Promi-MSP™

User Guide

Version 2.6.0 **(2006.02.24)**

For Wireless Multi-Serial Communications,
based on Bluetooth Technology

by Bluetooth

Enabling Wireless Serial Communications

Contents

Revision History: User Manual of Promi-MSP™

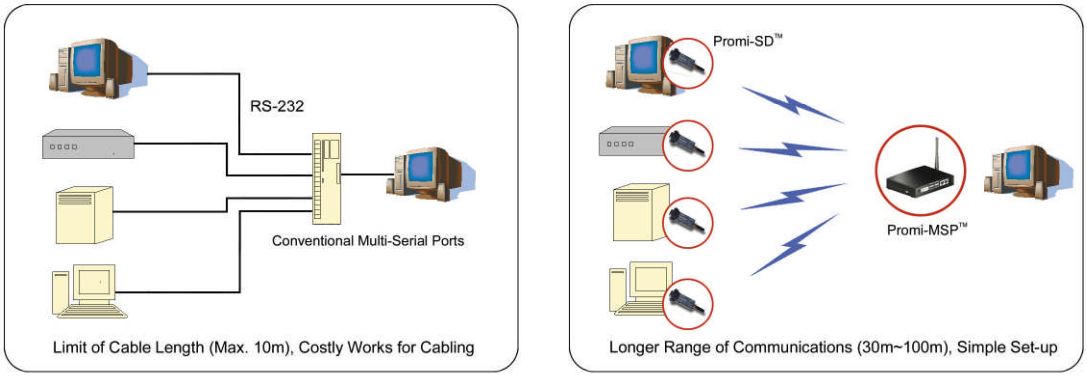
Version	*Changed Contents*	*Date*
1.0	Draft version	01/02/2003
1.1	Added user guide for Promi-MSP software	07/14/2003
1.2	Promi-MSP software upgrade and New commands added	08/11/2003
2.0	New functions of Promi-MSP102 series added	09/10/2004
2.5	Appedix merged. AT Command Interface added. Serial/IP added.	07/20/2005
2.6	Information of manufacturer was added.	02/24/2006

1. About Promi-MSP™

Promi-MSP™ is a Bluetooth-wireless multiple serial server for minimum 7 to maximum 14 devices; an option to conventional multi-serial ports. Wireless Promi-MSP™ results in dramatic installation cost and time savings.

With Promi-SD™ installed at RS-232 interfaced terminals, Promi-MSP™ affords dependable convenience for a variety of serial communications environments.

Refer to the figure 1.1. below:



<Fig. 1.1>

Promi-MSP™ has Bluetooth protocol stack qualified by Bluetooth SIG, which assures standardized, secure and scaleable serial communications. Promi-MSP™ identification of data, per each additional unique Bluetooth SPP enabled device address, prevents data jam.

Bluetooth's 2.4GHz frequency-hopping system is resilient to RF interference from sources such as Wireless LAN. Increased communications security is possible via optional user set-up authentication.

Promi-MSP™ transmits data from each Bluetooth devices to Host PC via TCP/IP Ethernet. Host PC also responds to each Bluetooth devices wirelessly via Promi-MSP™.

Non-TCP/IP legacy serial applications can make use of Promi-MSP™ without any modification to the application in thanks to the COM port redirector software, such as Serial/IP. More information can be found in chapter 9.

<Table 1.1> Promi-MSP™

Model	Hardware Interface	Specifications
Promi-MSP 102(a) (Part no. : MSP00-10201) (MSP102+USB Dongle)	LAN 10/100 x2, Inclusive Hub function. Ethernet/RS232C com. supported Built-in Bluetooth1 USB A-type port for USB extension dongle (**Max. 7 Bluetooth links**)	Coverage : 100m Data rate : Max. 723 Kbps Frequency: 2.4GHz COM port redirector - Serial/IP* Supported Networks HTTP / FTP / Telnet / IP-sharing(NAT) / DHCP /PPP server
Promi-MSP 102(b) (Part no. : MSP00-10202)	LAN 10/100 x2, Inclusive Hub function. Ethernet/RS232C com. supported Built-in Bluetooth 1 USB A-type port for USB extension dongle (**Max. 14 Bluetooth links**)	

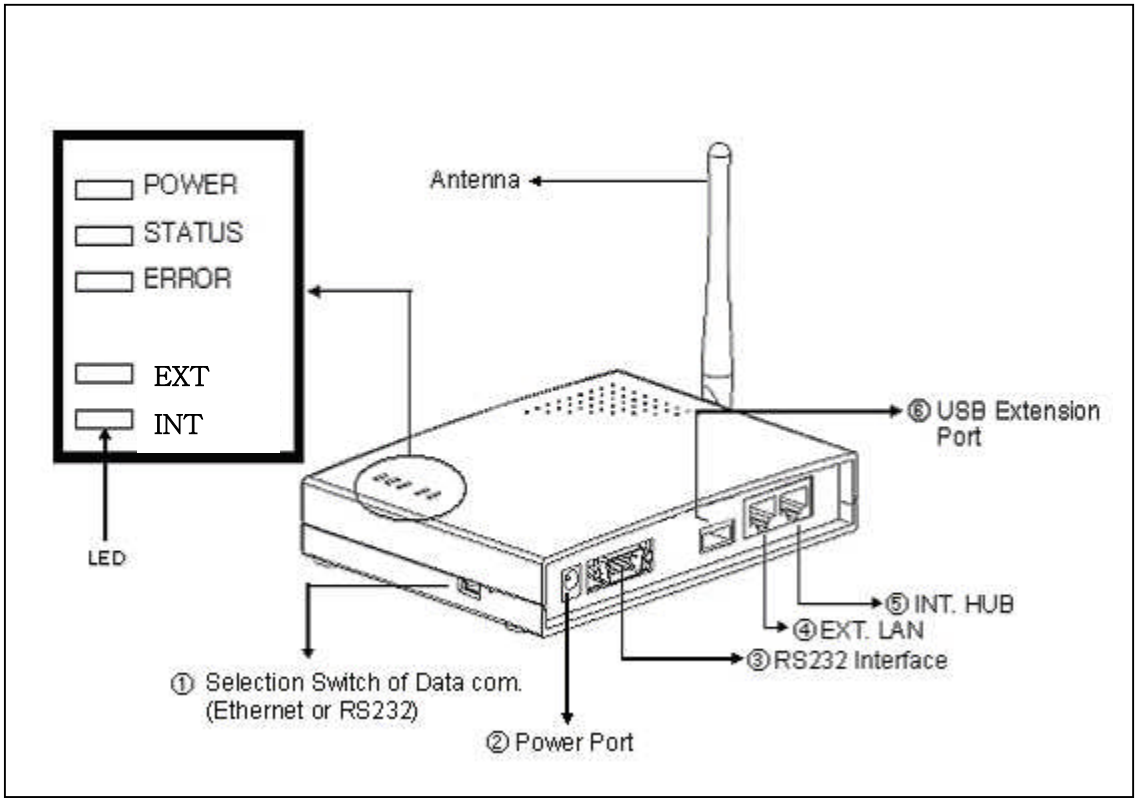
* Promi-MSP101 was phased out as of August, 2004.

* Serial/IP is shipped with Promi-MSP since July, 2005

One Promi-MSP™ set includes:

Hardware	Quantity	Remarks
Promi-MSP™	1	
Power Adapter	1	
Antenna	1	
RS232 cable	1	
Software and Manual in CD	1	
USB extension Dongle	1	For Promi-MSP102(b) only
Anchor Support	1 Set	

1.1 External View



<Fig. 1.2> Promi-MSP 102(a)/(b) external view

① DIP Switch

Users may select the way of data communication with host PC. Default setting is TCP/IP communication using no. ④ **RJ45 marked EXT,** but if users need, data communication via no. ③ RS232 Interface marked "IOIOI" is also possible.

- If DIP switch is on the side of drawing , Promi-MSP communicates with Host via Ethernet line (TCP/IP).
- If users want to use RS232 com. please change the direction of switch to the other way. (effective after power-cycling)

② **Power Port**: For Power Adapter connection

③ **RS232 Interface marked "IOIOI"**:

For Promi-MSP network configuration via RS232 serial cable - One RS232 serial cable, both ends female DSUB interfaces, is provided with Promi-MSP.

This port can be used for both Configuration of Promi-MSP and Data communication with Host.

④ **RJ45 marked EXT**.: For connection to Host or hub devices. For connection to PC, use a **Crossed cable**; for connection to hub, use Straight Ethernet cable.

⑤ **RJ45 marked INT**.: Hub port for connection to another Promi-MSP™. With this, Promi-MSPs can be chained without network hub. This is for the better user experience of convenient installation. Use a straight cable for this purpose.

⑥ **USB Extension Port**: For expanding multi-connection beyond 7 devices. A Bluetooth USB extension dongle will be supplied with Promi-MSP102(b) for extension of 7 connections.

<Fig. 1.3> Promi-MSP 102(b) attached with USB extension dongle

NOTE:

USB dongles provided only by SENA will be able to operate at Promi-MSP102(b). USB dongles from other mfg. cannot be used for extension of Bluetooth connections.

NOTE:

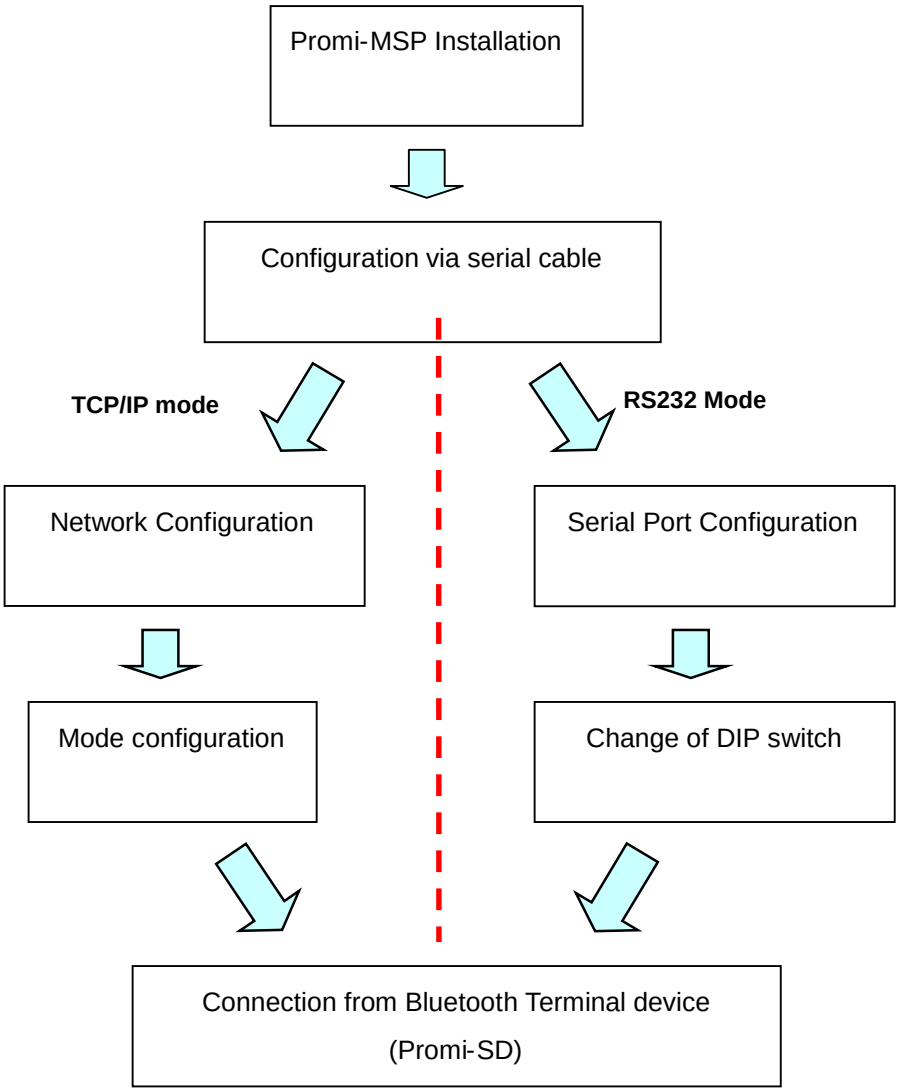
RF Characteristic of USB extension dongles may differ from the built-in Bluetooth module of Promi-MSP.

1.2 LED indicators

- POWER: POWER ON/OFF Status
- STATUS: Promi-MSP™ Status
- ERROR: Error Event Status
- LINE/ACT1, LINE/ACT2: RF45 connections Status

STATUS LED	ERROR LED	Description
ON	OFF	Normal
Blinking	OFF	Connecting to Station MSP (in Repeater Mode)
OFF	ON	Internal Bluetooth module operation malfunction
ON	Blinking	LAN connection Error (Connecting to ADSL or waiting for DHCP server response)
Flashing	Flashing	Upgrading Firmware ***DO NOT turn off Promi-MSP during firmware upgrade***; turning off Promi-MSP during firmware update may impair operability

2. Installation



TIP

If you are going to use Promi-MSP as RS232 mode – RS232 communication with Host, you don't need to configure Networking settings.

2.1 Network Settings

(1) Promi-MSP™ power-up; 'POWER' and 'STATUS' LEDs display green

(2) Promi-MSP™ network configuration: connect Promi-MSP™ to PC via RS232 cable

(3) Open HyperTerminal

(4) Set PC COM port;
Baud rate 115200 / 8 Data bit / non-parity / 1 stop bit / no hardware flow control

(5) Press Enter key; ***the following information is displayed on HyperTerminal screen***; If Promi-MSP™ prompts Login ID/password, default values are:

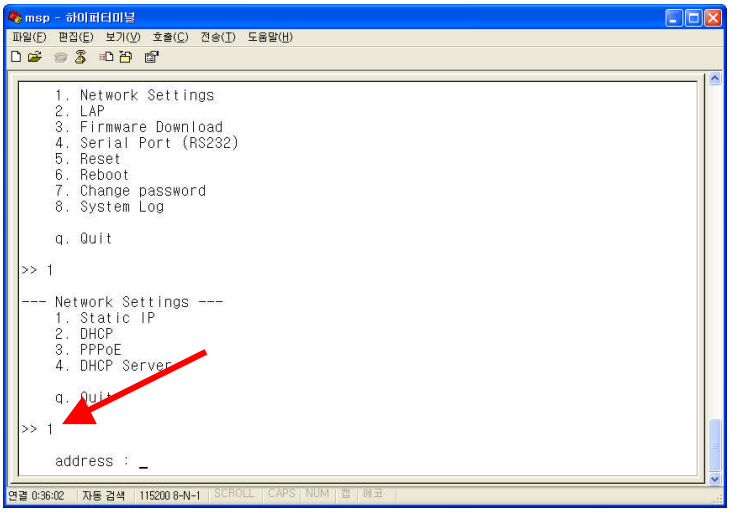
Login: admin
Password: 11111

(6) **Default Promi-MSP™ IP address factory setting is 192.168.1.10**. Revise to user appropriate networking environment IP address

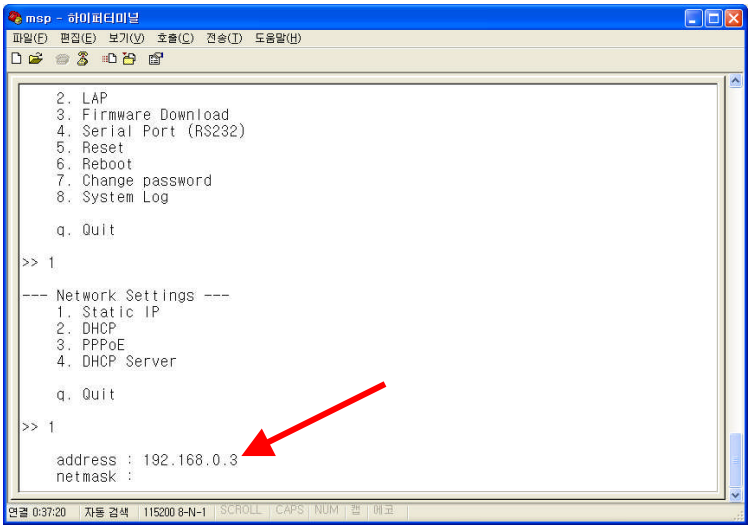
(7) To revise Network Settings, click main menu Number. Enter "1"
as displayed below.

(8) Network Settings sub menu is displayed.
Description:
1. Static IP: For Assigning Promi-MSP™ a static IP
2. DHCP: For Assigning Promi-MSP™ IP using DHCP
3. PPPoE: For assigning Promi-MSP™ IP using PPPoE
4. DHCP server: For instant network setting. Promi-MSP assigns temporary IP to PC.

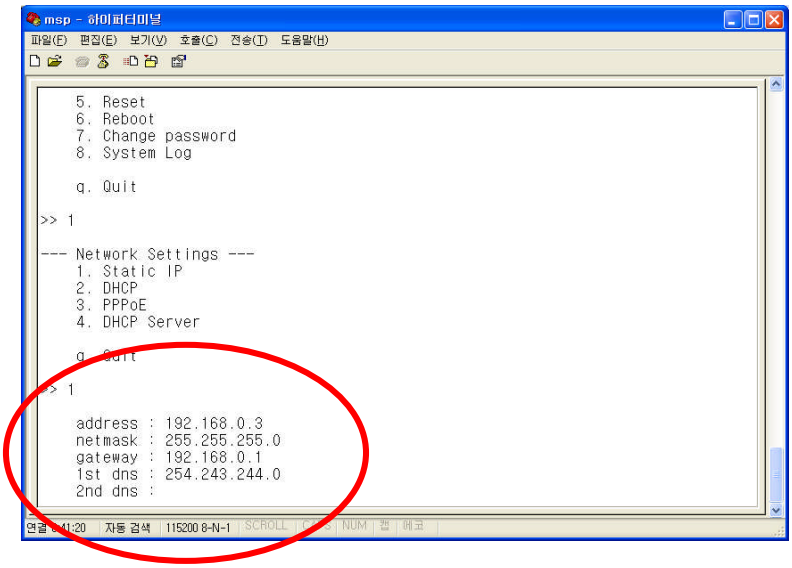
(9) If No. 1, Static IP, is selected, the following is displayed on screen:



(10) Enter user Static IP address. In the example below, 192.168.0.3 is entered for the Promi-MSP™ IP address. Enter the user network appropriate IP address.



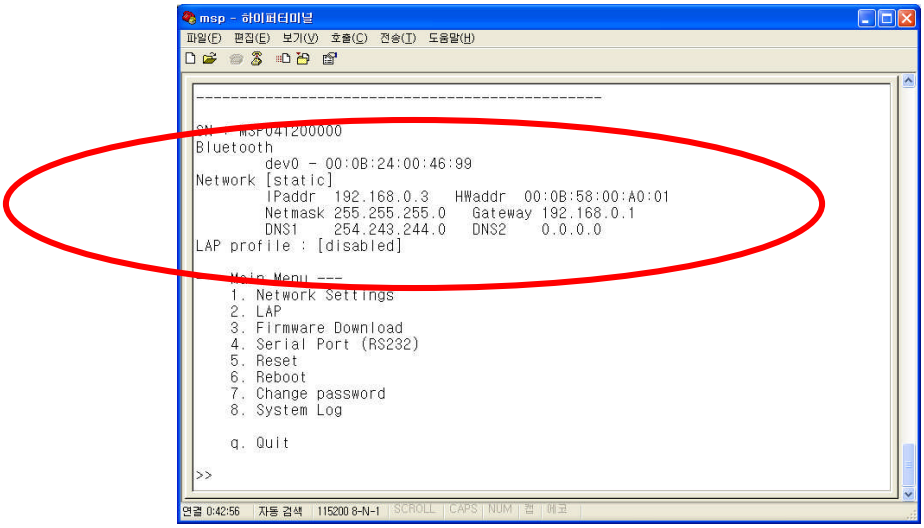
(11) Please enter your Netmask/Gateway/DNS information, as in below for example:



(12) Press Enter; Promi-MSP™ will prompt reboot request. Enter 'Y' [Yes]; press Enter to reboot Promi-MSP™ to apply the revised Network Settings.

(13) Enter Login ID and Password. Default ID: admin, Password: 11111

(14) Revised Network settings are displayed



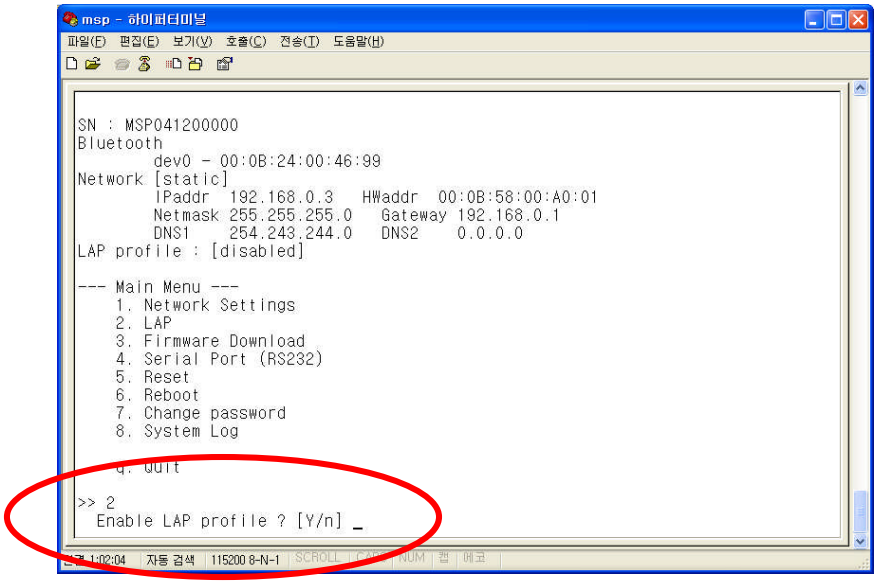
<An example: Revised Network Settings>

(15) Networking configuration is complete. The preceding example shows static IP assignment to Promi-MSP™. User selects static, DHCP or PPPoE IP as needed.

2.2 LAN Access Profile

Promi-MSP™ supports LAN Access Profile for Bluetooth networking Access Point. By direct connection of Promi-MSP™ to ADSL, the internet is accessible via Bluetooth.

Select menu 2. LAP by entering '2'; Promi-MSP™ prompts for LAP profile enable/disable. Select 'Y' [Yes] to enable or 'N' [No] to disable LAP profile.



TIP:

For Internet connection, both LAP and NAP devices may access to the internet. For more information, please refer to chapter 8.

2.3 Firmware Download

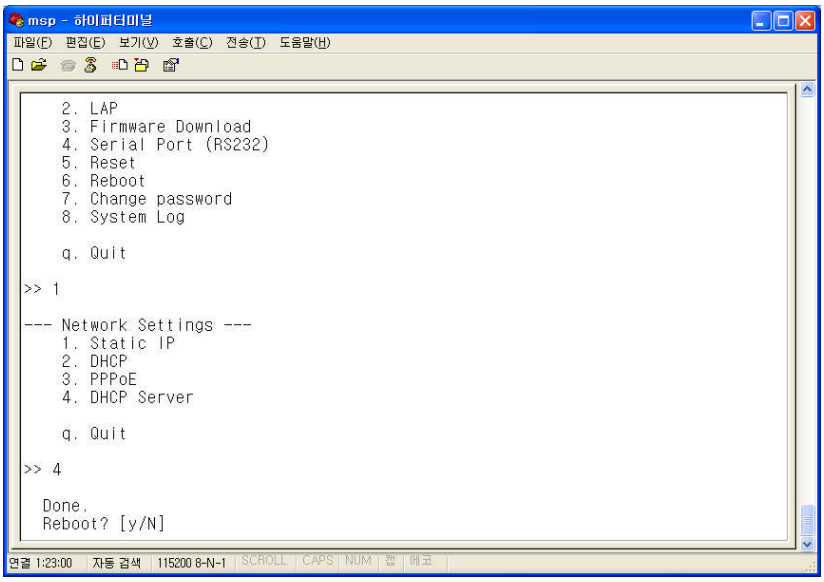
Promi-MSP is upgradeable with the latest firmware. The SENA customer support team offers available firmware, with which user upgrades Promi-MSP by himself via TFTP or Xmodem user download; menu no. 3. Firmware Download.

During Firmware download, STATUS and ERROR LEDs flash. DO NOT TURN OFF Promi-MSP™ during firmware upgrade. Turning off Promi-MSP™ during firmware upgrade may result in irreversible operation malfunction.

There are two methods of firmware upgrade: 1. TFTP 2. Xmodem.

2.3.1 Firmware Upgrade via TFTP:

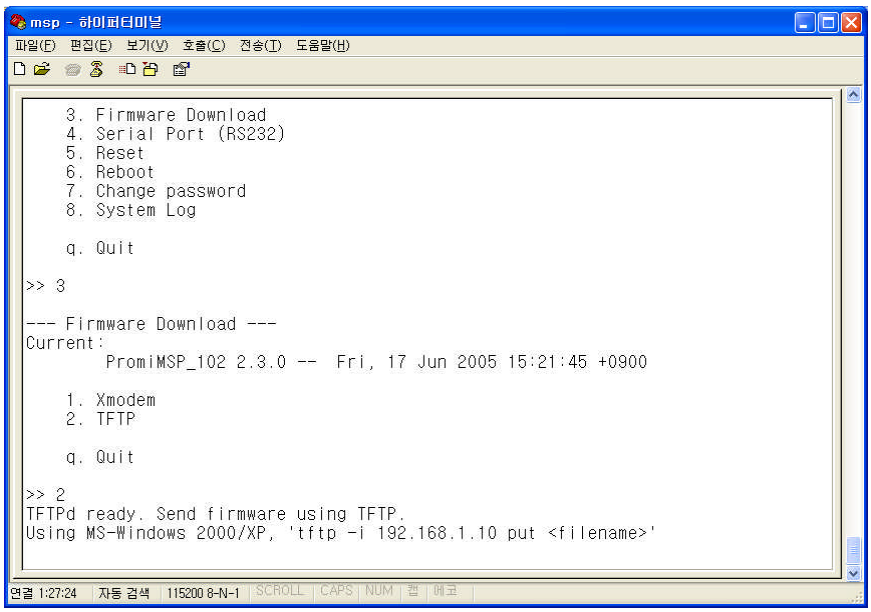
- Users may upgrade the firmware using TFTP via crossed LAN cable. Connect Promi-MSP to PC with crossed LAN cable and change network setting to 'DHCP server' as below. Make sure Host PC to be configured using DHCP.



After rebooting, enter to Firmware Download menu.

3. Firmware Download → 2.TFTP

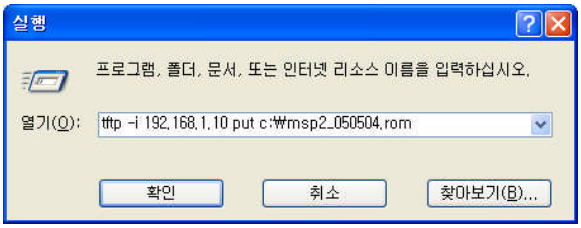
- Then you will get following screen:



- Place the MSP upgrade ROM file which is downloaded from SENA web site to C:\ folder on your PC and run tftp command on [Start] →[Run] as below.

- Users need to make sure that the upgrade ROM file is in the same location or users need to specify the exact location to send the ROM file to the connected Promi-MSP via crossed ethernet cable.

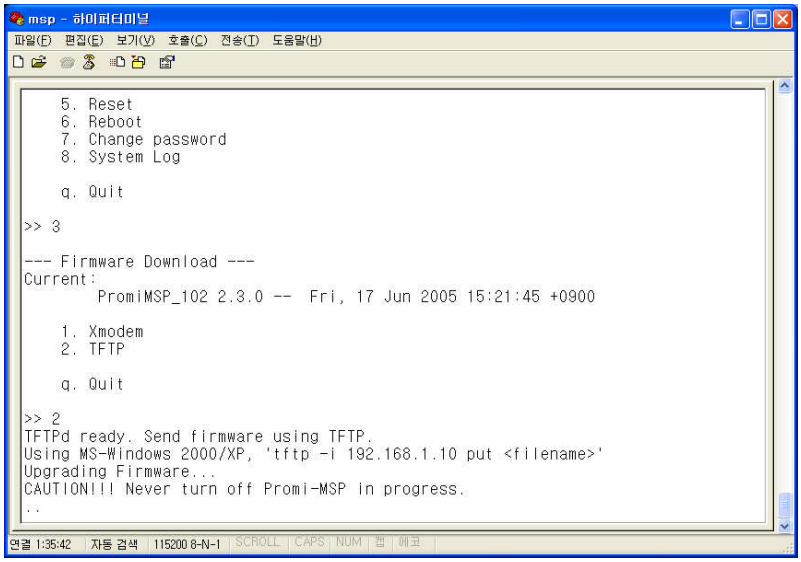
- Below window is showing the procedure of sending ROM file named “msp2_040906.rom” to the connected Promi-MSP via TFTP.



- Users will be able to check the status of firmware upgrade in Serial console.

- During upgrade, LEDs will flash and users SHOULD NOT turn off Promi-MSP this time. If user cannot send the ROM file, please check the network connection status.

- Once ROM file is delivered to the connected Promi-MSP, the upgrade firmware will be recorded to nonvolatile memory. During this time both STATUS LED and ERROR LED will flash speedily. NEVER turn off Promi-MSP during this firmware recording.

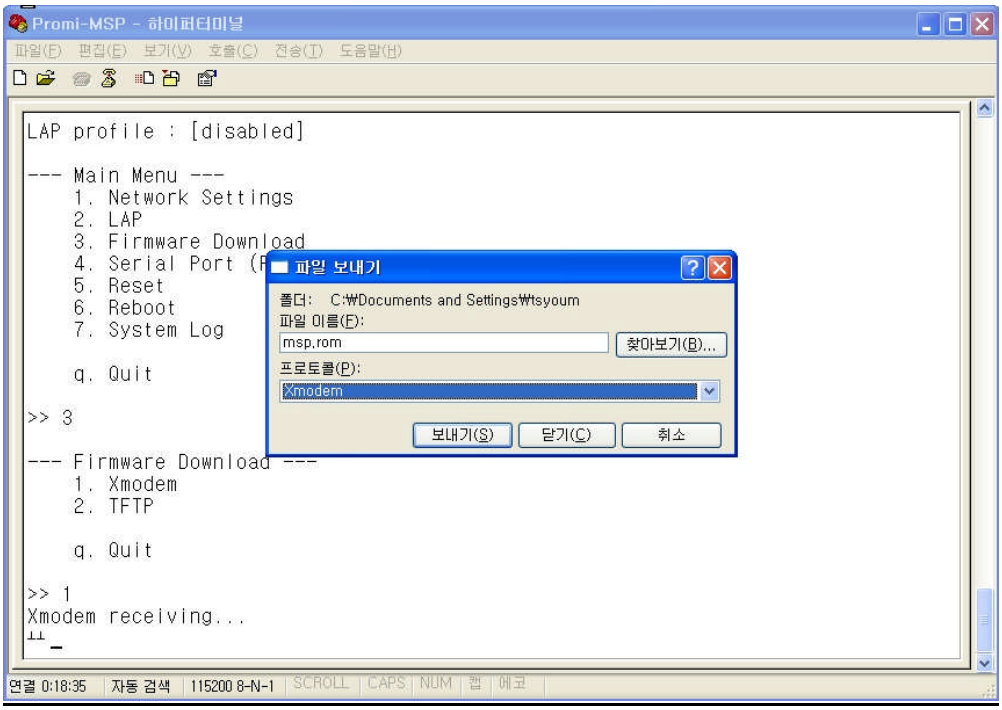


- Once finished, please resupply power to Promi-MSP for applying.

> ⚠ **Note:**
> **If you turn off Promi-MSP during firmware upgrade, Promi-MSP may be damaged severely and irreversibly.**

2.3.2 Firmware Upgrade via Xmodem:

Users may upgrade the firmware using Xmodem protocol via RS232 serial cable.



<Upgrade firmware via Xmodem>

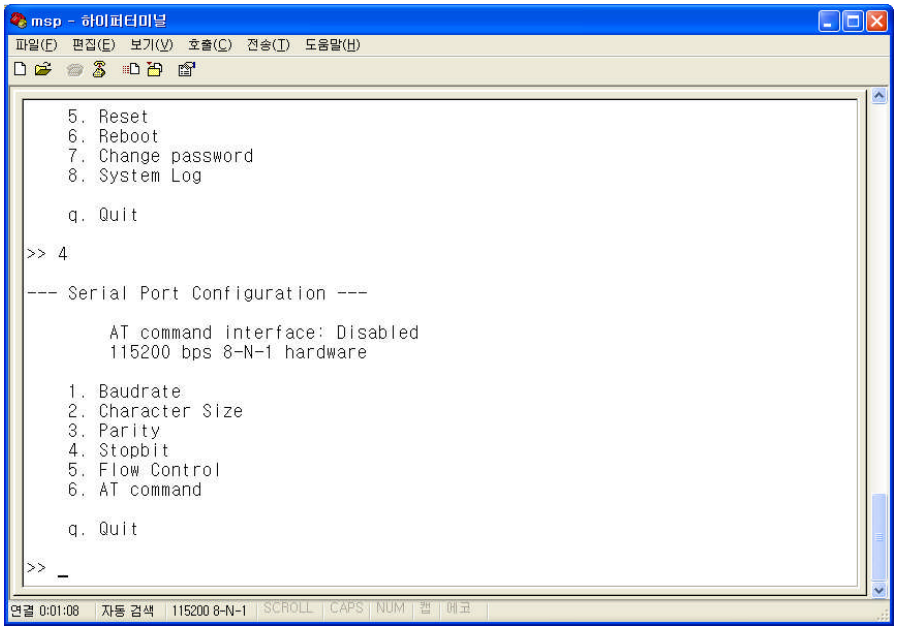
2.4 Serial Port

Serial port of Promi-MSP can be used for both Configuration and Data communication. For this, users need to change the DIP switch of Promi-MSP to the right.

Note:

Before to configure the serial port settings, please change the DIP switch to the right.

Users may set configuration of serial port communication in this menu.
Below figure is showing that '115200 bps 8-N-1 hardware' which means '115200 bps, 8 data bit, None parity, 1 stop bit, hardware flow control (RTS/CTS).



Configurable ranges:

Baudrate	1200 ~ 115200 bps
Character size	8, 7, 6, 5 bits
Parity Check	None / Even / Odd
Stop Bit	1 bit or 2 bits
Flow Control	Hardware (RTS/CTS), Software (XOn/Off), None

If you enable AT command interface, AT commands which are compatible with Promi-SD can be used with Promi-MSP. Please refer to Promi-MSP AT command list in chapter 6.

For applying changed configuration, please RESUPPLY the power, then Promi-MSP will start to operate as RS232 mode.

TIP:

If you need to do data communication via RS232 port, you do not need to configure Network settings.

2.5 Reset/Reboot/Quit

Entering no. 4, Promi-MSP™ RESET, in the main menu, restores all factory default value settings.

REBOOT restarts Promi-MSP™ for new configuration application.

QUIT makes user leave configuration console for log-in prompt.

3. Configuration

If users finished configuring network settings using serial console, now users need to select the operation mode of Promi-MSP. Following three (3) ways can be used for selection of operation mode:

1. Via Promi-MSP configuration software
2. Via Telnet (Control port)
3. Via Web browser (Internet Explorer, etc.)

In this chapter, guide to use Promi-MSP configuration software will be introduced.
How to configure via Telnet or Web browser will be introduced in Appendix.

3.1 Configuration via Promi-MSP software

3.1.1 When Promi-MSP is connected to PC directly

If users are going to connect Host PC and Promi-MSP directly using a crossed cable, network settings as in the chapter 2.1 will not be required.

Promi-MSP has factory settings: Static IP 192.168.1.10/24 with DHCP server

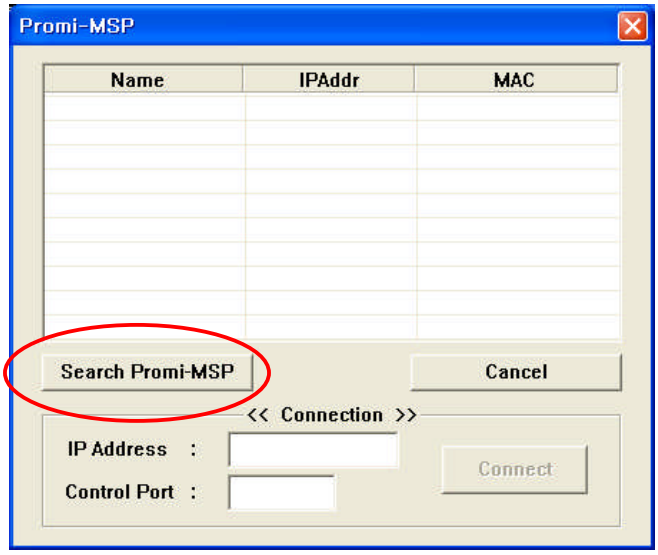
For communication with Promi-MSP, just connect Promi-MSP and Host PC with a crossed cable as below. Make sure Host PC to be configured using DHCP.

3.1.2 Log in Promi-MSP software

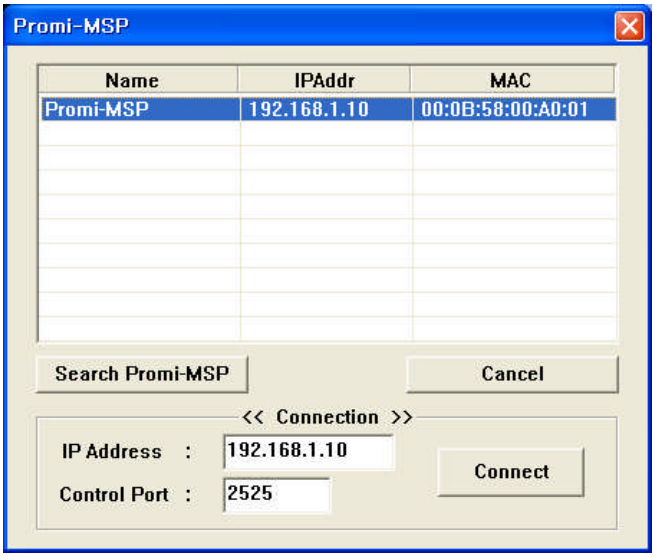
For easier configuration and **monitoring** on a specific Promi-MSP, which has been

installed locally or remotely, users may use Promi-MSP software.

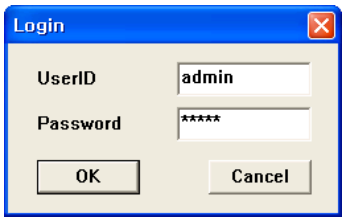
Start Promi-MSP software, and press “Search MSP device” button on the left side. (Promi-MSP installed remotely may not be listed even though pressing “Search MSP device” button)



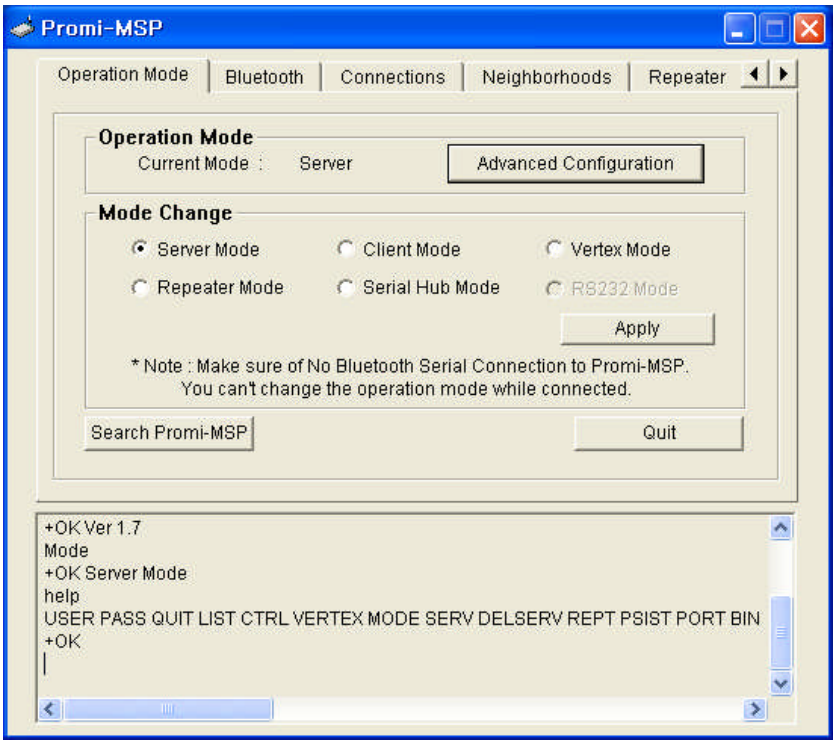
Please select one Promi-MSP you would like to access and press “Connect” button.”



You will need to enter UserID/Password: admin/11111



3.1.2 Operation Mode



Promi-MSP may be set to different type of Mode, so users may select one for its own implementation. There are 6 types of Mode: Server, Client, Vertex, Repeater, Serial Hub, and RS232. (RS232 Mode will be provided to Promi-MSP102 only)

- MSP Operation Mode

This shows current type of Mode.

- Mode Change

Users may change and select the type of Operation mode.

***Note:** While Bluetooth devices are connected to Promi-MSP, mode change is not allowed.

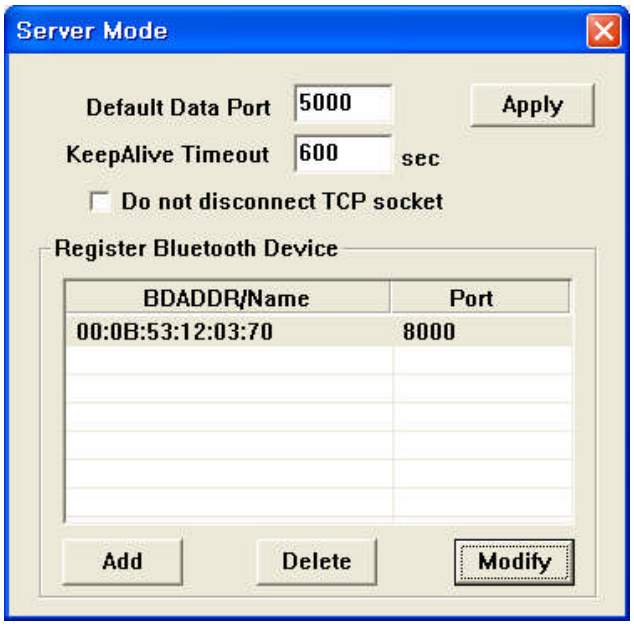
- Search Promi-MSP

Users may search Promi-MSP on the same network. Firewall installed on PC may prevent Host PC from searching Promi-MSP.

a) Server Mode

In Sever Mode, Promi-MSP will operate as a TCP server on the network. Host PC will connect to Promi-MSP via TCP/IP Ethernet, and Promi-MSP get the connection. After connection, full duplexing is possible.

Users may adjust the TCP port number where Promi-MSP waits for the connection from Host PC.



<Configuration of Server Mode>

- Default Data Port

If unregistered device tries to connect to Promi-MSP, Promi-MSP will assign the port number consecutively from default data port number (5000).

- KeepAlive Timeout

When TCP connection is stalled unexpectedly (Ex. Power off of Host PC), Promi-MSP will send beacons during KeepAlive Timeout (second). If there is no response during this Timeout, TCP connection will be closed.

- Do not disconnect TCP socket

In Server Mode, each TCP connection and Bluetooth connection will be matched as point-to-point. When new Bluetooth connection is established, new TCP connection will be established as well.
So, when Bluetooth connection is stopped, TCP connection would be closed.
If this behavior annoys your application, users may use this option. With this option enabled, TCP network connection remains established regardless of Bluetooth connection.

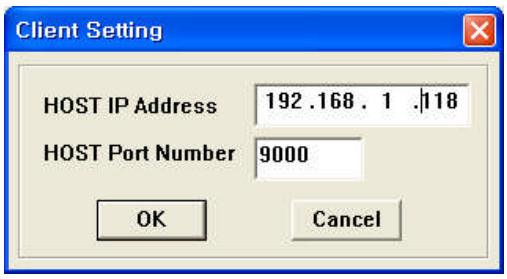
- Register Bluetooth Device :

Shows the Bluetooth devices registered.

- Add : Add Bluetooth device to register.
- Delete : Remove Bluetooth device registered.
- Modify : Modify Port of the selected device.

b) Client Mode

In Client Mode, Promi-MSP will act as a TCP client. When a Bluetooth device connects to Promi-MSP, Promi-MSP will try to connect to the designated Host PC. So, Host PC should be TCP server.
In Client Mode, please select the IP address and port number of the Host PC to connect.



<Configuration of IP address of Host>

Select “Advanced Configuration” button.

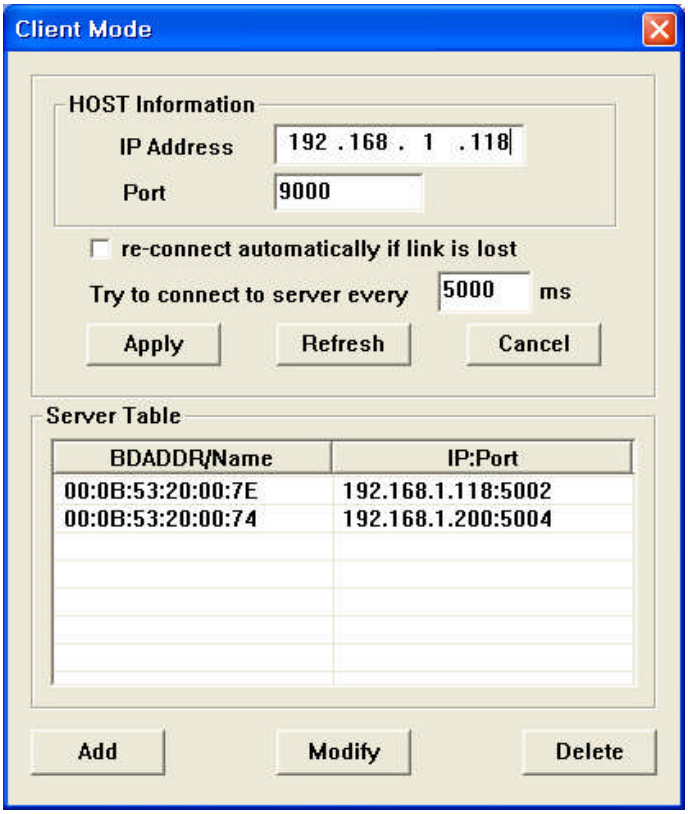
Here, users may configure which Bluetooth device will connect to which Host as they need.

Server Table has priority over default Host Information.

Bluetooth device “00:0B:53:20:00:7E” will connect to Host “192.168.1.118”, port no. 5002.

Bluetooth device “00:0B:53:20:00:74” will connect to Host “192.168.1.200”, port no. 5004.

Bluetooth devices, which are not configured to connect to a specific Host, will connect to Default Host in Host information.



<Fig 0-1> Client Mode

- Host IP Address

For network Server IP address entry

- Host Port Number

For network port no. entry

- re-connect automatically if link is lost.

For Host connect retry, if failed. Retry frequency is set in the preceding function..

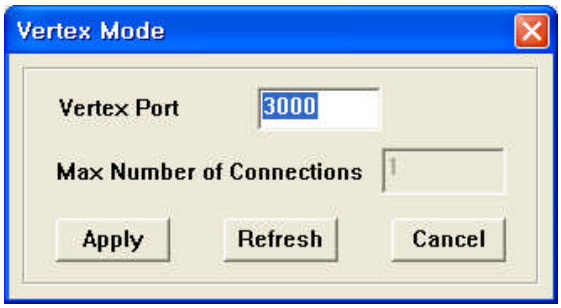
- Try to Connect to Server every [ ] ms

When Promi-MSP™ fails to connect to Host, it will retry. Enter the connection retry frequency here. Entering 0 [zero] means no retry.

c) Vertex Mode

In Vertex Mode, Host and Bluetooth devices communicate each other via Promi-MSP™ in multi-drop manner, which is similar to RS485 way.

Promi-MSP acts as TCP server like server mode. It waits for connection from Host on Vertex Port.



<Fig 0-2> Vertex Mode

- Vertex Port

For Promi-MSP™ Vertex port no. entry.

- Max Number of Connections

For entering the number of Hosts connectable to Promi-MSP™ concurrently.

d) Repeater Mode

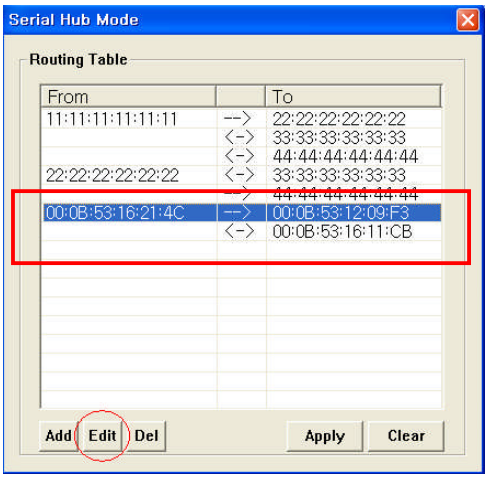
In Repeater Mode, Promi-MSP will act as a Repeater to expand the coverage of existing Promi-MSP. Let's call the Promi-MSP which will act as Repeater, "Repeater", and call the Promi-MSP of normal operation as "Station".
In Repeater Mode, the Bluetooth address of the Station is all you need to configure.
When Repeater is trying to connect to the Station, Status LED of Repeater is blinking.
Repeater and Bluetooth devices connected to the repeater are displayed in 'Repeater' tab in software.

> **Note:**
> **When using repeater, overall data throughput can be lowered.**
> **Multi-level repeater is not allowed.**

e) Serial Hub Mode

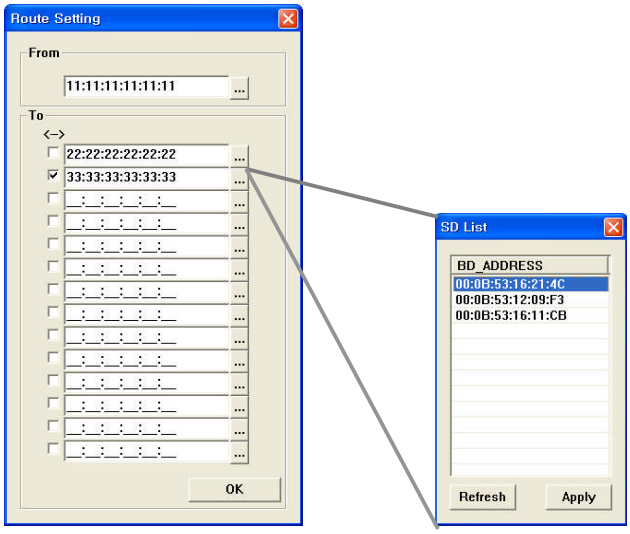
Users may transmit/receive data via Promi-MSP in Serial Hub mode (Serial Hub).
Promi-MSP in serial hub mode relay the data from a Bluetooth device to another Bluetooth device connected to Promi-MSP. No network host is involved.

Users may configure Promi-MSP how to handle data from Bluetooth devices in advanced configuration of Promi-MSP software.



Routing table shows paths that data will follow. Arrow shows direction of data flow. In the above example, data coming from 00:0B:53:16:21:4C will be sent to 00:0B:53:12:09:F3 and 00:0B:53:16:11:CB and data coming from 00:0B:53:16:11:CB will be sent 00:0B:53:16:21:4C in the reverse direction, but data coming from 00:0B:53:12:09:F3 will be dismissed because it has no path in the route table.

Press Add to add route entry. Following dialog will appear.



To select Bluetooth device, press '…', then Bluetooth devices connected currently will be displayed in another dialog or enter bluetooth device address manually.

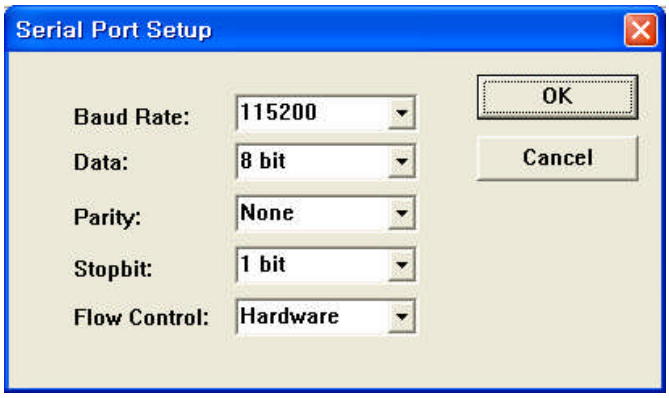
If you mark checkbox, opposite direction route will be also registered.

f) RS232 Mode[1]

In RS232 Mode, Promi-MSP may communicate with other Bluetooth device via RS232 serial cable.

As RS232 port has been configured to be used as Configuration as factory setting, users need to change the switch on the left side of Promi-MSP to data communication mode.

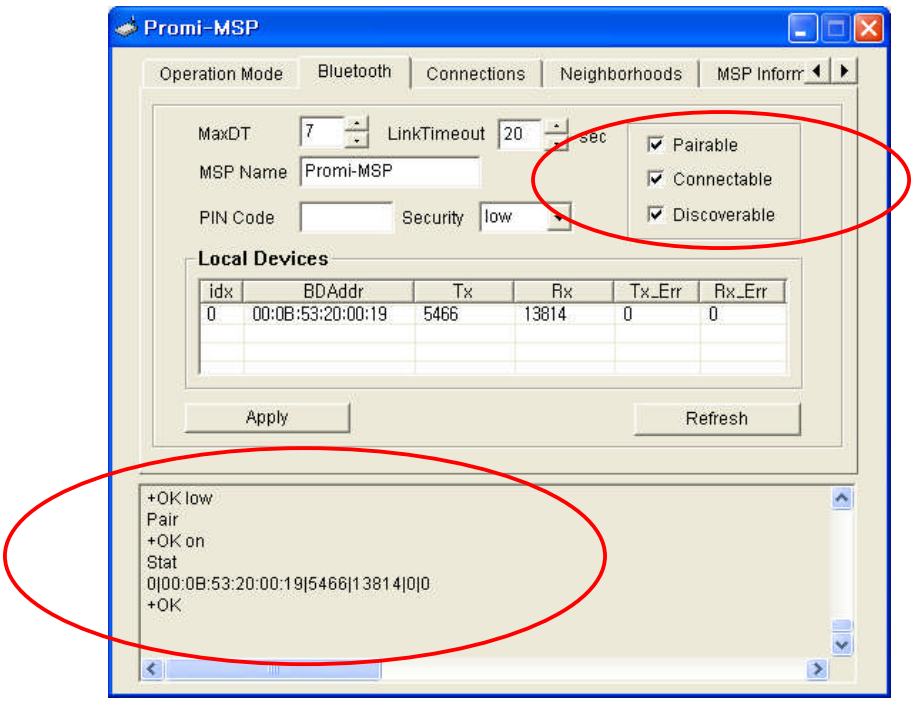
[1] Available only with Promi-MSP102.



If you enable AT command interface in RS232 configuration console, AT commands which are compatible with Promi-SD can be used with Promi-MSP. Please refer Promi-MSP AT command list.

3.1.3 Bluetooth

In this page, users can find current status of Promi-MSP.



You can see the process of command at the bottom of each page as in red circle above.

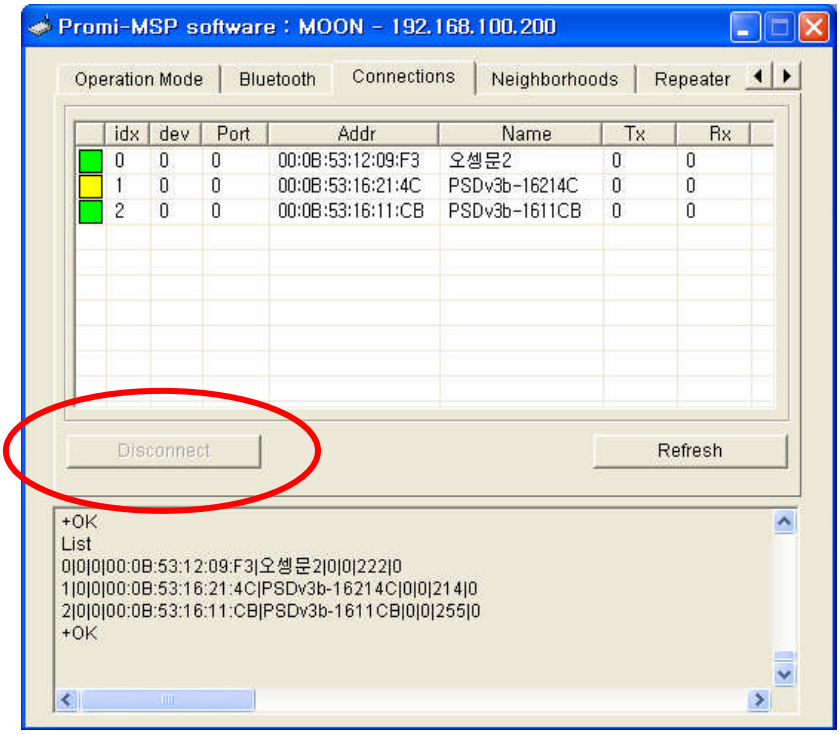
TIP:

For 14 connections in Promi-MSP102(b), please change the MaxDT to 14 above, after installing USB extension dongle provided.

3.1.4 Connections

In this page, users may MONITOR the connection status of devices to Promi-MSP. Now, three Bluetooth devices have been connected for Wireless serial communications as below.

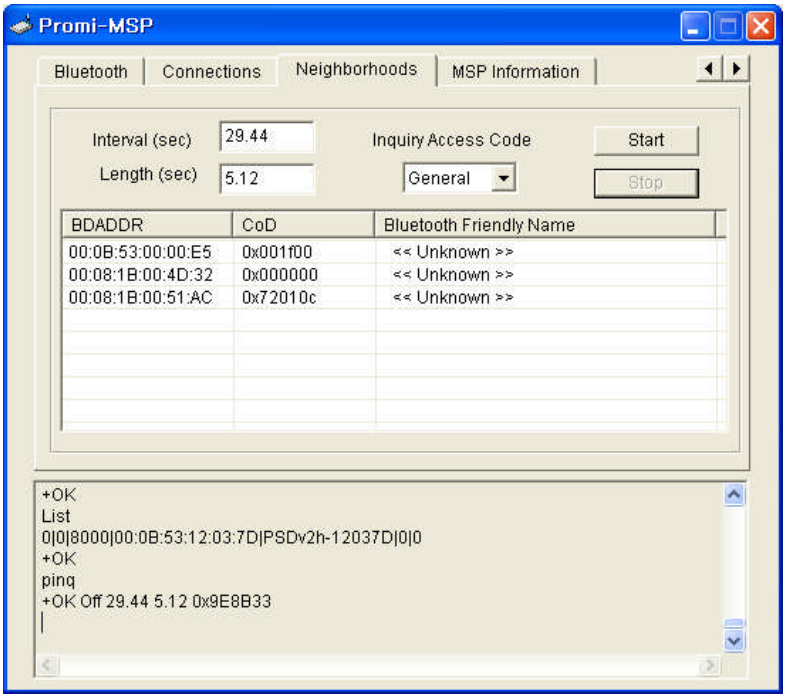
Left square shows quality of connection. Green square is good, red square is poor quality.



If you want to disconnect a Bluetooth terminal, you can do the job using DICONNECT button on the left.

3.1.5 Neighborhoods

This page is to search nearby Bluetooth devices, every Interval, during the Length.



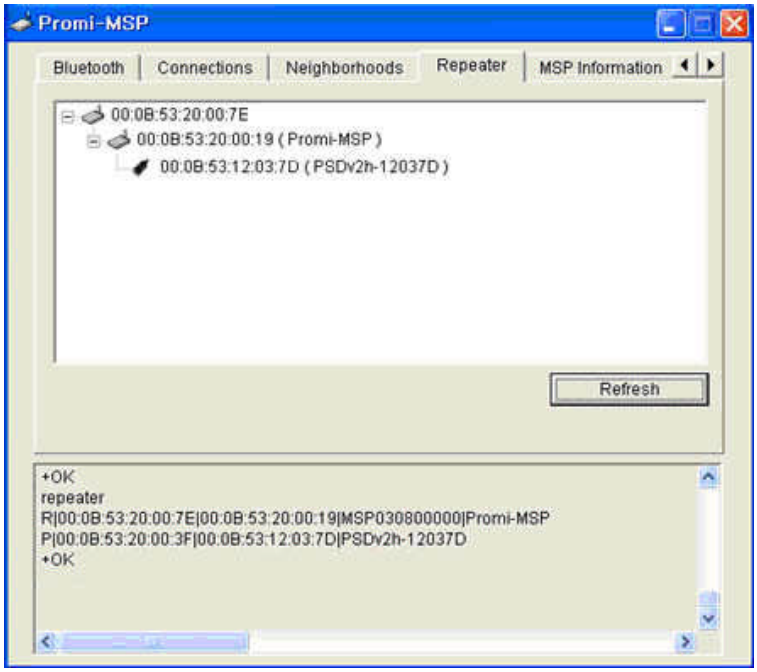
< Neighborhoods>

Bluetooth Friendly Names of only ever-connected devices will be appeared. Otherwise '<< Unknown >>' will be shown instead.

3.1.6 Repeater

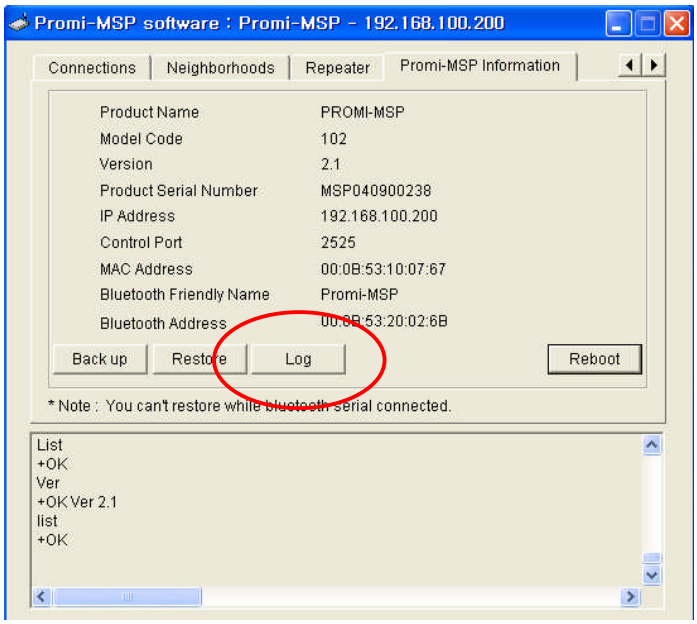
This page shows tree-structure how Repeater MSP and terminal devices are connected to the Station MSP. If user's MSP is in Repeater Mode, nothing will be showed.

In the window below, Repeater MSP is connected to a Station MSP and a Promi-SD is connected to Repeater (00:0B:53:20:00:19).



3.1.7 MSP information

Users may see Promi-MSP information currently accessing.



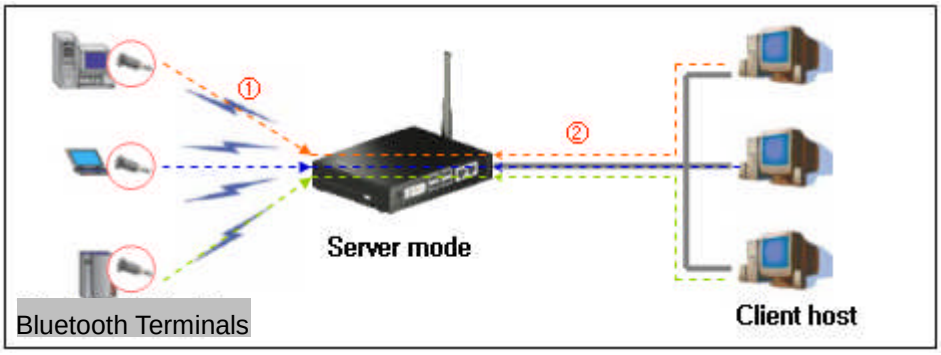
Pressing ‘Log’ button, system log messages will appear in notepad. System log is the source of invaluable information when the problems occur during operation.

4. Operation Mode

With Promi-MSP™, users may configure the mode of operation to meet each application.
Total 6 kinds of different modes can be selected. By selecting the appropriate mode, users may minimize cost and time for developing new solution.

4.1 Server Mode

In Server Mode, Promi-MSP will act as TCP server. If a Bluetooth device is connected to Promi-MSP, corresponding TCP port for the Bluetooth device will wait for connection for as Host. The Host may connect to the terminal via this port of Promi-MSP.
Please refer to the drawing below for your better understanding.



<Fig. 4.1> Server Mode

If a Bluetooth device has been registered to Promi-MSP, the Bluetooth device will communicate with client host via the designated port at Promi-MSP.
If not registered, Promi-MSP will assign arbitrary port number to connect.
Pre-registered Bluetooth devices are distinguishable by the different port numbers at Promi-MSP.

4.2 Client Mode

In a Client mode, Promi-MSP™ will act as a “TCP client”.
When a Bluetooth device connects to Promi-MSP, Promi-MSP will send TCP connection request to the designated Host. Once TCP connection is established, Bluetooth devices and a Host may communicate via Promi-MSP, same as in Server mode.
Only difference from Server mode is that the initiator is now Promi-MSP. Please refer to the drawing below for your better understanding.

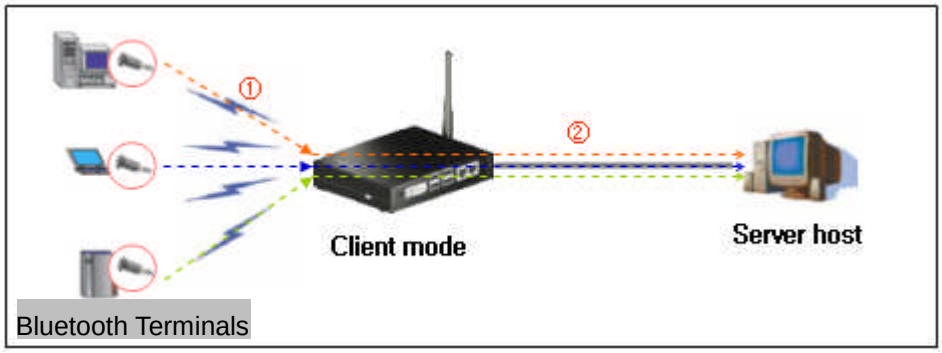


Fig. 4.2 Client Mode

4.3 Vertex Mode

Vertex Mode is similar to Server Mode. Only difference is that, in Vertex Mode, data from a Host are sent to all of connected Bluetooth devices, like Multi-drop. This mode can be a replacement of RS485/RS422 multi-drop.

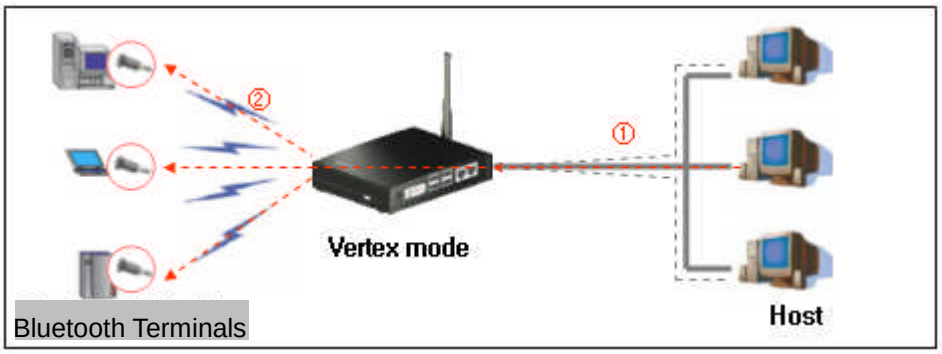
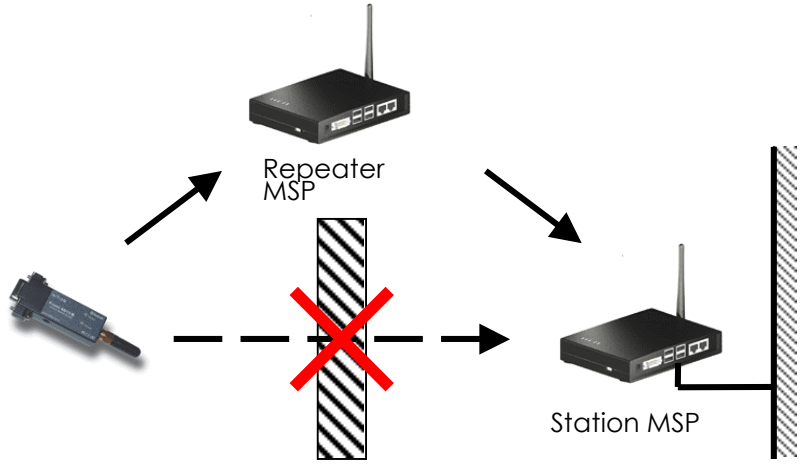


Fig. 1.3.1 Vertex Mode

Default data port number in Vertex mode is 3000. If you need to use other port number, please change the configuration using Promi-MSP software->Advanced configuration.

4.4 Repeater Mode

Promi-MSP in Repeater Mode can be used to function as a Repeater to extend the range of Bluetooth network or avoid obstacles between Promi-MSP and Bluetooth devices. Please refer to the drawing below.



Multiple Repeater Promi-MSPs up to 7 can be connected to one Station Promi-MSP, but Repeater-to-Repeater connection (Multi-level repeater) is not allowed. Promi-MSP may operate as “Station MSP” while it is either Server/Client/Vertex/Serial Hub/RS232 mode.

All you need to configure in Repeater is only Bluetooth device address of Station MSP and repeater doesn’t need to have any network connectivity (Just power-supply).

> **Note:**
> **When using repeater, overall data throughput can be lowered.**
> **Multi-level repeater is not allowed.**

4.5 Serial Hub Mode

In Serial Hub Mode, Promi-MSP relays data communication between Bluetooth devices. With Promi-SD only 1:1 cable replacement is possible, however, incorporating Promi-MSP multiple Promi-SDs can communicate each other, 1:N multi-serial with Promi-SD.

In Serial Hub mode, Promi-MSP handles data according to Route Table, which shows which data frame should go where. Route Table needs to be configured in advance using Promi-MSP software.

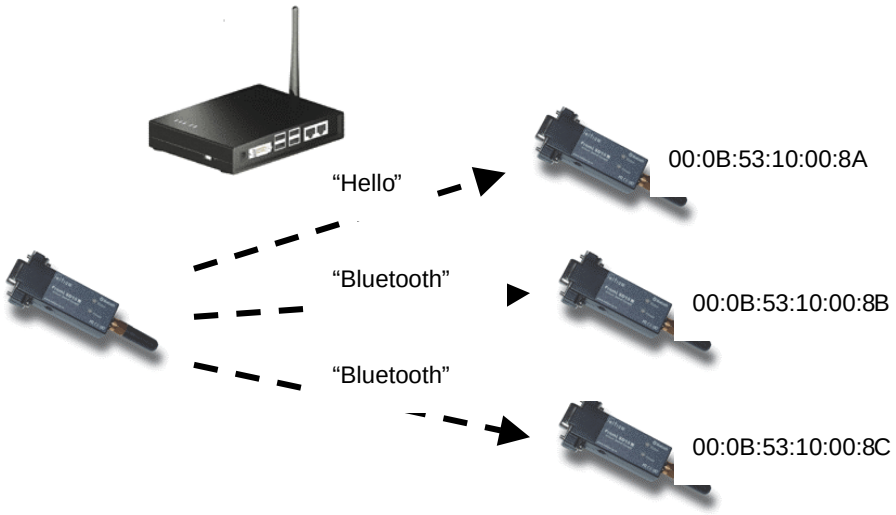
In-Band Command

In addition to Route Table, user can specify the destination of the frame they send by inserting extra frame called 'In-Band Command'. Inserted frame will be processed by Promi-MSP and not be transferred to destination device.

INI+DST,<dst1>,<dst2>,…
where, dstX means Bluetooth address of destination.

ex)
****INI+DST,00:0B:53:10:00:8A****Hello****INI+DST,00:0B:53:10:00:8B,00:0B:53:10:00:8C****Bluet
ooth

For example, if you send preceding frame to Promi-SD, 00:0B:53:10:00:8A device will receive 'Hello' and the other devices will get 'Bluetooth' as below figure.
All Promi-SD should be connected to Promi-MSP.



As Serial Hub mode does not need TCP/IP network connectivity, users do not need to configure network settings. Only power-supply needed.

4.6 RS232 mode

Multi-drop

If users set Promi-MSP to RS232 mode, Promi-MSP may act as 1:N multi-serial port by its RS232 port. In RS232 mode, Promi-MSP will send data to external serial port, not via Ethernet network.

In RS232 mode, Promi-MSP handles data in Multi-drop way, so data written to RS232 interface of Promi-MSP will be delivered to all of connected Bluetooth devices. So, in RS232 mode, “Polling” method- a master device schedules slave devices- is recommended to use.

Users may configure Serial settings in configuration console or Advance configuration dialog of Promi-MSP software.

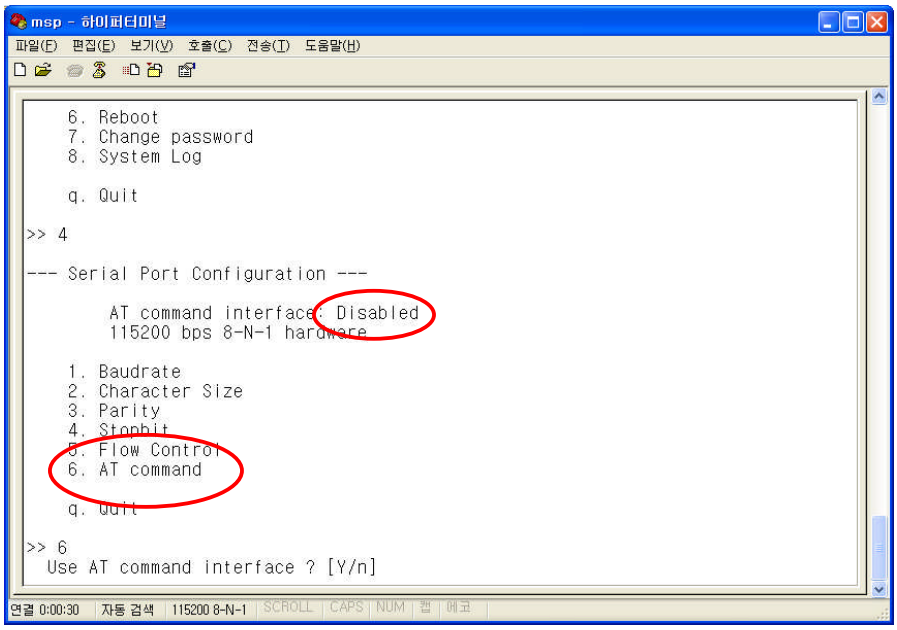
Baudrate	1200 ~ 115200 bps
Character size	5,6,7,8 bit
Parity	None, Odd, Even
Stop bit	1 bit, 2 bits
Flow Control	None, XOn/Off, Hardware (CTS,RTS)
DTR/DSR	not used
RI	not used
Auto probe	not supported

As default, RS232 interface of Promi-MSP is configured for configuration console. In order to use RS232 interface for the data communication purpose, user needs to change the Console switch to data mode. Changes will be effective after power-cycling of Promi-MSP. Please restart Promi-MSP.

AT Commands

AT command is very familiar with the legacy serial application developers. So, AT command interface of Promi-SD eases a lot of efforts to develop their own application from developers. So does Promi-MSP. Moreover, AT commands of Promi-MSP are so similar to one of Promi-SD that developers who have experiences with Promi-SD can make use of multi-serial functionality in no time.

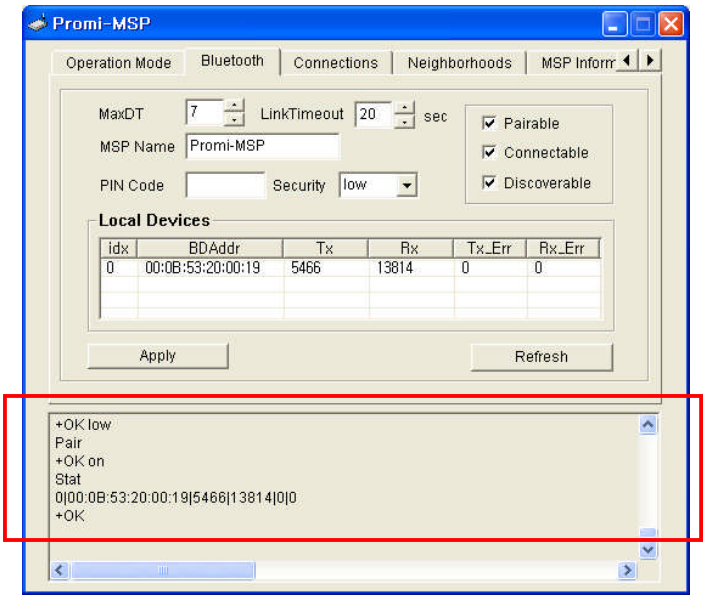
By default, AT command parser is disabled. You can enable AT command feature on configuration console as below.



Please refer to AT command List for its usage.

5. Control Commands

Promi-MSP is configurable and controllable by Control commands through control TCP port. Prom-MSP software is the GUI version of Control commands for easy use by customers. As all of the control commands, in Promi-MSP software, are listed in the bottom window, it gives users insight how each commands work.



Using control TCP port, users can make their own application control Promi-MSP by themselves. This means users do not need to equip expensive Bluetooth development kit but may develop Bluetooth solution to meet each needs by simple commands. Promi-MSP™ is cost-effective and time-saving solution for users.

By using telnet program, users may use Control commands easily. Rich-featured telnet software like “PuTTY” can be also useful.

PuTTY Download:
http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

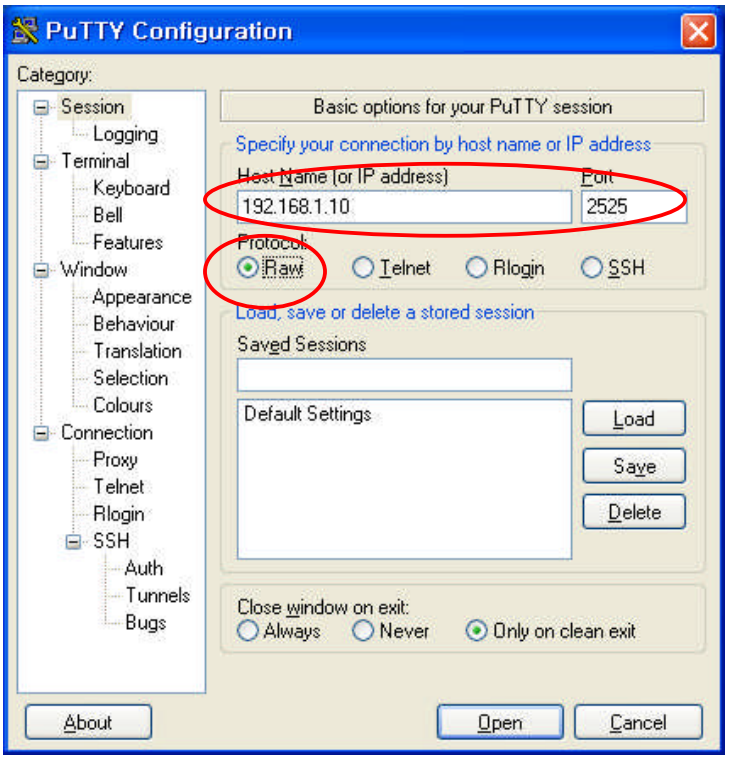
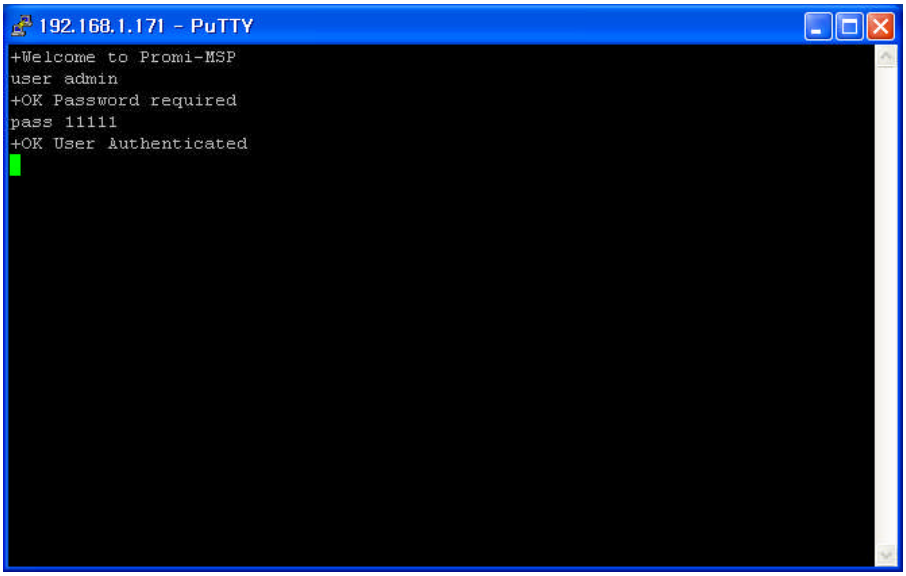


Fig. 2.1.1 PuTTY

Press 'Open', then following telnet session will be opened.

Enter '***user admin***' and '***pass 11111***' to access Promi-MSP via Control Commands.



Every command responds with +OK if successful, otherwise –ERR.

5.1 Basic Commands

USER <username>

: To enter Log in Name

Ex.: **USER admin**
+OK Password required

PASS <password> [new password]

: To enter or change the Password for logging in.

Below Example shows how to change Password from '11111' to '1234'

Ex: **PASS 11111**
+OK User Authenticated
PASS 11111 1234
+OK

QUIT

: To quit the communication with Promi-MSP

Ex.: **QUIT**
+OK
Disconnected

MODE [server|client|vertex|hub|repeater|rs232]

: To check or change the current Operation MODE of Promi-MSP.

If any of Bluetooth devices are connected to Promi-MSP, MODE change is not allowed. Before changing the MODE, please drop all of Bluetooth connections first.

Ex.: **MODE**
+OK Server Mode
MODE CLIENT
+OK Client Mode

5.2 Commands for Server Mode

PORT [port no.]

: To configure default data port number of Server Mode Promi-MSP.

If a Bluetooth device, which is not pre-registered to Promi-MSP, has

connected to Promi-MSP, port number will be assigned automatically by Promi-MSP. Users may check the port numbers used by LIST command.

Ex.: **PORT**
+OK PORT 5000
PORT 6000
+OK PORT 6000

BIND <bdaddr|name> <port>

: A static port number may be assigned to a designated Bluetooth device using BIND command. A Bluetooth device can be specified by either friendly name or Bluetooth address.

Response: +OK index|name|bdaddr|port

Ex.: **BIND 00:0B:53:00:00:01 8000**
+OK
BIND Promi-SD 8001
+OK
BIND
0||00:0B:53:00:00:01|8000
1|Promi-SD||8000
+OK

RELE <port no.>

: If users do not need to use a bound port number, RELE command can be used to release the port number.

Ex.: **RELE 8000**
+OK

PRSV <on|off>

: A TCP data port is opened as a Bluetooth connection is made. So, when Bluetooth connection is closed, the corresponding TCP port is also closed. If this behavior interferes with your usage scenario, this option will help.
When this option is enabled, TCP connection remains regardless of Bluetooth connection. Users do not need to make TCP connection each time whenever Bluetooth connection is closed for a while.

Ex.: **PRSV on**
+OK

KATO <time> <probe> <interval>

: To configure 'TCP Keep Alive Time'

When Host, which is communicating with Promi-MSP via network, is stalled unintentionally, Promi-MSP cannot aware this unexpected disconnection. Accordingly, Promi-MSP sends beacon packets to monitor connection status when there is no data communication for certain time.

When there is no data communication for <time>, Promi-MSP will send beacon packet <probe> times to monitor the connection, by each <interval>, before closing the connection. Below example means when there is no communication for 10 min., Promi-MSP will send beacon packets 3 times by 10 seconds interval.

Ex.: **KATO 600 3 10**
+OK KATO 600 3 10

5.3 Commands for Client Mode

SERV <IP Address:Port> [bdaddr|name]

: To assign IP address and port number of server host where Promi-MSP will send connection request in client mode. If you enter either bluetooth address or friendly name of the Bluetooth device, you may configure different host addresses and port numbers for each Bluetooth devices.

Response: index|name|bdaddr|server_IP:port

Ex.: **SERV 192.168.1.11:9000**
+OK
SERV 192.168.1.11:9001 Promi-SD
+OK
SERV
0|Promi-SD||192.168.1.11:9001
+OK 192.168.1.11:9000

DELSERV <bdaddr|name>

: To delete Host information stored by SERV command.

Ex.: **DELSERV Promi-SD**
+OK

REPT <interval>

: When connection to Host is failed, users may configure Retrial period of connection. Unit: millisecond, Default value: 5000 ms

If the value is '0', Promi-MSP will try to recover connection only once.

Ex.: **REPT 3000**
+OK REPEAT every 3000 ms

PSIST <on|off>

: In Client mode, in the event of TCP disconnection, Promi-MSP™ automatically attempts to recover TCP connection when PSIST is set to ON, in the period of pre-defined ms by REPT command.

Ex.: **PSIST ON**
+OK PERSIST on

5.4 Commands for Vertex Mode

VERTEX <port no.> [number of clients]

: To assign port number where Promi-MSP waits for connection in Vertex mode.

Promi-MSP™ Vertex Mode avails Wireless RS485 multi-drop service when assigned at this site.

Ex.: **VERTEX 4000 1**
+OK PORT 4000 MAX 1

5.5 Commands for Serial Hub Mode

ROUTE <add> <src> <dst>

<del> <src> <dst>

<ptp|multi|manual>

: To configure Routing table for Repeater Mode.

src: Bluetooth address of source device

dst: Bluetooth address of destination device

Response: src > dst

Ex.: **ROUTE**
00:0B:53:12:03:A8 > 00:00:00:00:00:00
00:00:00:00:00:00 > 00:0B:53:12:03:A8
+OK

5.6 Commands for Repeater Mode

STATION <bdaddr>

: To configure Bluetooth address of station Promi-MSP.

In repeater mode Promi-MSP will try to connect to this device.

Ex.: **STATION 00:0B:53:00:00:01**
+OK

REPEATER

: Display all of repeaters and Bluetooth devices connected currently.

Entry starting with R is repeater and one with P is Bluetooth device.

Response: R|station|repeater|repeater_name

P|msp|peer|peer_name

Ex.: **REPEATER**
R|00:0B:53:00:00:01|00:0B:53:00:00:02|Promi-MSP_001002
P|00:0B:53:00:00:02|00:0B:53:00:00:10|PSDv3b-000010
+OK

5.7 Commands for Bluetooth Configuration

BTNAME <name>

: BTNAME command audits or revises Promi-MSP™ Device Names exposed to other Bluetooth devices.
If configured with default name (i.e., Promi-MSP), lower part of Bluetooth address will be appended to the name.

Ex.: **BTNAME My Promi-MSP**
+OK
BTNAME
+OK My Promi-MSP

PIN <pin-code>

: PIN command revises the Bluetooth PIN code. Max.: 16 bytes, ASCII code only.

Ex.: **PIN 1234**
+OK

SECU <low|high>

: SECU command revises the security level. Low obtains no security; High obtains Enabling Security. Default SECU displays current security level.

Ex.: **SECU high**
+OK
SECU
+OK high

PAIR <on|off>

: For Pairable mode enable/disable. In High security levels, when Paring mode is set to off, only Bluetooth devices already sharing Link Key (see LKEY command) can connect with Promi-MSP™ (non-pairable mode)

Ex.: **PAIR off**
+OK
PAIR
+OK off

LKEY

: For auditing currently paired Bluetooth devices sharing Promi-MSP™. Link Key.

Response: local bdaddr|remote bdaddr

Ex.: **LKEY**
00:0B:53:20:00:63|00:08:1B:00:52:72
+OK

TEMPKEY <on|off>

: Some Bluetooth device doesn't save their link key and makes new link key on every connection. This behavior causes Promi-MSP's flash memory to wear out in the long period. With TEMPKEY on, Promi-MSP won't save link key neither and protects itself.
If you see tons of 'Replacing hci0 link key xx:xx:xx:xx:xx:xx …' messages on System Log, you should turn this option on.

Ex.: **TEMPKEY on**
+OK
TEMPKEY
+OK on

SCAN [inquiry] [page] [noscan]

: For Promi-MSP™ scan mode assignment. INQUIRY set to ON activates discoverable mode. PAGE set to ON activates connectable mode. Default SCAN displays current scan mode.

Ex.: **SCAN page**
+OK
SCAN
+OK page

STAT

: Displays current Bluetooth device status
If any background task running, it will show [PENDING].

Response: idx|bdaddr|tx_byte|rx_byte|err_tx|err_rx

Ex.: **STAT**
0|00:0B:53:20:00:63|1710|3513|0|0
+OK

AFH [channel] …

: This command will activate 802.11b Wi-Fi Combo mode, in which Promi-MSP doesn't make use of the ranges of frequencies where co-existing

802.11b Wi-Fi devices work.

Specify channel 0(zero) to disable combo mode.

When enabled, overall throughput will be reduced.

Ex.: **AFH 10 11**
+OK
AFH
+OK AFH 10 11
AFH 0
+OK

5.8 Commands for Bluetooth Connection Management

LIST

: To see connected Bluetooth device list.

Higher link quality, better link status. Zero rssi means the most efficient RF condition (so called 'Golden Range').

With link quality lower than 200, throughput may be affected or link may be lost.

Response: idx|dev_id|port|bdaddr|name|tx_byte|rx_byte|link_quality|rssi

Ex.: **LIST**
0|0|5000|00:0B:53:00:00:8A|SDv3b-00008A|0|0|255|0
+OK

CONN <bdaddr> [channel]

: Promi-MSP may try to CONNECT to Bluetooth devices. If you specify a channel, Promi-MSP will try connection directly skipping SDP (Service Discovery Protocol) process.

Each device to connect should be in connectable mode.

Ex.: **CONN 00:0B:53:00:00:8A**
+OK

Note:

Promi-MSP normally acts as an acceptor. Do not use CONN command in operating sequence as Promi-MSP will freeze during CONN operation.
If using with Promi-SD, please configure Promi-SD as Mode 1 and make it initiate connection to Promi-MSP.

DISC <idx>

: Promi-MSP may DISCONNECT forcibly by DISC command, giving INDEX value in LIST command.

Ex.:
LIST
0|0|5000|00:0B:53:00:00:8A|SDv3b-00008A|0|0
+OK
DISC 0
+OK
LIST
+OK

LINKTO <timeout>

: When a Bluetooth device is disconnected by turning off its power, Promi-MSP has default time out of 20 seconds in finally closing the connection. You may assign the time out from 1 second up to 30 seconds.

Ex.: **LINKTO 20**
+OK

MAXDT <number of max. connections>

: To assign maximum Bluetooth devices concurrently connectable to Promi-MSP™. Default value is 7. Each additional USB extension module adds up to 7 more Promi-MSP™ connectable Bluetooth devices.

Ex.: **MAXDT 7**
+OK

PINQ <on|off> <interval> <length> <IAC>

: If PINQ (periodic inquiry) is ON, Promi-MSP will inquire nearby Bluetooth devices periodically, by each <interval> seconds, for <length> time. Inquired result can be checked by NGBRH command.

<IAC>: Inquiry Access Code. Users may inquire the device with same IAC code. In Bluetooth specification, there are General IAC (0x9E8B33) and Limited IAC (0x9E8B00).

Ex.: **PINQ on 20 5 0x9E8B33**
+OK

NGBRH

: To see the inquired device list by PINQ command.

Response: bdaddr CoD name

Ex.: **NGBRH**
00:0B:53:00:00:E5 0x001f00 PSDv3b-0000E5
00:0B:53:20:00:79 0x020300 Promi-MSP
+OK

DTINFO <on|off>

: The information of the corresponding data terminal is sent from Promi-MSP prior to any data transmission when TCP socket connected. It consists of Bluetooth address and name in fixed length with NULL padding following.
Available in server mode or client mode.

Response: bdaddr,name<null-padding> (64bytes fixed-length)
000B53123456,PSDv3b-123456

Ex.: **DTINFO on**
+OK

FWDT <tx_timeout> <rx_timeout> [init]

: Reboot itself if no change in TX bytes for more than <tx> seconds, or in RX bytes for more than <rx> seconds after [init] seconds from booting. If init is not specified, timer won't start till any data transaction.
These values accept 0 for disabling each function. [init] can be just omitted to disable the function.

Ex.: **FWDT 0 10**
+OK

5.9 Other Commands

DUMP [idx] [bin]

: This command shows data that flows between Host and Bluetooth devices.

[idx]: To select a specific device to monitor. (255 means all of devices)

[bin]: To display data in binary format.

format: <dir:1><idx:1><length:2><timestamp:4><data… :length>

timestamp: in milliseconds

Ex.: **DUMP**

```
> line 0 len 4 timestamp 1413986
61 62 63 64                                    abcd
< line 0 len 4 timestamp 1414056
4F 4B 0D 0A                                    OK..

+OK
```

LOG [line]

: LOG displays system logs. If line number specified, only latest <line> rows will be displayed.

Ex.: **LOG**

```
<30>Jan 1 00:00:09 msp: Promi-MSP ver 2.3 started
<30>Jan 1 00:00:09 msp: Loading configurations…
…
+OK
```

HELP

: HELP command displays all control commands available.

Ex.: **HELP**

```
+OK
```

VER

: To see software version no. of Promi-MSP

Ex.: **VER**

```
+OK Ver 2.3
```

CTRL <port no.>

: Control port default value is '2525'. CTRL command assigns new control port number. Revised control port number is effective after Promi-MSP™ restart. Default CTRL displays current control port number value.

Ex.: **CTRL 3500**
+OK

CANCEL

: To cancel current background operation.

Ex.: **CANCEL**
+OK

RSET

: To restore to factory settings.

Ex.: **RSET**
+OK

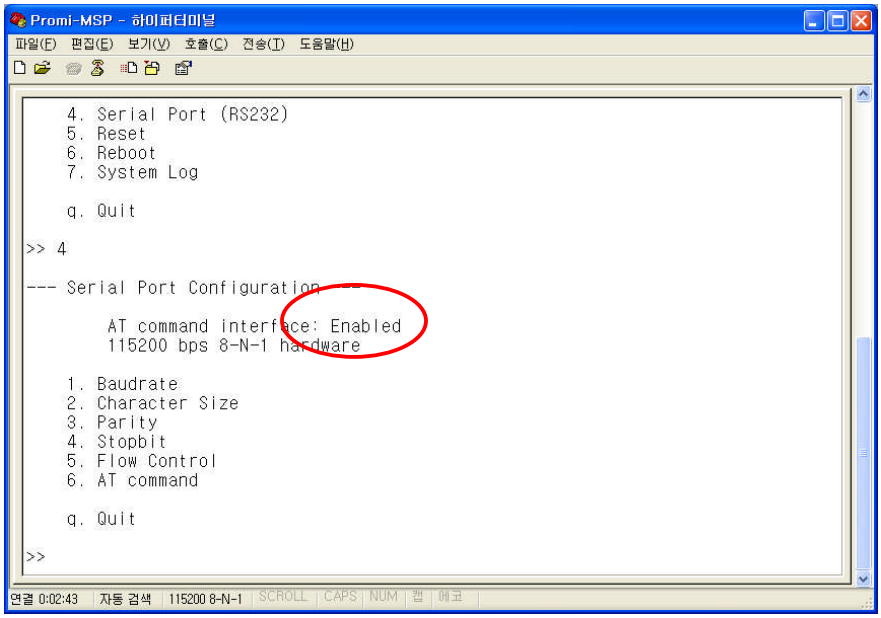
REBOOT

: To reboot Promi-MSP

Ex.: **REBOOT**
+OK Rebooting…

6. AT Command Interface

Promi-MSP supports user friendly AT commands. Make sure this feature enabled in configuration console in order to use AT commands.



Most of them are compatible with Promi-SD but some have differences in their usage and some commands are appended for Promi-MSP exclusive use.

Supported AT commands and their differences from AT command of Promi-SD are summarized as below. Please refer to Promi-SD userguide for more information.

Command	***Description***	***Example***
AT	compatible with Promi-SD	
ATZ	〃	
AT&F	〃	
ATD	Connectable up to 7 devices concurrently	
ATH	Device to disconnect can be specified.	ath000b53123456<cr>
ATO	Device to communicate can be specified. Without specified device, lately communicated device will be selected.	ato000b53123456<cr> CONNECT 000B53123456

	Promi-MSP responds with CONNECT.	
AT+BTSCAN	Scan mode can be specified. 1: Discoverable 2: Connectable 3: Discoverable and Connectable	at+btscan,3<cr>
AT+BTINQ?	compatible with Promi-SD	
AT+BTINFO?	〃	
AT+BTNAME	〃	
AT+BTKEY	〃	
AT+UARTCONFIG	〃	
AT+BTCANCEL	〃	
AT+SETESC	〃	
AT+BTLAST?	〃	
AT+BTSEC	〃	
AT+BTSD?	〃	
AT+BTCSD	〃	
AT+BTMODE	Support only Mode 1 and Mode 2. You can register Mode 1 devices by using AT+BTREG.	

※ S-registers are not supported.

Following commands are appended to Promi-MSP.

Command	***Description***	***Example***
AT+BTCHAN?	Show currently selected device. Promi-MSP only communicates with selected device.	AT+BTCHAN? 000B53123456 OK
AT+BTCONN?	Show all connected devices.	AT+BTCONN? 000B53123456,PSDv3b-123456 000B53112233,PSDv3b-112233 OK
AT+BTREG	Register Mode 1 device. In Mode 1, all connections with registered devices will be recovered after power-up.	AT+BTREG,000b53123456

AT+BTUNREG	Remove registered Mode 1 device.	AT+BTUNREG,000b53123456
AT+BTLIST?	Show registered Mode 1 devices.	AT+BTLIST? 000B53123456 000B53112233 OK

Multi Serial Communication via RS232 interface

Promi-MSP can communicate with Promi-SDs up to 14 devices via RS232 interface, while Promi-SD can be only used as 1:1 cable replacement.

Even though Promi-MSP supports multiple serial connections, because RS232 interface is inherently 1:1 communication protocol, user should communicate with serial devices sequentially. Data coming from non-selected Promi-SD is buffered on Promi-MSP and retrieved when corresponding Promi-SD is selected by ATO command.

If link is lost with currently selected device, one of connected devices will be selected arbitrarily.

Accepting new incoming connection

When incoming connection is established in command mode, Promi-MSP responds with **CONNECT** message and enters to online mode.
When incoming connection is established in online mode, **CONNECT** message is not printed and selected device with which Promi-MSP communicates won't be changed.
You can check out all connected devices by **AT+BTCONN?** command in command mode.

Disconnecting device

You can disconnect Bluetooth device by **ATH** command in command mode. With specified device address, any connected device, selected or not, can be disconnected.

AT command usage example is provided below.

```
OK
AT+BTINFO?
000B2431FB14,Promi-MSP,MODE0,STANDBY,0,0,HWFC
OK
ATD000B53000001
OK
CONNECT 000B53000001
…                              ← connected to 000b53000001
+++
OK
ATO
CONNECT 000B53000001
+++
OK
ATD000B53000002                ← making new connection to 000B53000002
OK                               while connected with 000B53000001
CONNECT 000b53000002
…                              ← connected and routed to 000B53000002
+++
OK
AT+BTCONN?
000B53000001,PSDv3b-000001
000B53000002,PSDv3b-000002
OK
ATO000B53000001                ← changing route back to 000B53000001
CONNECT 000b53000001
…                              ← communicating with 000B53000001
```

7. Configuration via WEB

Promi-MSP™ configuration access is available via Telnet or Web browser.

SENA provides Web user interface to expedite Promi-MSP™ configure/manage and current status check functions. To access Promi-MSP™ via Web interface, open user web browser and enter the Promi-MSP™ IP address in the address area.

Here is shown the 192.168.0.3 address assigned to Promi-MSP™ in the preceding configuration example.

Enter the default ID: admin, Password: 11111.

7.1 MSP Configuration

- **Basic Setting**

  (2) MSP name: For user Promi-MSP name revision

(3) Max DT: For configuring the maximum number of Bluetooth devices connectable to Promi-MSP™. Default maximum is 7.

(4) Discoverable: When checked, Promi-MSP™ is in inquiry scan mode, in which other Bluetooth devices may discover Promi-MSP.

(5) Connectable: When checked, Promi-MSP™ is in page scan mode, in which other Bluetooth devices may connect to Promi-MSP.

(6) Pairable: For Pairable mode enable/disable. When in need of high security, set Pairable option to UNCHECKED, enabling High Security. When this option is NOT checked, other Bluetooth devices, except those that already share link key with Promi-MSP™, cannot connect to Promi-MSP™, even via PIN code.

(7) Control port: TCP port number for control port. Default value is 2525.

- **Buffering**

(1) Buffering: For Frame Buffering function enable/disable

*** Firstly set Header and Trailer, secondly turn on Buffering option.**

(2) Header: Heading characters in the frame. Enter alphabets or hexadecimal ASCII codes.

(3) Trailer: Trailing characters in the frame. Enter alphabets or hexadecimal ASCII codes.

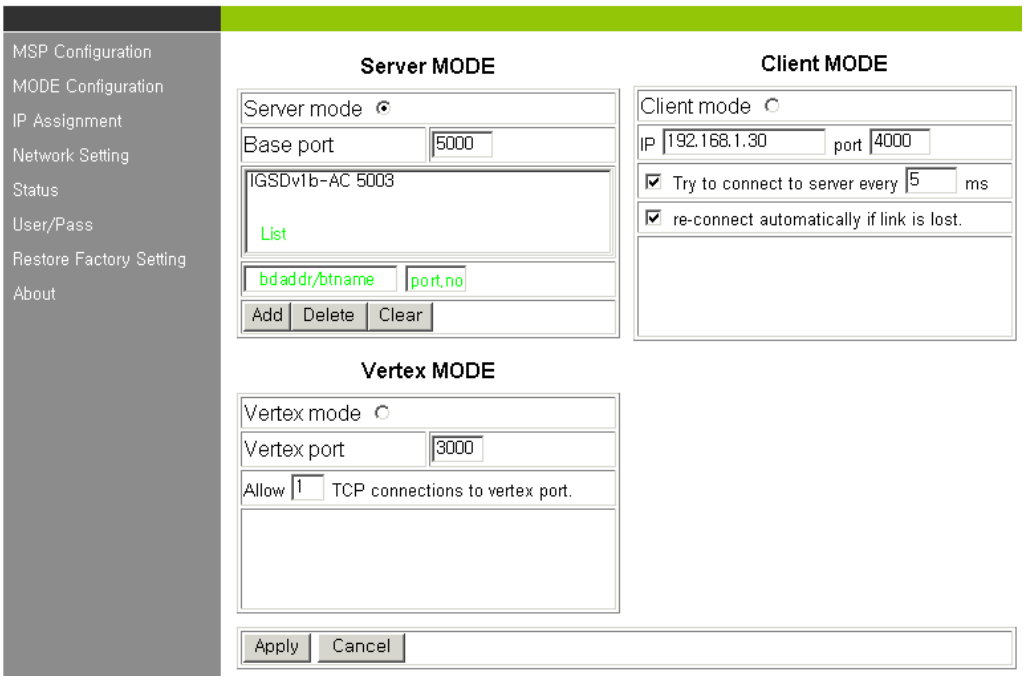
- **Security**

(1) Pin code: For Bluetooth Pin code entry

(2) Security: For security level entry

7.2 Mode Configuration

Promi-MSP™ accesses 3 types of operation modes. Select according to user requirement and applications.



- **Server Mode**

(1) Base port: For Promi-MSP™ Server mode default port configuration
(2) List: For assessment of currently connected Bluetooth devices
(3) Bdaddr/btname: Enter address or preferred name of Bluetooth device/s to BIND.
(4) Port no.: Enter a specific port no. to assign to the Bluetooth device selected in no. (3).
(5) BIND buttons: Add/Delete/Clear

To delete more than one device from the bound list, press Shift or Ctrl key while using the computer mouse.

- **Client Mode**

In Client Mode, Promi-MSP™ operates as client initiating TCP connection request. Host PC becomes a server.

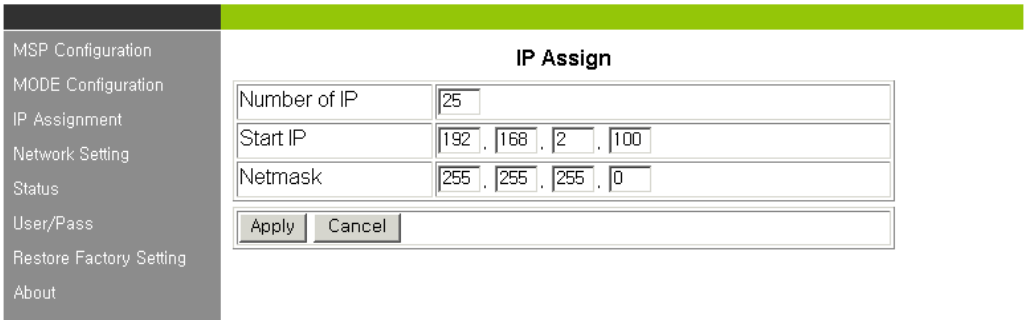
(1) IP: For network Host Server IP address entry
(2) Port: For Server Host port no. entry
(3) [ ] Try to connect to server every [ ] ms:
When Promi-MSP™ fails to open a data channel connecting to Host, enter the connection retry frequency. Entering 0 [zero] obtains retry abort.
(4) [ ] re-connect automatically if link is lost.
For Host connect retry, if failed. Retry frequency is set in the preceding function.

- **Vertex Mode**

In Vertex Mode, data from a Host are sent to all of connected Bluetooth devices, like Multi-drop.

(1) Vertex port: For Promi-MSP™ Vertex port no. entry.
(2) Allow [ ] TCP connections to vertex port:
For entering the number of Hosts connectable to Promi-MSP™.

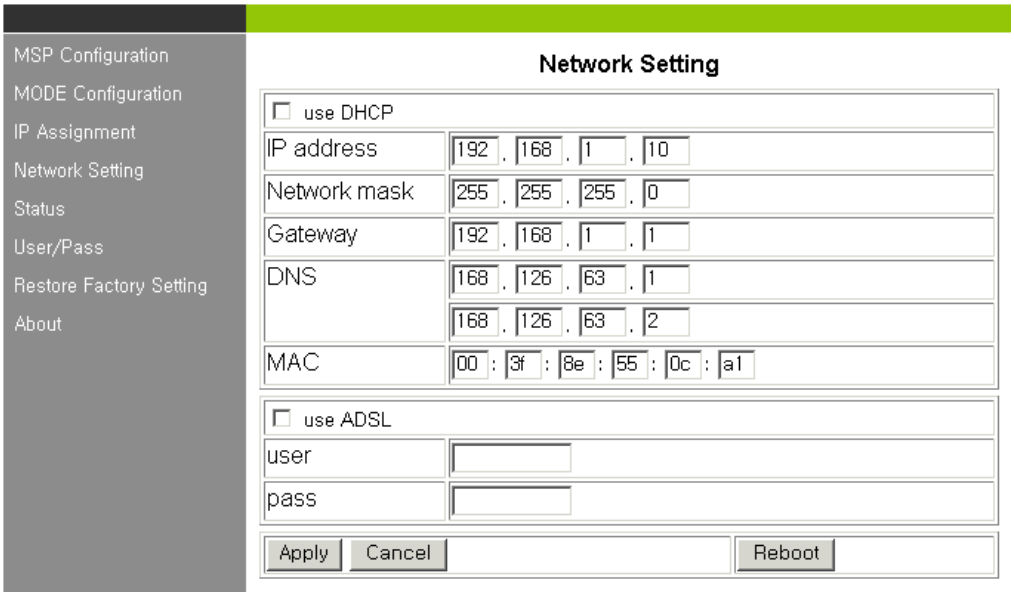
7.3 IP Assignment



Promi-MSP™ LAP service use renders assignable IP numbers for LAN access

service Bluetooth devices configuration. Set IP address and subnet mask Start number; Promi-MSP™ automatically assigns IP to connected Bluetooth devices.

7.4 Network Setting



For user Promi-MSP™ network setting.

(1) [ ] use DHCP: When checked, Promi-MSP™ receives IP address from DHCP server.

(2) IP address/Network mask/Gateway/DNS: Enter appropriate data to assign static IP address for Promi-MSP™.

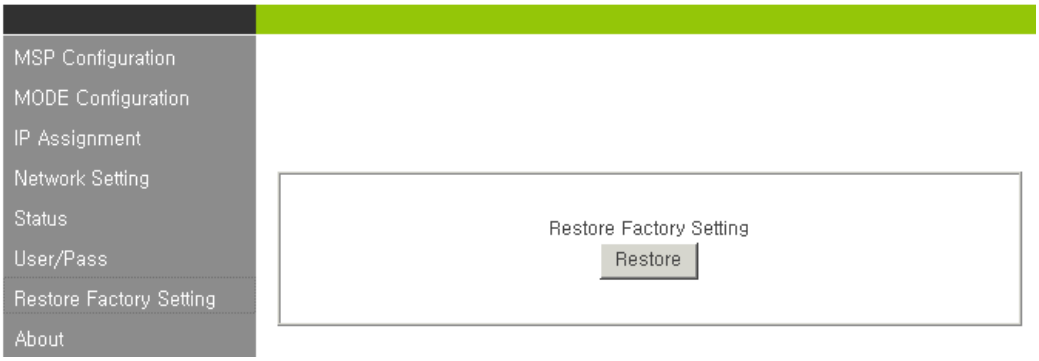
(3) MAC: Displays MAC Promi-MSP™ address; non-user entry

(4) [ ] use ADSL: Select this option when ADSL networking

(5) User/Pass: Enter ID/password data for ADSL login.

7.5 Restore Factory Setting

To reset to Promi-MSP™ default factory settings, click the 'Restore' button.



8. Internet Access via Promi-MSP

Promi-MSP may operate as conventional Bluetooth AP to provide Bluetooth devices Internet connectivity.

Following 3 standard ways of Bluetooth internet connections are supported.

> ⚠ **Note:**
> **If Internet Access Service is NOT needed, please disable this feature for the security concerns.**

8.1 LAP

8.2 PAN

8.3 Dial-Up Modem Emulation

9. COM port redirector

9.1 Serial/IP

NOTE:

Serial/IP is bundled with Promi-MSP since July, 2005.

Customers prior to July, 2005 should pay additional cost to use Serial/IP.

Serial/IP is a serial port emulator enabling to use your legacy serial communication application with Promi-MSP. Serial/IP provides virtual COM port, which is redirected to TCP socket connection to Promi-MSP.

SENA provides licensed Serial/IP programs to customers purchasing Promi-MSP™ since July, 2005. Users who purchased Promi-MSP™ before July, 2005 may download a 30day-trial version from http://www.tacticalsoftware.com after filling out simple forms for testing. The trial version Serial/IP does not require Serial Number for installation.

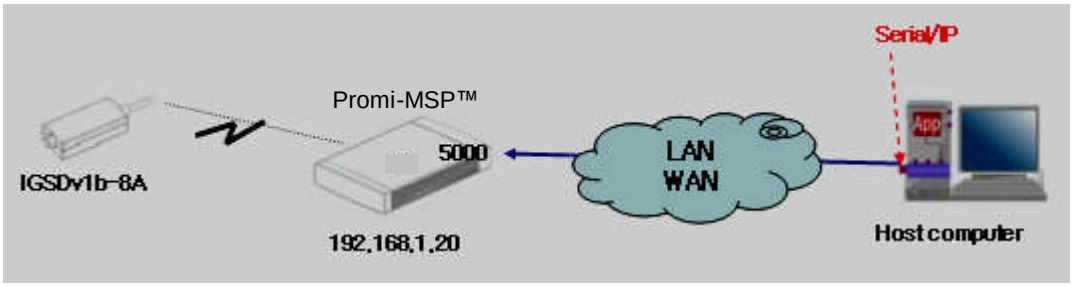


Fig. 9.1. Relationship between Serial/IP and Promi-MSP™

Firstly, Install Serial/IP which can be found on Installation CD-ROM.

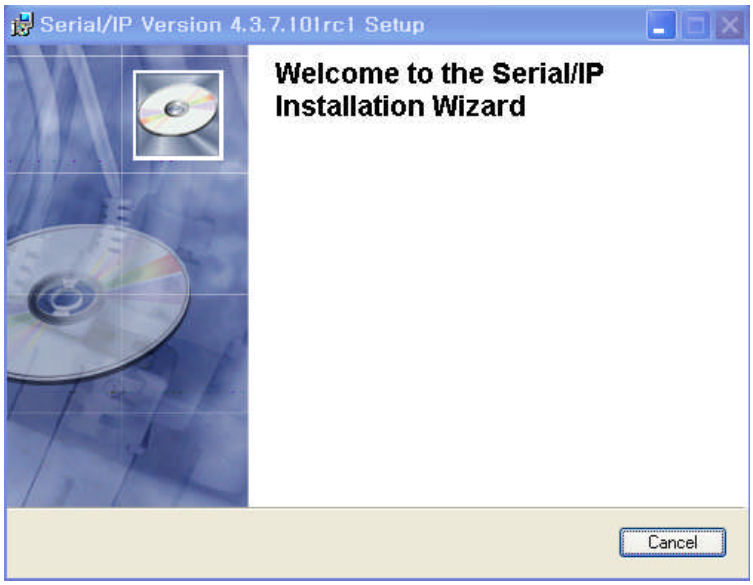


Fig. 9.2. Installation of Serial/IP

After installing Serial/IP, you can find Serial/IP tray icon. Right mouse clicking the Serial/IP icon on the right side of the Windows Tray activates “Configure…,” “Trace Window…,” and “Port Monitor...” menu display.

Fig. 9.3. Windows Tray after installation of Serial/IP

Click “Configure…” menu, and select the COM port to redirect to Serial/IP as in the left picture in Fig. 9.3 below. Enter IP address and Port number to meet Promi-MSP configuration as in the right picture in Fig. 9.3.

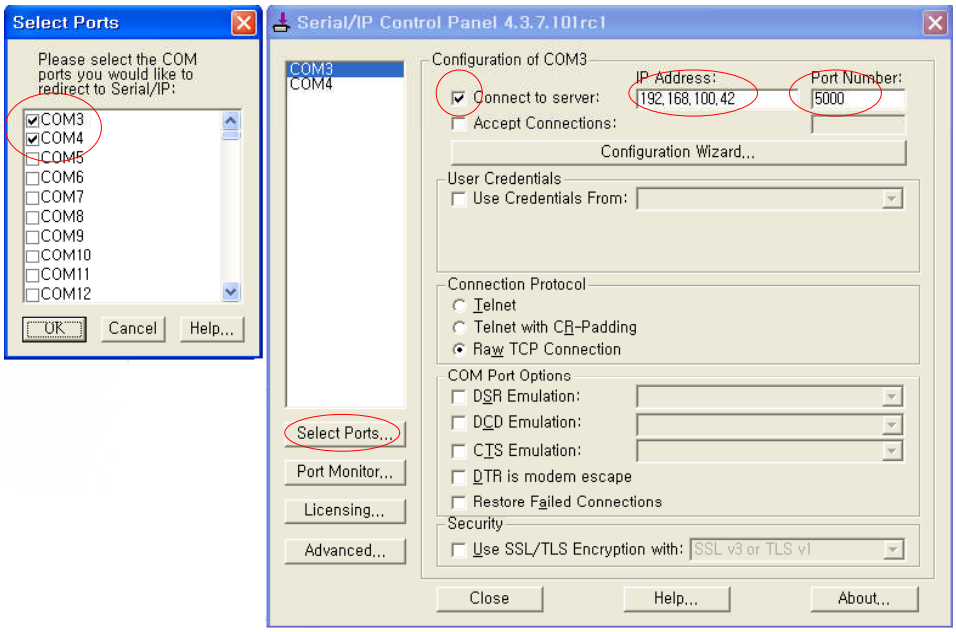


Fig 9.4 COM port configuration

Promi-MSP™ is ready for use without revising Serial Port Applications. Connect Promi-SD to Promi-MSP™ and see if data channel established between Promi-SD and Serial/IP COM port.

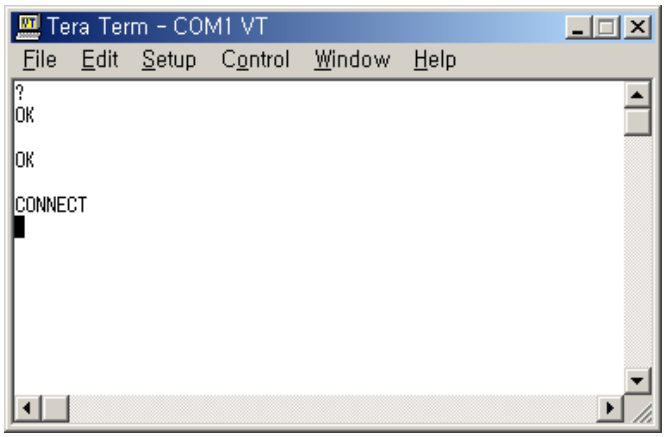


Fig. 9.5. Connection Configuration

10. Technical Support

User manual of Promi-MSP102 series will be updated on to make up the undocumented part and to be much easier guide.

If you have any questions using Promi-MSP series, please contact:

Sena Technologies, Inc.
210 Yangjae-dong, Seocho-gu
Seoul 137-130, Korea
Tel : (+82-2)-573-5422
Fax : (+82-2) 573-7710
E-Mail : support@sena.com
Website : http://www.sena.com
Manufacturing company : INITIUM Co.,Ltd.

Appendix A - Discovery Protocol

UDP Broadcast on 9097 port

Magic Number (4 bytes)

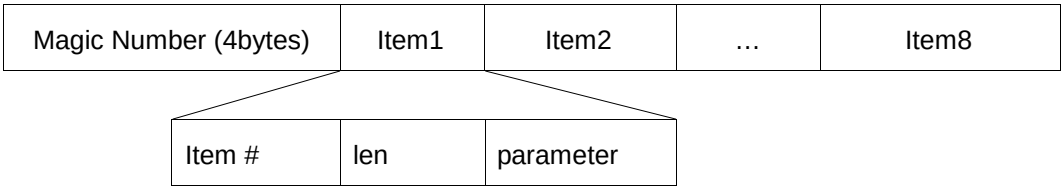
Searching

FA	05	21	EA

Response

FA	05	21	EF

Format



Item list

Item #	length	Parameter	Example
0x01	Var.	Product Name	PROMI-MSP
0x02	Var.	Model Code	101
0x03	Var.	Product Serial Number	MSP030403287
0x04	4	IP Address	C0 A8 01 0A
0x05	2	Control port (big endian)	09 DD
0x06	6	MAC address	00 0B 52 10 00 36
0x07	Var.	Bluetooth Friendly Name	Promi-MSP
0x08	6	Bluetooth Address	21 04 00 52 0B 00

<An Example>

0	8	16	24	32
Magic1 (=FAh)	Magic2 (=05h)	Magic3 (=21h)	Magic4 (=EFh)	
Item1(=01h)	Len1(=09h)	P	R	
O	M	I	-	
M	S	P	Item2(=02h)	
Len2(=03h)	1	0	1	
Item3(=03h)	Len3(=0Ch)	M	S	
P	0	3	0	
4	0	3	2	
8	7	Item4(=04h)	Len4(=04h)	
C0h	A8h	01h	0Ah	

…