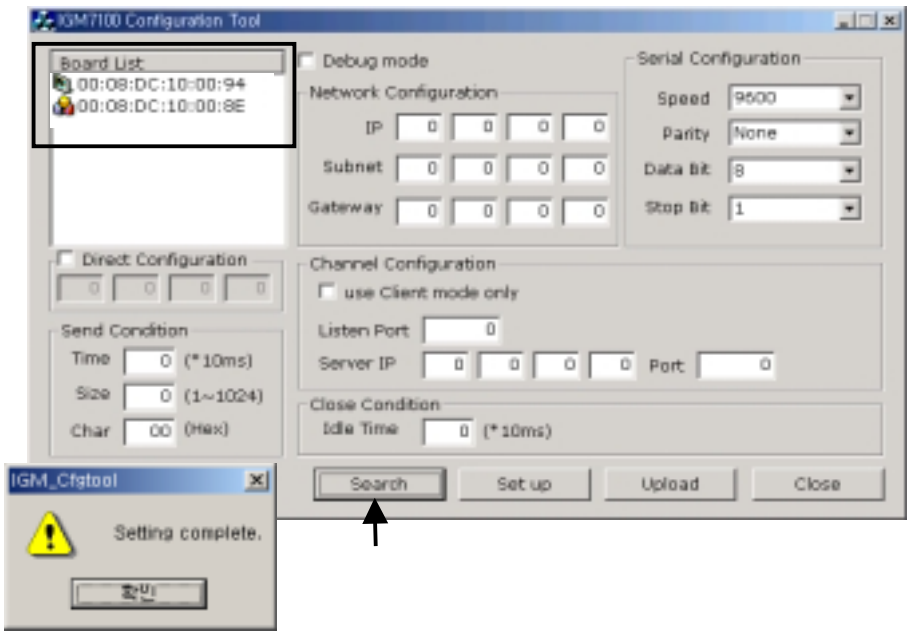
[Image 5-4] “IGM_Cfgtool.exe” Initialization Window

- Click “Search” button.
- If two boards are properly connected to the network, “Searching completed” message and MAC address of Board A and Board B will be displayed as shown in [Image 5-5].



[Image 5-5] Board Results List after Running "Find Board"

- If one of the MAC addresses displayed on the "Board List" is selected, the current setup values of the selected board will be displayed on "Board Network Configuration", "Board Serial Configuration", and "Mode Selection" (for reference, IP, Subnet, Gateway are set as "0.0.0.0", "255.255.255.0", "0,0,0,0" as default)



[Image 5-6] Initial Setup Value of Located Boards

- To modify the setup values, press “Set up” after designating the IP address, etc., then the inserted values will be setup at the board and message box showing “Setting complete” will be displayed.

[Example] Setting Board A and Board B

(1) Setting Board A

1) Network Configuration

Insert following values in the board network configuration

IP Address	211.171.137.10
Subnet	255.255.255.0
Gateway	211.171.137.1

2) Serial Configuration

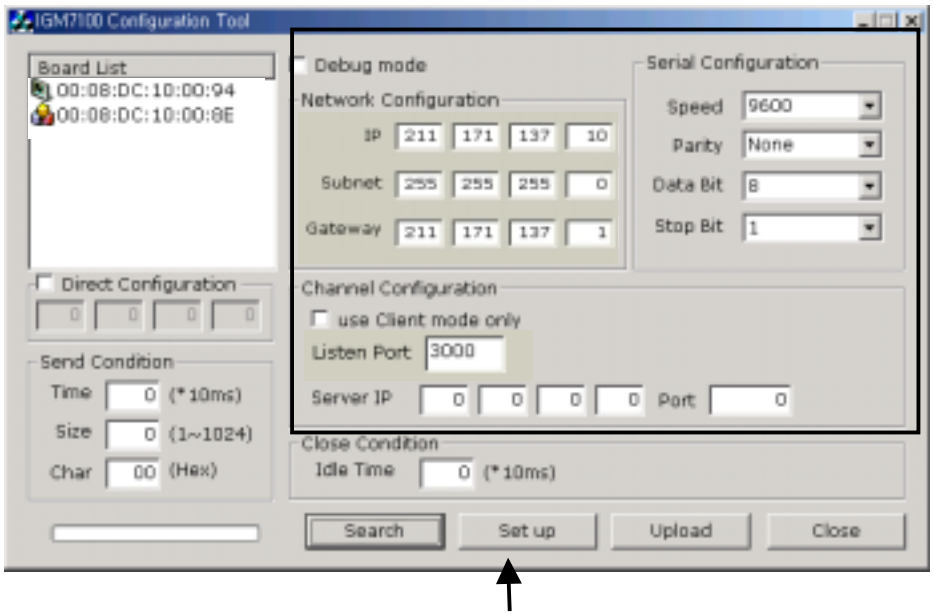
Select following values in the board serial configuration

(These values is example, so you should adjust Speed and Parity according to your serial devices).

Speed	57600
Parity	None
Data bit	8
Stop bit	1
Flow	None

3) Channel configuration

Select server mode, that is, not check 'use Client mode only', and set listen port at 3000 and Click "Set up" button.



[Image 5-7] Board A Sample Setup

(2) Setting Board B

1) Network Configuration

Insert following values in the board network configuration

IP Address	211.171.137.11
Subnet	255.255.255.0
Gateway	211.171.137.1

2) Serial Configuration

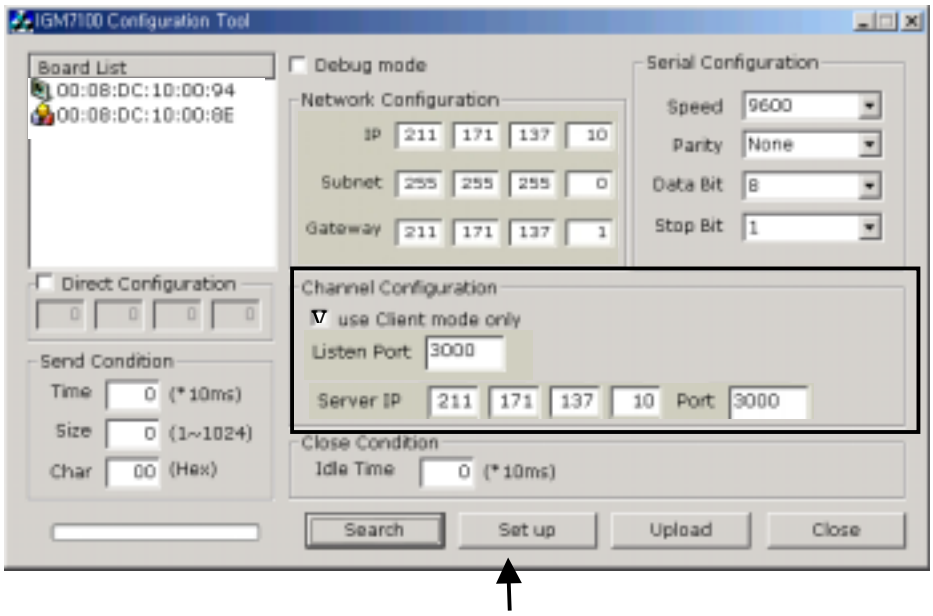
Select following values in the board serial configuration.

(These values is example, so you should adjust Speed and Parity according to your serial devices).

Speed	57600
Parity	None
Data bit	8
Stop bit	1
Flow	None

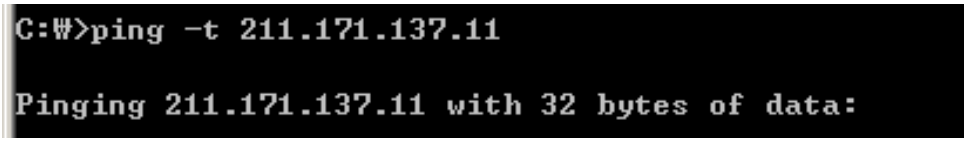
3) Channel configuration

Select client mode, that is, check 'use Client mode only', and insert Board A's IP address and port number. Click "Set up" button.



[Image 5-8] Board B Sample Setup

- Conduct ping test on the computer to see whether Board A and Board B are properly connected to the network.

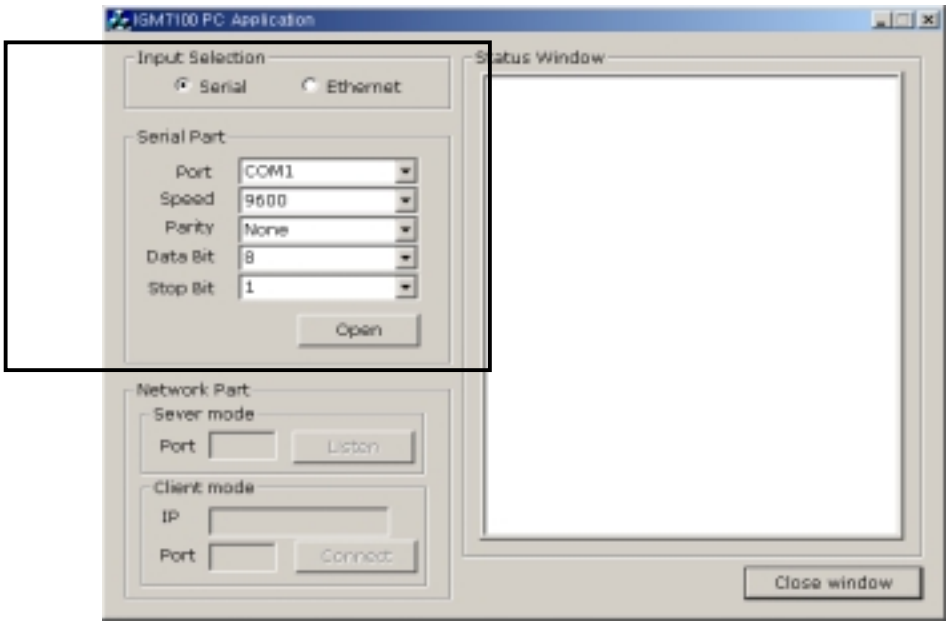


[Image 5-9] Ping test

5.1.3 Confirming Operation

1) When using “IGM_PCutil.exe”

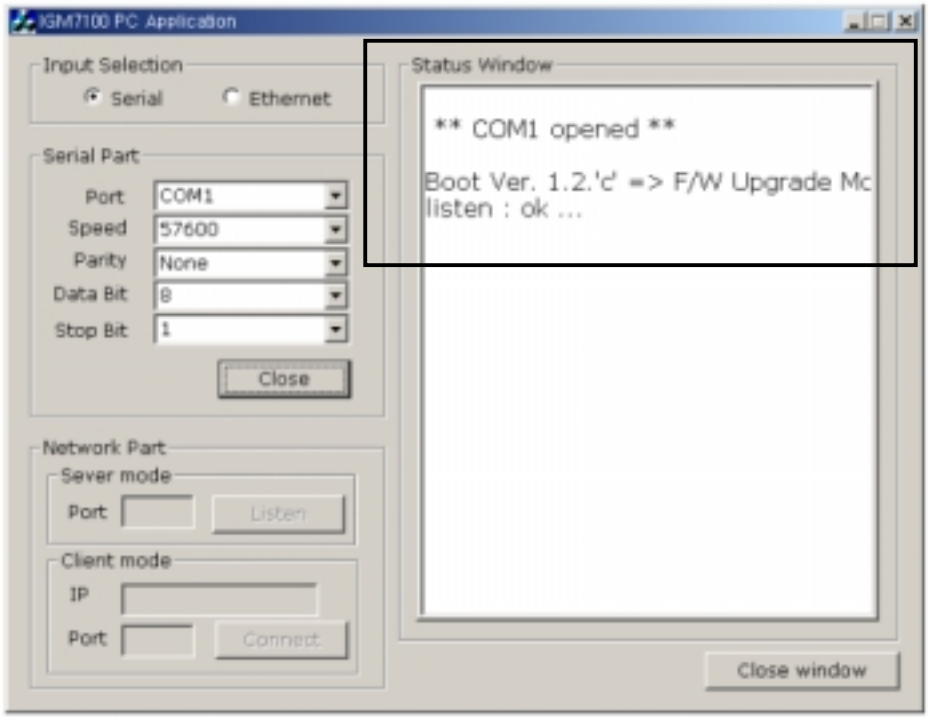
- Disconnect the UTP cable for @WEB SEG32 environment setup.
- Run “IGM_PCutil.exe” program on the computer. Program window will be displayed as shown as [Image 5-10].
- Select “Serial” of the “Input Selection” menu as shown in [Image 5-10].
- Set the values of the tabs of the “Serial Part” menu identical to the serial setup value as set by “IGM_Cfgtool.exe” and click “Open” button.



[Image 5-10]”IGM_PCutil.exe” Program Window

- Press reset button of each Board A and Board B and wait for about 2~3 seconds (time required for initialization)

- Text will be displayed on the “Status Window” as shown in [Image 5-11].



[Image 5-11] “IGM_PCutil.exe” Connection Window

- Transmit data from the serial device to PC. For example, Scan some bar codes with the scanner which is connected to Board B.
- Verify whether the data transmitted by the serial device is accurately displayed ion the status window as shown in [Image 5-11].

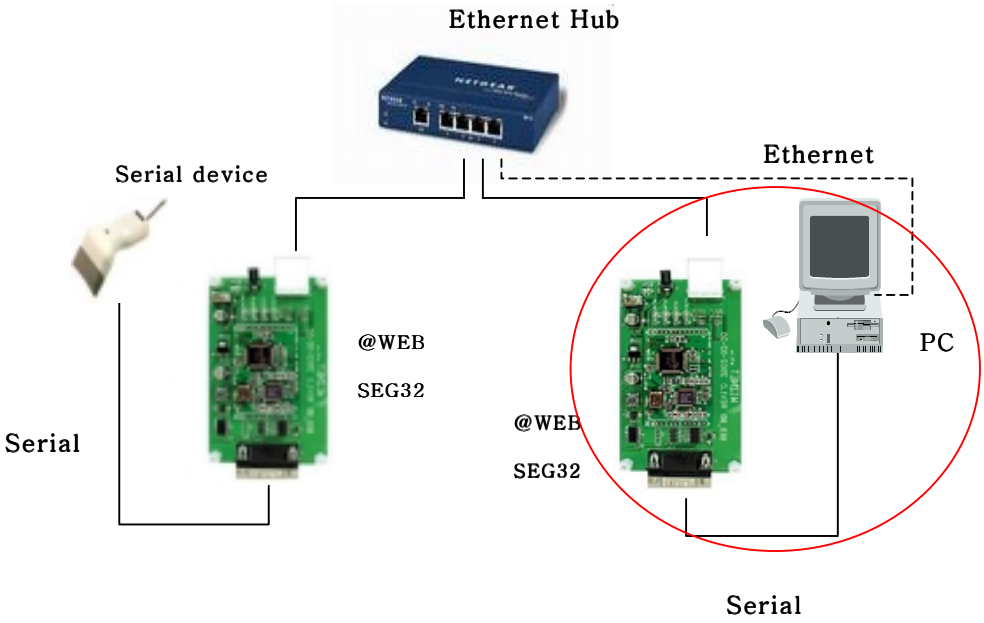
2) When using existing PC program

Run the existing program instead of “IGM_PCutil.exe” program. The remaining process is identical to 1).

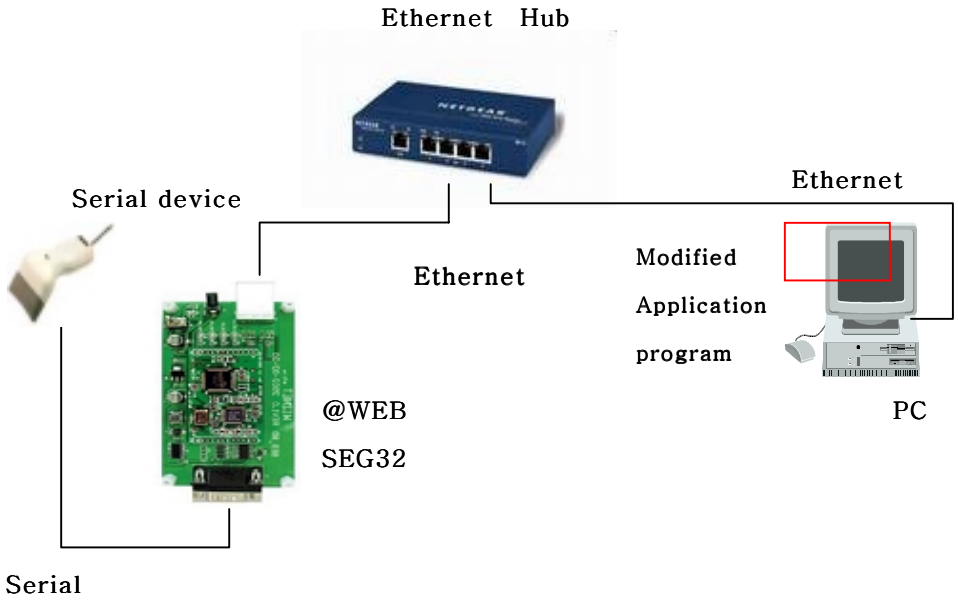
5.2 Step 2

5.2.1 Network Configuration

[Image 5-12] shows the change of existing PC application program to Ethernet communication program after removal of Board A from Step 1.



[Image 5-12] Step 1 Network Configuration



[Image 5-13] Step 2 Network Configuration

- Remove Board A from the computer as shown in [Image 5-13].
- Connect the serial device to Board B by using RS-232.
- Connect Board B to the hub.
- Connect the computer to the hub.
- Connect power to Board B.

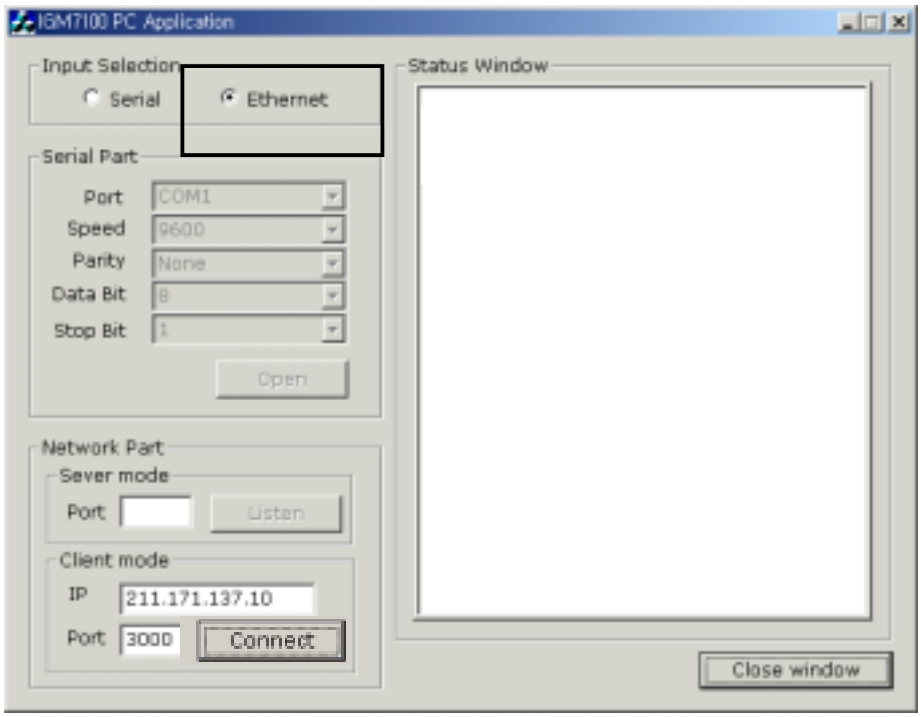
5.2.2 @WEB SEG32 Environment Setup

The setup is identical to Section 5.1.2 with the exception that only one @WEB SEG32 Evaluation board is comprised in this process (refer to Section 5.1.2)

5.2.3 Confirming Operation

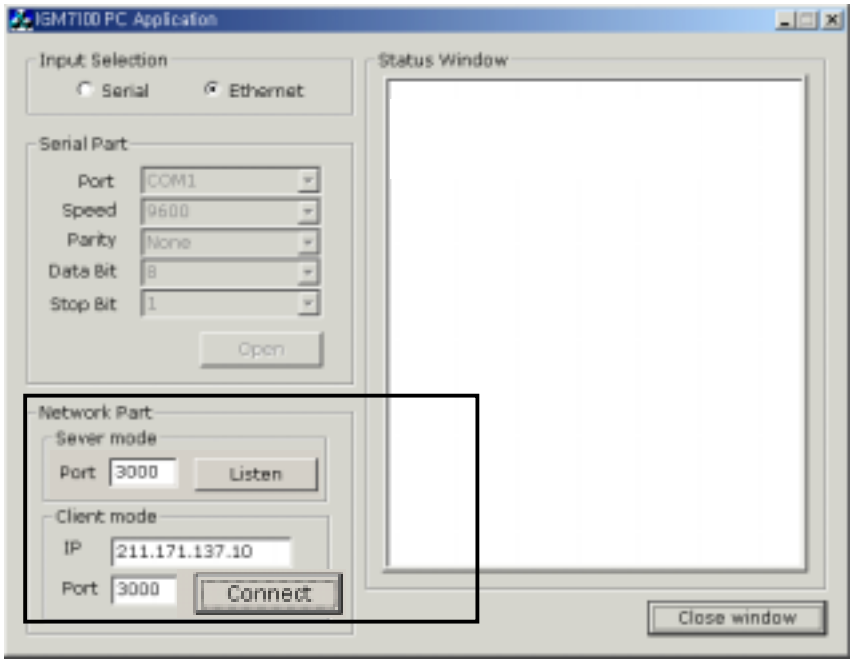
1) When using “IGM_PCutil.exe”

- Run the “IGM_PCutil.exe” program on the computer. The program window will be displayed as shown in [Image 5-14].
- Select “Ethernet” of the “Input Selection” menu as shown in [Image 5-14].



[Image 5-14]”IGM_Pcutil.exe” Program Window

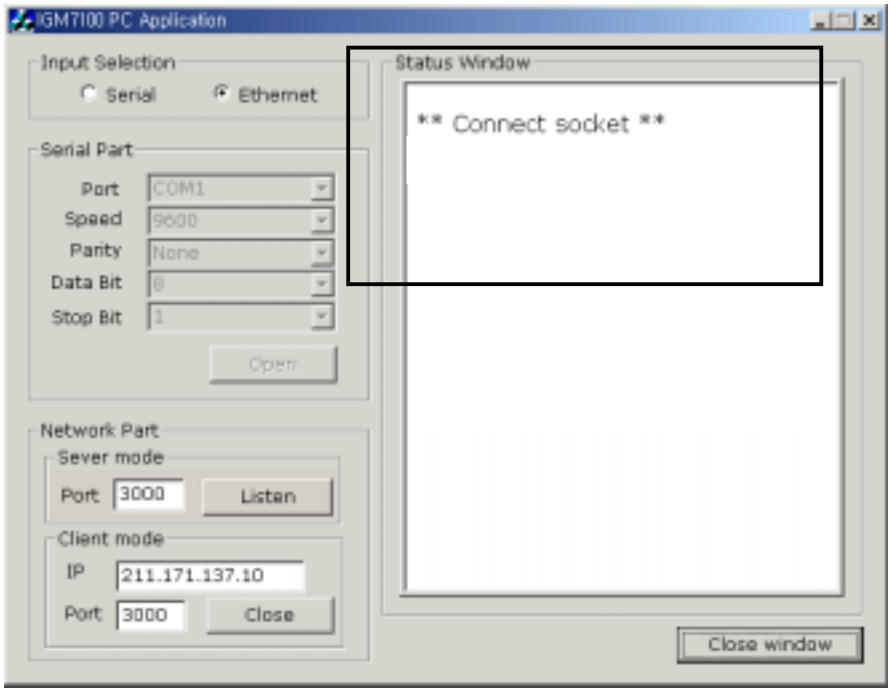
- As shown in [Image 5-15].Set the port number identical to Board A (server) in the server mode and click “Listen” button.
    - However, if the @WEB SEG32 connected to the computer was setup in Client Mode during Step 1, then it also needs to be operated in Client Mode. Insert server IP address and port number in the client mode and click “Open” button.



[Image 5-15]”Network Part” Setup Window

- Press reset button of Board B and wait for about 2~3 seconds (time required for initialization).

- Text will be displayed on the “Status Window” as shown in [Image 5-16].



[Image 5-16]”IGM_PCutil.exe” Connection Window

- Send data from the serial device.
- erify whether data sent by the serial device is accurately displayed in the Status Window as shown in [Image 5-16].

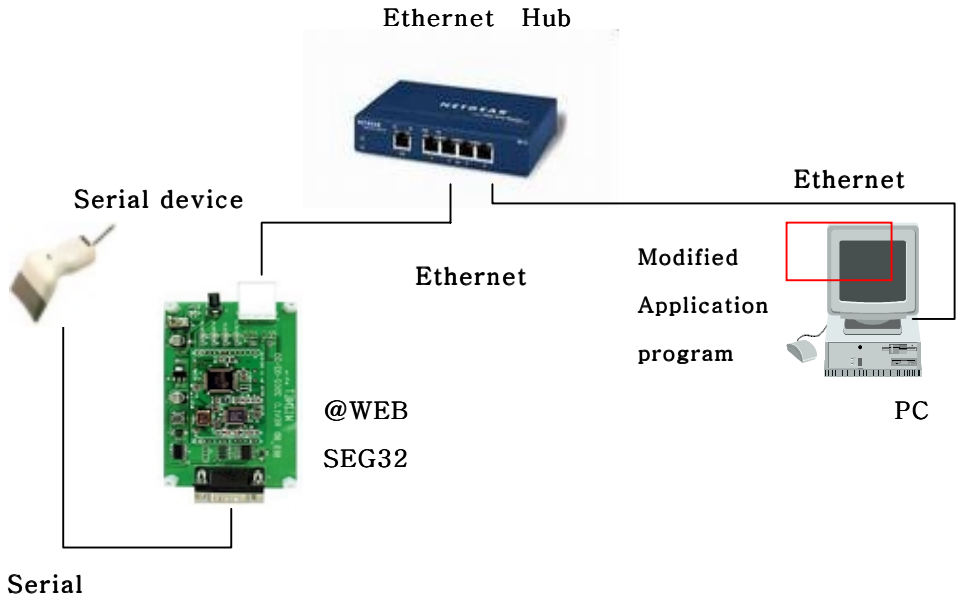
2) When using existing PC program

You can test by using “Serial IP” program, which enables Ethernet communication for serial device.

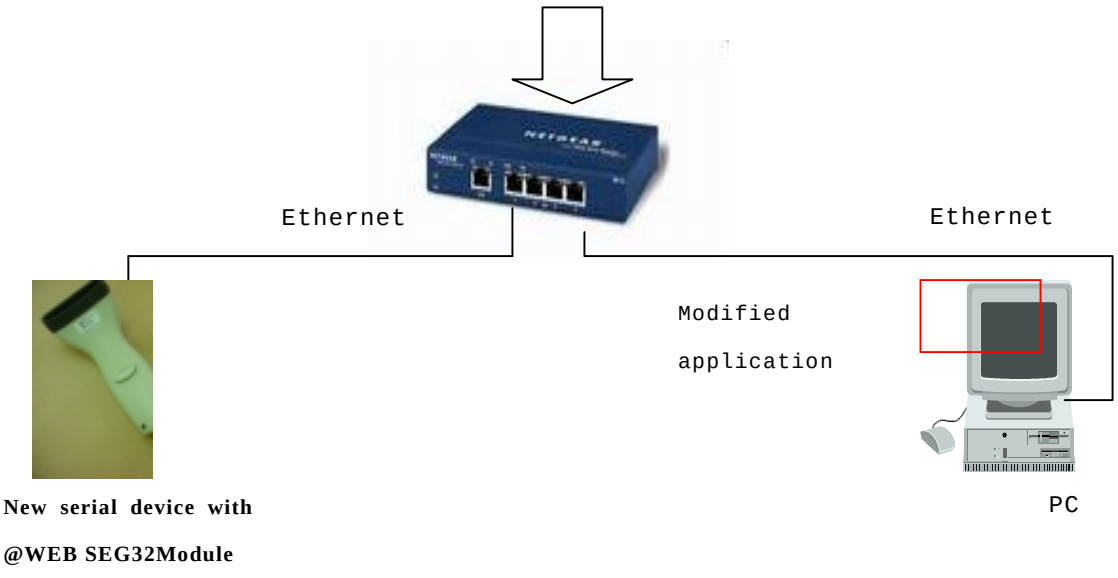
5.3 Step 3

5.3.1 Network Configuration

[Image 5-18] shows that information can be transferred between the computer and device ultimately through the Ethernet network by removing Board B in Step 2 and embedding the module on the existing RS232 serial device.



[Image 5-17] Step 2 Network Configuration



[Image 5-18] Step 3 Network Configuration

- Remove Board B from the serial device connection and embed it on-board to the serial device as shown in [Image 5-18].
- Connect computer to the hub.
- Connect the new serial device with Board B to the hub.

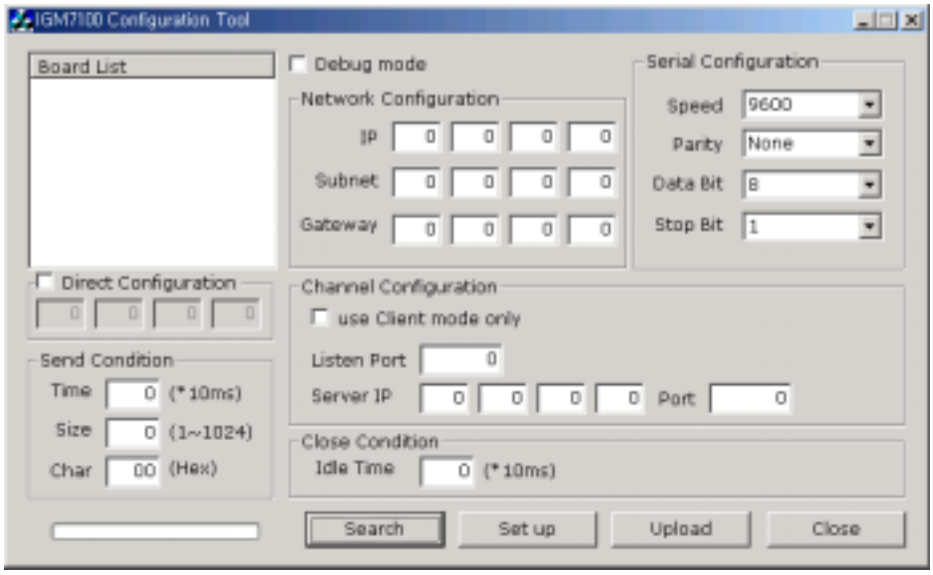
5.3.2 Confirming Operation

The process is identical to Section 5.2.3 with the exception that @WEB SEG32 Evaluation board is installed onto the serial device (refer to Section 5.2.2). The purpose of this step is to describe a new product integrating the serial device and @WEB SEG32 Module, and the executing method is identical to Section 5.2.2.

6 Auxiliary Functions(Firmware Uploading)

6.1 When using “IGM_Cfgtool.exe” program

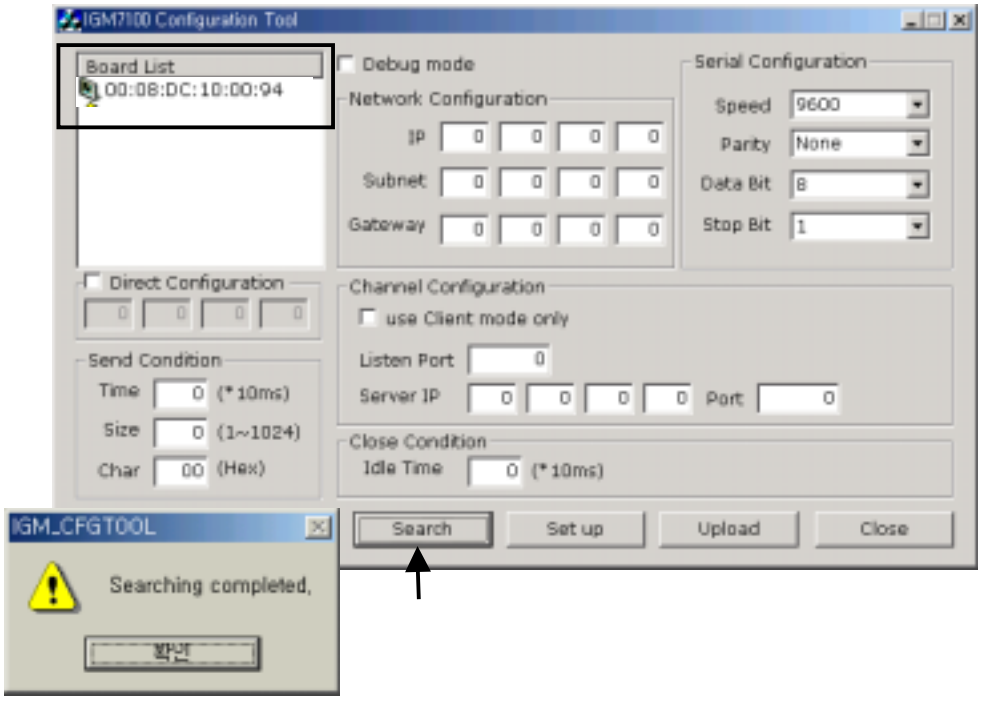
- Run IGM_Cfgtool.exe after completing board connection.



[Image 6-1] “IGM_Cfgtool.exe” Initialization Window

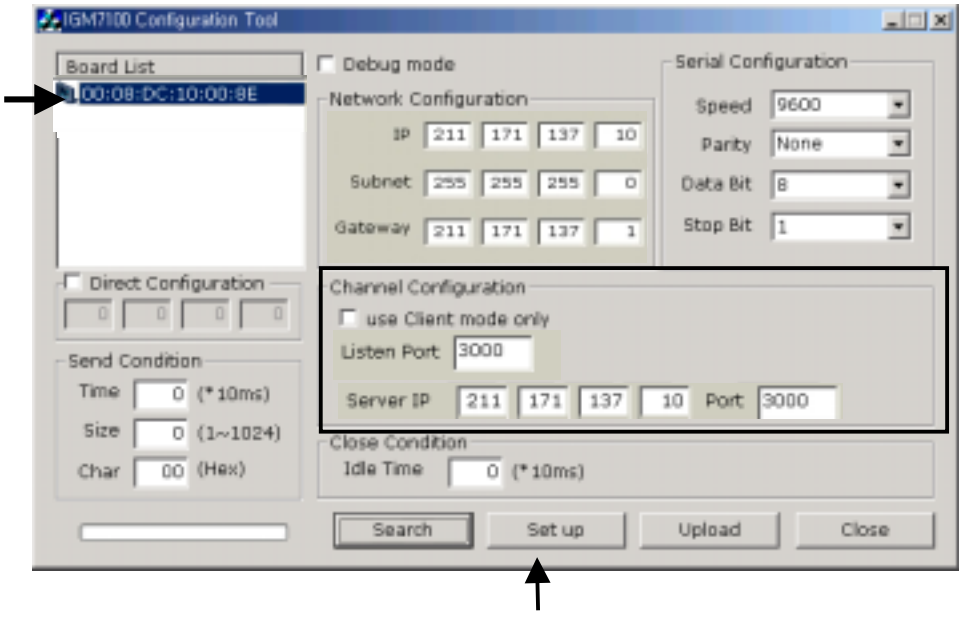
- Click “Find Board” button.

- If the board is properly connected to the network, “Searching completed” message and MAC address will be displayed on the “Board List” as shown in [Image 6-2].



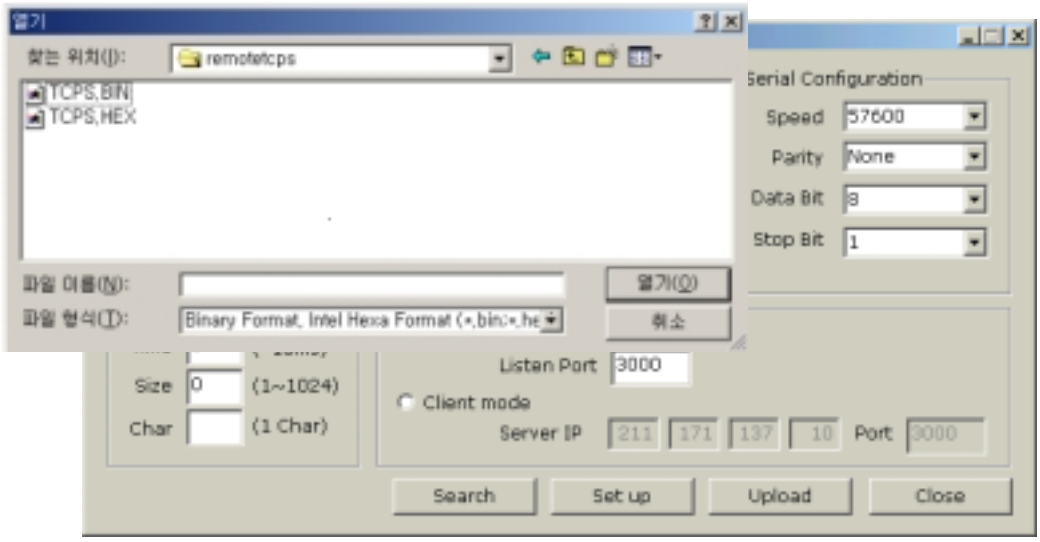
[Image 6-2] Board Search Window

- Select board for upload and click “Upload” button.



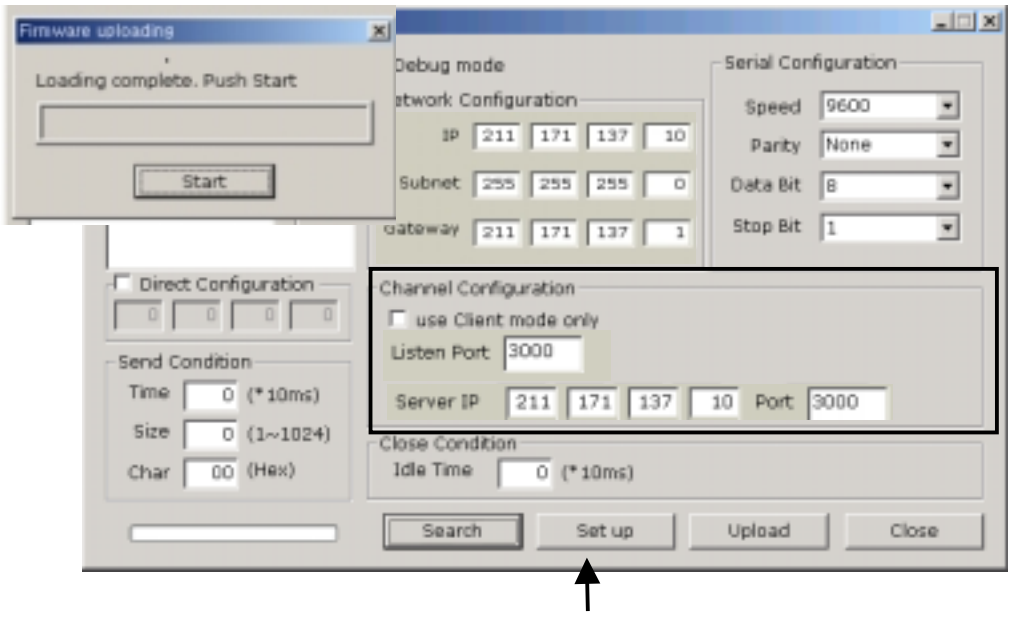
[Image 6-3] Upload Selection Window

- When the window as shown in [Image 6-4] is displayed, select file for upload and click “Open” button (files must be converted to Hex or bin format before uploading).



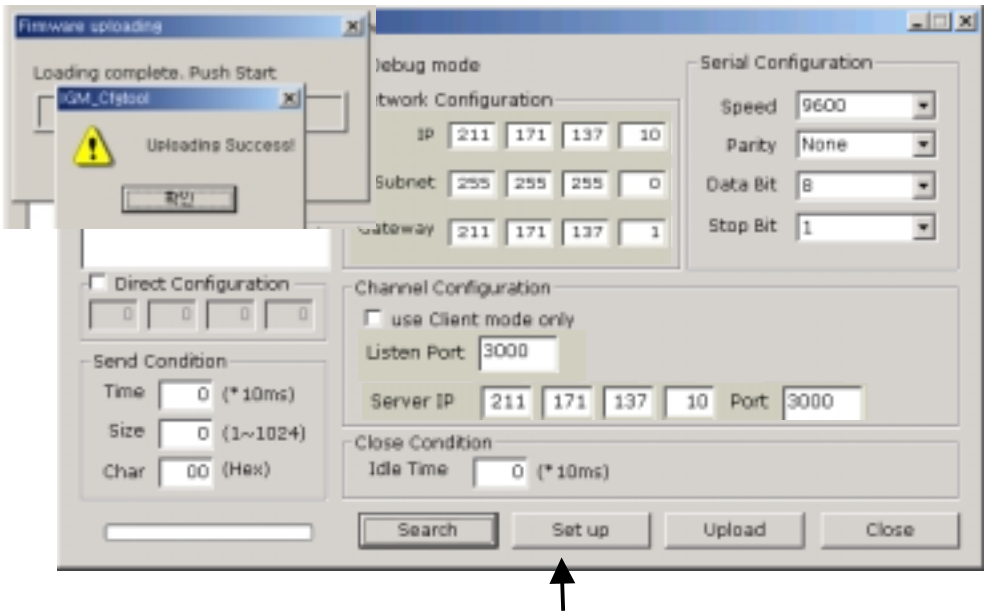
[Image 6-4] Firmware Selection for Upload

- A dialogue box with “Firmware uploading” will be displayed as shown in [Image 6-5]. Press “Start” button to start uploading the firmware file to flash memory of @WEB SEG32 module.



[Image 6-5] Firmware Uploading

- When uploading is complete, a message box with “Uploading Success” will be displayed as shown in [Image 6-6].



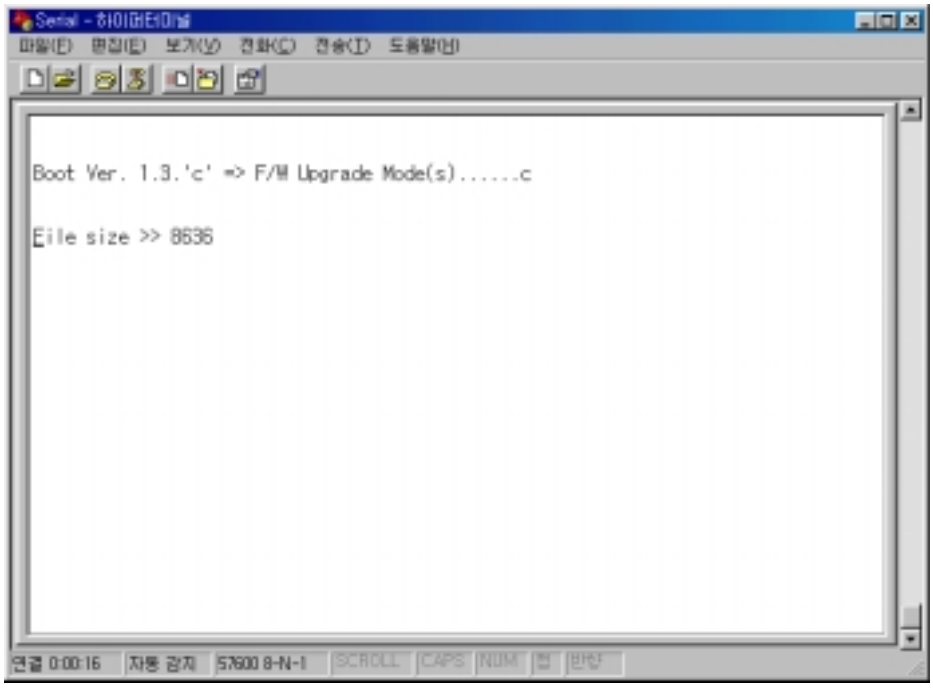
[Image 6-6] Uploading Complete

6.2 When doing serial upload

- Connect @Web SEG32 Evaluation board serial port and computer serial port by using the serial cable.
- Run terminal emulator such as the hyper terminal and switch on the power.
- When starting, press ‘c’ on the keyboard to start the firmware upgrade mode.

Firmware Upgrade Mode is accessible only during the 2-second initialization process, therefore ‘c’ needs to be pressed immediately after initialization otherwise it will be changed automatically to the existing firmware mode.

- Insert file size (bin file size) and press enter key.
- After selecting text file send, select bin file for transmission to transmit the file, update the firmware and complete the firmware update, then a new firmware will be running.



[Image 6-7] Hyper Terminal Window