

Parani-MSP100

For Wireless Multi-Serial Communications,
based on Bluetooth Technology

User Guide

Version 1.0.2

2006-12-21

User Guide for the Parani-MSP100

Version 1.0.2

Firmware version 1.0.X

Last revised on December 21, 2006

Printed in Korea

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1. Introduction

1.1. Overview

The Parani-MSP100 enables multiple Bluetooth devices to connect to the Ethernet network simultaneously and without delay when they are within range. The Parani-MSP100 provides Class 1 Bluetooth wireless connectivity to Ethernet/Fast Ethernet. It supports all Bluetooth devices compatible with Bluetooth Profiles for the Serial Port, Dial-up Networking, LAN Access and PAN. Along with the Serial Port Profile support, the Parani-MSP100 is the ideal solution for the replacement of the wired serial port application.

The Parani-MSP100 supports versatile host modes for various user applications, i.e. TCP Server and Client modes for TCP/IP-Bluetooth replay applications, Vertex mode for multicasting, Repeater mode, Serial Hub mode and RS232 mode.

The Parani-MSP100 runs on embedded Linux operating system, with Flash memory for easy software upgrades, and built-in Web server and Web interface for quick installation, and remote configuration and management. The Parani-MSP100 uses the RADIUS protocol for user authentication.

Typical application areas of the Parani-MSP100 include:

- Truck/Bus monitoring system
- Car Diagnostics
- Wireless POS system
- Wireless Factory monitoring PLC programming
- Wireless machine (healthcare/industrial) monitoring
- Wireless Printing
- Wireless logistics

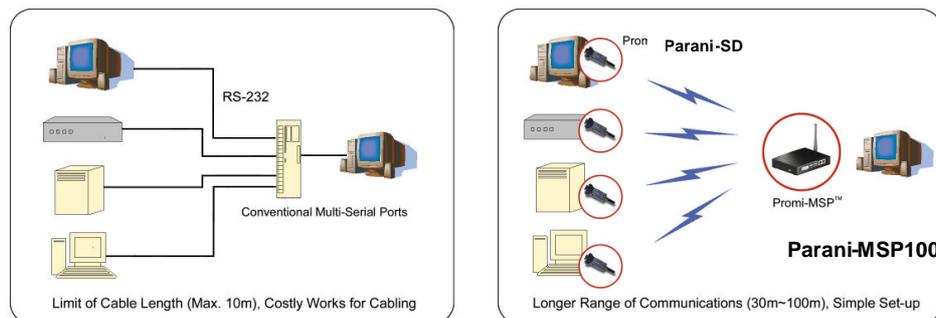


Fig. 1.1.1 Application Diagram

1.2. Package Check List

- DC Power Adapter
- Quick Start Guide
- Serial Data Cable
- Ethernet Cross Cable
- Dipole antenna
- CD-ROM, including the Parani-MSP100 Manager Software, COM Port Redirector, Tips_Serial/IP Com Port Redirector and manual

1.3. Product Specification

	Parani-MSP100
Ethernet Interface	10/100 Base-T Ethernet with RJ45 connector Supports Static IP and Dynamic IP address
Bluetooth Interface	Bluetooth v2.0 * Class 1 Level: 18dBm Frequency: 2.4GHz Profiles - Serial Port, LAN Access, PAN, Dial up Networking Working distance: Dipole-Default Antenna 150m Dipole-Dipole Antenna 200m Dipole-Patch Antenna 400m Patch-Patch Antenna 1000m
Point to multi point connectivity	MSP100 : Max. 7 Bluetooth links MSP100 + USB Dongle : Max. 14 Bluetooth links
Network Protocols	HTTP, TFTP, Telnet, DHCP Server/Client SNMP v1/v2/v3 PPP server and PPP tunneling RADIUS
Configuration	Parani-MSP100 Manager Web, Telnet, Serial Console Modem AT command set
Diagnostic LED	Power, Status, Error, EXT and INT
Power	Supply voltage: 5V DC Supply current - Minimum 2A Common Power supply options: Power via a standard AC-plug DC-adapter
Hardware Interface	LAN 10/100 x2, Inclusive Hub function. Ethernet/RS232C com. supported Built-in Bluetooth1 USB A-type port for USB extension dongle
Environmental	Operating temperature: 0 ~ 50 °C Storage temperature: -20 ~ 70 °C Humidity: 90% Non-condensing
Physical properties	Dimension (LxWxH) <ul style="list-style-type: none"> • 147 x 112 x 32 (mm) • 5.8 x 4.4 x 1.3 (in.) Weight: 225g
Approvals	FCC, CE, MIC, Telec
COM port redirector Software	Serial/IP
Warranty	3-year limited warranty

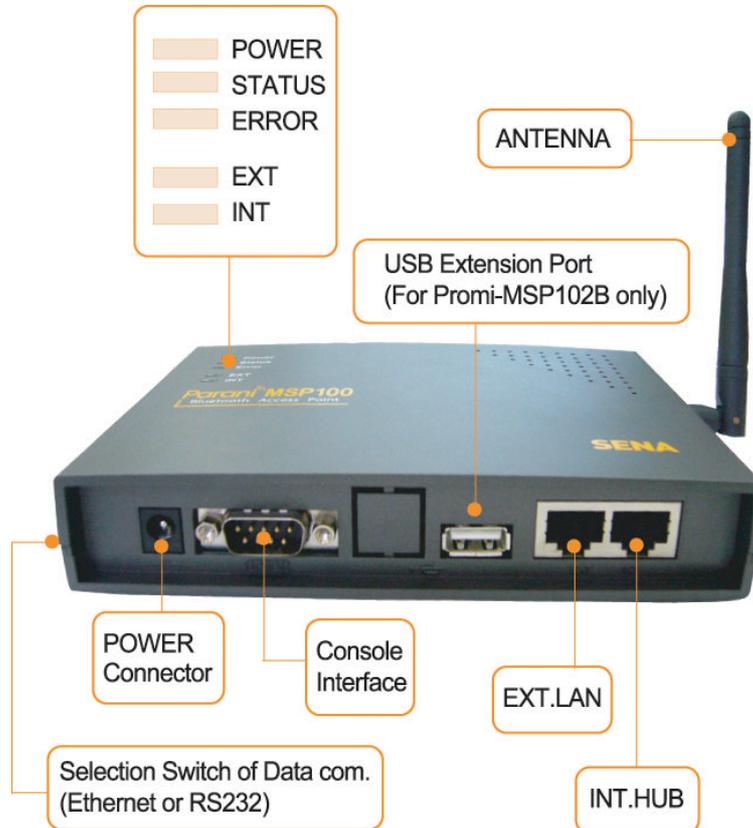


Note * :

Bluetooth v2.0 supports improved AFH function. AFH function is to mitigate the interference between WiFi and Bluetooth radios by automatically avoiding the active WiFi channel from Bluetooth link. However, AFH does not provide a complete solution making WiFi and Bluetooth work together in harmony. It is highly recommended for users to test their wireless system enough before deployment since the overall system performance is affected by various environmental factors such as distance between them.

2. Getting Started

2.1. External View



<Fig. 1.3.1> Parani-MSP100 external view

(1) DIP Switch

Users may select several different methods of data communication with the Host. Default setting is TCP/IP communication using **no.4 RJ45 marked EXT**, but if users need, data communication by **no.3 RS232 Interface marked "IOIOI"** is also possible.

- If DIP switch is on the side of drawing , Parani-MSP100 communicates with Host via Ethernet line (TCP/IP), while the RS232 port will be used for configuration purposes only (In this case, DIP switch must be positioned on the side of drawing . Refer to Section 3.1 for more details on configuration).
- If users want to use RS232 communication mode (data only), please change the direction of switch to the opposite direction.

NOTE: If the DIP switch is switched to a new position the Parani-MSP100 will need to be powercycled to take effect.

(2) Power Port: For Power Adapter connection

(3) RS232 Interface marked "IOIOI":

For Parani-MSP100 network configuration via RS232 serial cable - One RS232 serial cable, both ends female DB-9 interfaces, are provided with the Parani-MSP100. This port can be used for both Configuration of Parani-MSP100 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 Parani-MSP100. With this, Parani-MSP100s can be chained without network hub. This is for the better user experience of convenient installation. Use a straight cable for this purpose.

2.2. LED Indicators

- POWER: POWER ON/OFF Status
- STATUS: Parani-MSP100 Status
- ERROR: Error Event Status
- LINE/ACT1, LINE/ACT2: RJ45 connections Status

STATUS LED	ERROR LED	Description
ON	OFF	Normal
Blinking	OFF	Connecting to Station Parani-MSP100 (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 <i>DO NOT turn off Parani-MSP100 during firmware upgrade</i> ; turning off Parani-MSP100 during firmware update may cause malfunction.

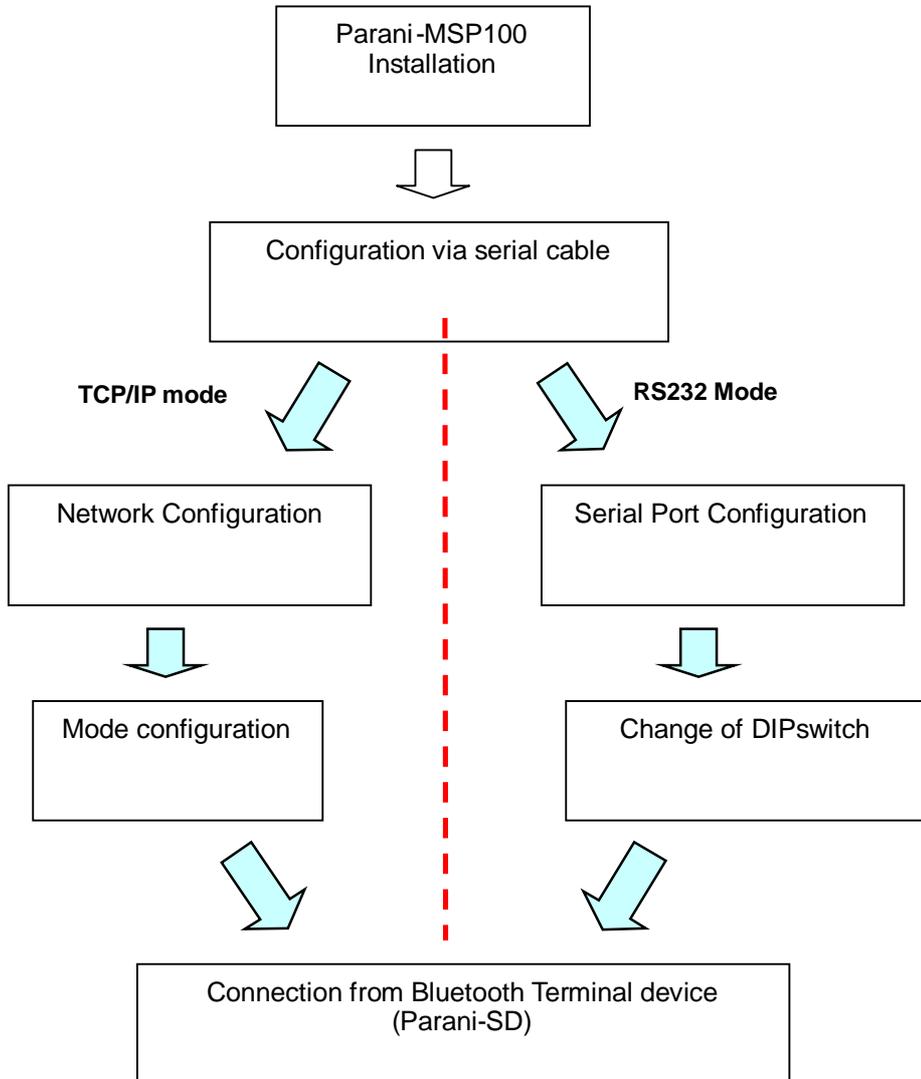
2.3. Connecting Parani-MSP100 to host

Step 1: Connect the power jack to the power connector of the Parani-MSP100 using DC power adapter included in the package. If power is properly supplied, the LEDs for 'Power' and 'Status' will maintain a solid green color.

Step 2: Connect the one end of the Ethernet cable to the 'EXT' port of the Parani-MSP100 and the other to the Ethernet network. If the cable is properly hooked up, the Parani-MSP100 will have a valid connection to the Ethernet network by indicating 'EXT' LED becomes green and is blinking if there's any corresponding packet traffic.

Step 3: Only for 1st time installation, attach the serial console cable to the Parani-MSP100. You are ready to install the Parani-MSP100 using serial console.

3. Installation

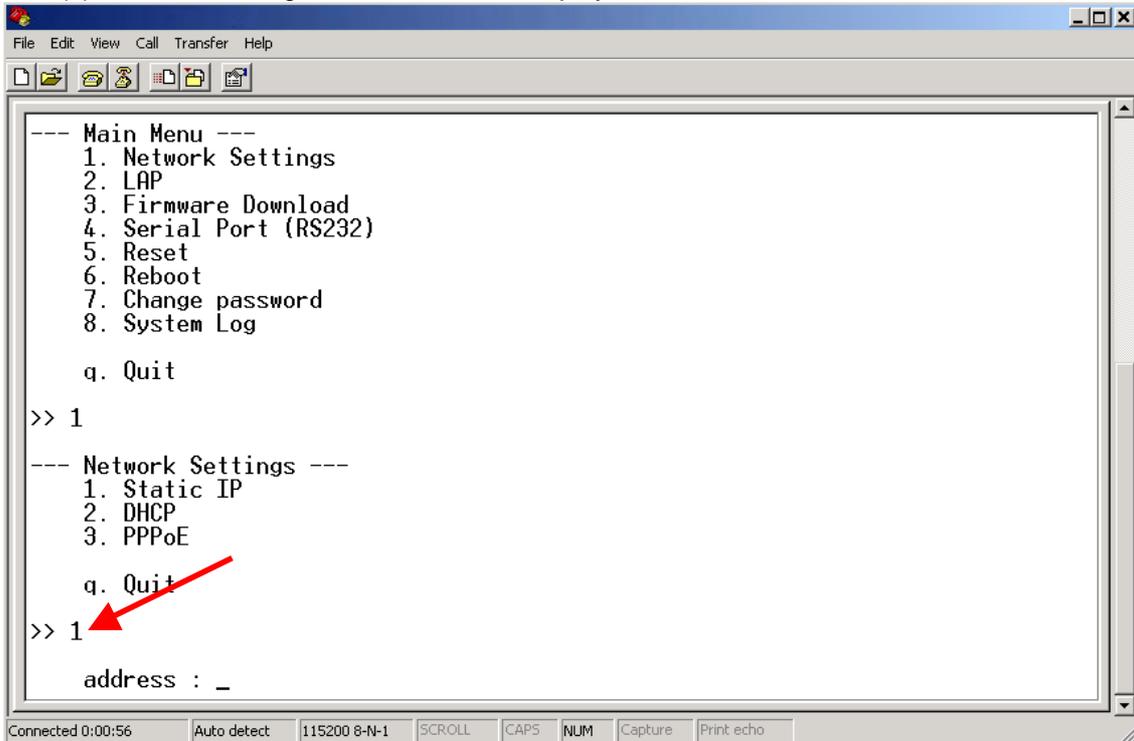


3.1. Network Settings

- (1) Parani-MSP100 power-up; 'POWER' and 'STATUS' LEDs display green
- (2) Parani-MSP100 network configuration: connect Parani-MSP100 to PC via RS232 cable(Position of DIP switch is on the side of drawing .)
- (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 as is displayed on a HyperTerminal screen**; If Parani-MSP100 prompts Login ID / password, default values are:

Login: admin
Password: admin

- (6) **Default Parani-MSP100 IP address factory setting is 192.168.1.10.** Please revise settings to reflect the user's appropriate networking environment IP address.
- (7) To revise Network Settings, Enter "1" as displayed below.
- (8) Network Settings sub menu will be displayed.



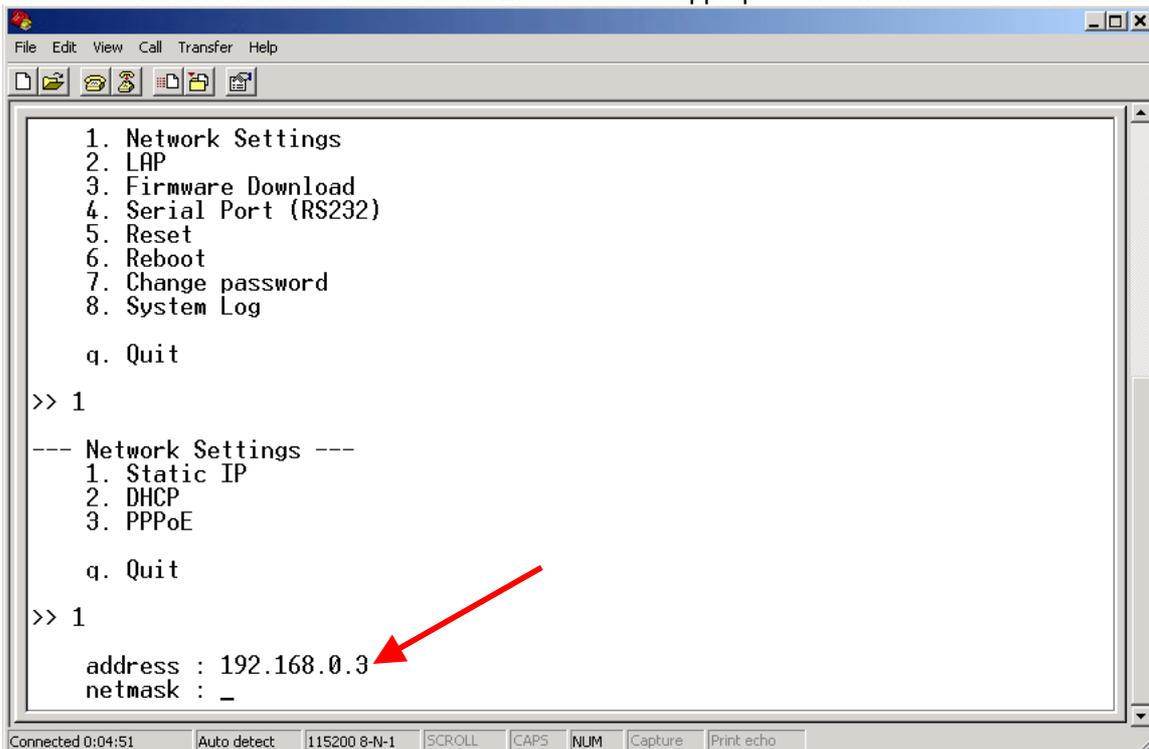
```
File Edit View Call Transfer Help
--- Main Menu ---
1. Network Settings
2. LAP
3. Firmware Download
4. Serial Port (RS232)
5. Reset
6. Reboot
7. Change password
8. System Log

q. Quit
>> 1
--- Network Settings ---
1. Static IP
2. DHCP
3. PPPoE

q. Quit
>> 1
address : _
```

Connected 0:00:56 | Auto detect | 115200 8-N-1 | SCROLL | CAPS | NUM | Capture | Print echo

- (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 Parani-MSP100 IP address. Enter the user appropriate network IP address.



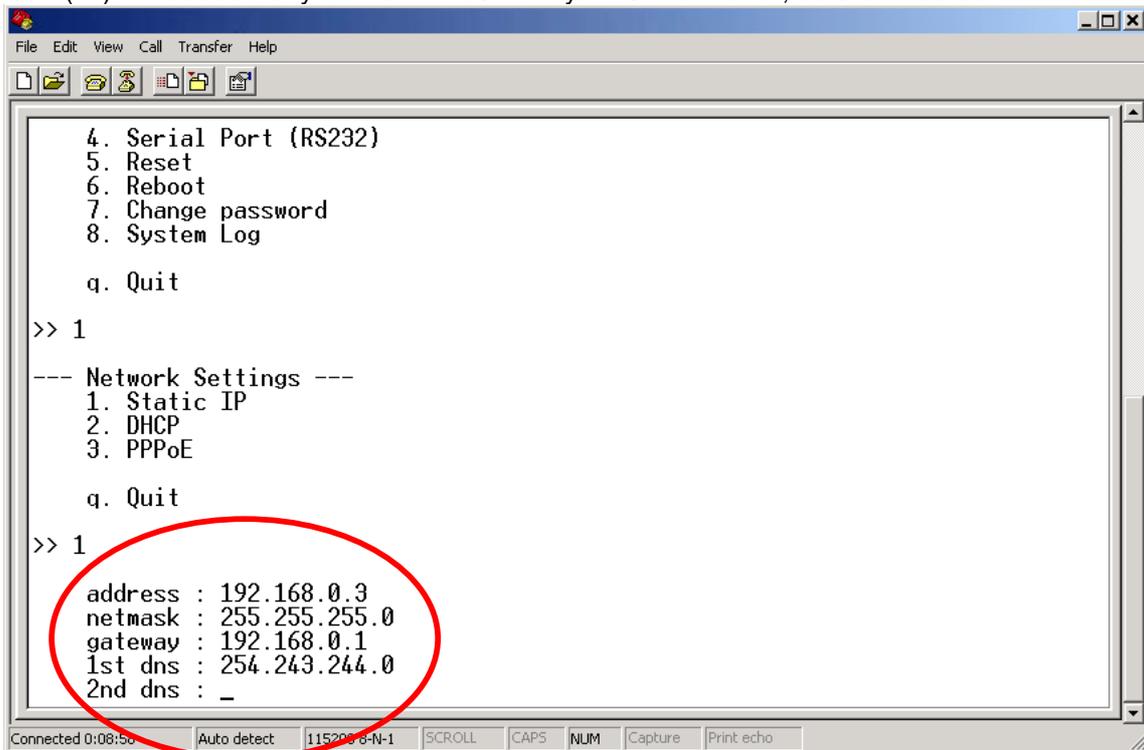
```
File Edit View Call Transfer Help
1. Network Settings
2. LAP
3. Firmware Download
4. Serial Port (RS232)
5. Reset
6. Reboot
7. Change password
8. System Log

q. Quit
>> 1
--- Network Settings ---
1. Static IP
2. DHCP
3. PPPoE

q. Quit
>> 1
address : 192.168.0.3
netmask : _
```

Connected 0:04:51 | Auto detect | 115200 8-N-1 | SCROLL | CAPS | NUM | Capture | Print echo

(11) Please enter your Netmask/Gateway/DNS information, as shown below:



```
File Edit View Call Transfer Help
[Icons]
4. Serial Port (RS232)
5. Reset
6. Reboot
7. Change password
8. System Log

q. Quit
>> 1
--- Network Settings ---
1. Static IP
2. DHCP
3. PPPoE

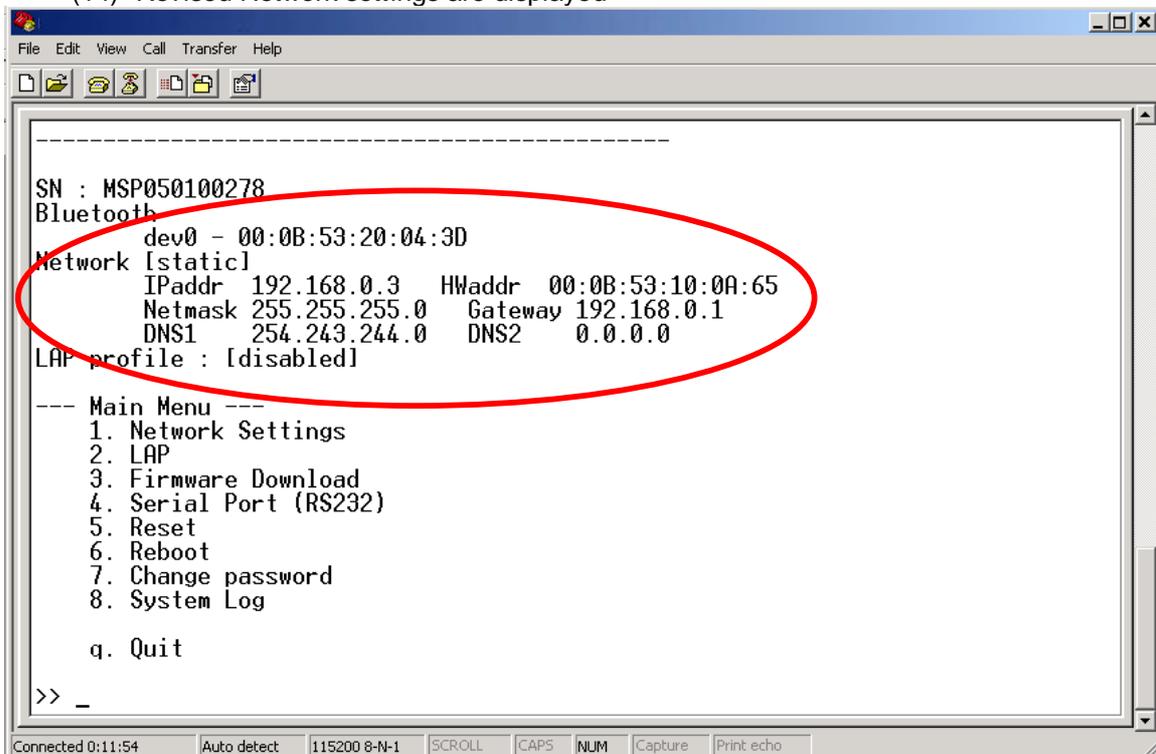
q. Quit
>> 1
address : 192.168.0.3
netmask : 255.255.255.0
gateway : 192.168.0.1
1st dns : 254.243.244.0
2nd dns : _

Connected 0:08:50 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo
```

(12) Press Enter: Parani-MSP100 will prompt reboot request. Enter 'Y' [Yes]; press Enter to reboot Parani-MSP100 to apply the revised Network Settings.

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

(14) Revised Network settings are displayed



```
File Edit View Call Transfer Help
[Icons]
-----
SN : MSP050100278
Bluetooth
dev0 - 00:0B:53:20:04:3D
Network [static]
IPaddr 192.168.0.3 HWaddr 00:0B:53:10:0A:65
Netmask 255.255.255.0 Gateway 192.168.0.1
DNS1 254.243.244.0 DNS2 0.0.0.0
LAP profile : [disabled]

--- Main Menu ---
1. Network Settings
2. LAP
3. Firmware Download
4. Serial Port (RS232)
5. Reset
6. Reboot
7. Change password
8. System Log

q. Quit
>> _

Connected 0:11:54 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo
```

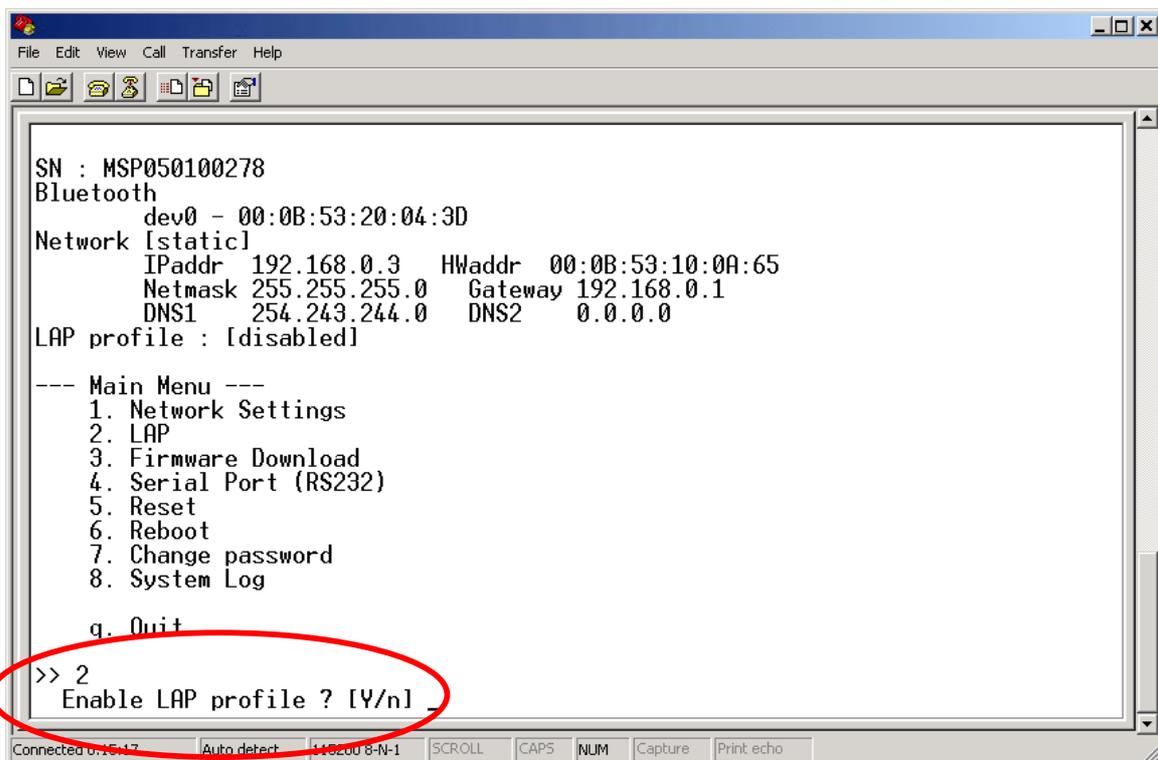
<An example: Revised Network Settings>

- (15) Networking configuration is complete. The preceding example shows static IP assignment to Parani-MSP100. The user should select static, DHCP or PPPoE IP as needed.

3.2. LAN Access Profile

Parani-MSP100 supports LAN Access Profile for Bluetooth networking Access Point. By direct connection of Parani-MSP100 to ADSL, the internet is accessible via Bluetooth.

Select menu 2. LAP by entering '2'; Parani-MSP100 prompts for LAP profile enable/disable. Select 'Y' [Yes] to enable or 'N' [No] to disable LAP profile.



3.3. Firmware Download

Parani-MSP100 enables users to upgrade the firmware. The SENA customer support team offers available firmware upgrades via Xmodem or TFTP user download; menu no. 3. Firmware Download.

During Firmware download, STATUS and ERROR LEDs flash. DO NOT TURN OFF Parani-MSP100 during firmware download. Turning off Parani-MSP100 during firmware download may result in operation malfunction.

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

3.3.1 Firmware Upgrade via TFTP

- Users may upgrade the firmware using TFTP via Crossed cable.

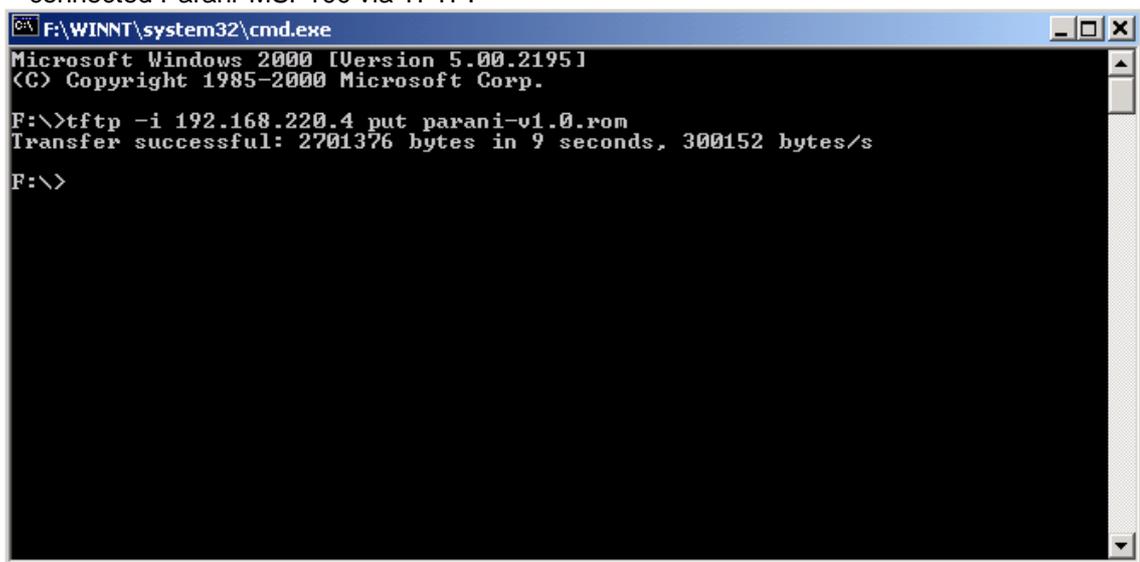
3. Firmware Download → 2.TFTP

- Then you will get following screen:

```
TFTPD ready. Send firmware using TFTP.  
Windows 2000/XP:  
tftp -i 192.168.220.4 put <filename>
```

* Here, a sample IP address, 192.168.220.4 has been assigned to Parani-MSP100. User must use your own IP address. User must put your own IP address.

- **Please keep this serial console connected.**
- After you save the Parani-MSP100 upgrade ROM file to your PC, please open COMMAND window as in 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 Parani-MSP100 via Crossed Ethernet cable.
- Below window is showing the procedure of sending ROM file named “parani.rom” to the connected Parani-MSP100 via TFTP.



```
F:\WINNT\system32\cmd.exe  
Microsoft Windows 2000 [Version 5.00.2195]  
(C) Copyright 1985-2000 Microsoft Corp.  
F:\>tftp -i 192.168.220.4 put parani-v1.0.rom  
Transfer successful: 2701376 bytes in 9 seconds, 300152 bytes/s  
F:\>
```

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

```

File Edit View Call Transfer Help
---
7. Change password
8. System Log

q. Quit

>> 3

--- Firmware Download ---
Current:
Parani-MSP100 2.1.0 -- Thu, 17 Feb 2005 12:32:09 +0900

1. Xmodem
2. TFTP

q. Quit

>> 2
TFTPd ready. Send firmware using TFTP.
Using MS-Windows 2000/XP, 'tftp -i 192.168.220.4 put <filename>'
Upgrading Firmware...
CAUTION!!! Never turn off Parani-MSP100 in progress.
.....
Done. Reboot Parani-MSP100
-

Connected 0:08:20 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo

```

- During upgrade, LEDs will flashing and users should NOT turn off Parani-MSP100 this time. If user cannot send the ROM file, please check the network connection status.
- Once ROM file is delivered to the connected Parani-MSP100, the upgrade firmware will be recorded to memory. During this time both STATUS LED and ERROR LED will flashing speedily. NEVER turn off Parani-MSP100 during this firmware recording.
- **Once finished, please resupply power to Parani-MSP100 for applying.**

```

File Edit View Call Transfer Help
---
>> 3

--- Firmware Download ---
Current:
Parani-MSP100 2.1.0 -- Thu, 17 Feb 2005 12:32:09 +0900

1. Xmodem
2. TFTP

q. Quit

>> 2
TFTPd ready. Send firmware using TFTP.
Using MS-Windows 2000/XP, 'tftp -i 192.168.220.4 put <filename>'
Upgrading Firmware...
CAUTION!!! Never turn off Parani-MSP100 in progress.
.....
Done. Reboot Parani-MSP100

Parani-MSP100 Configuration Console ----
-- Press Enter ---

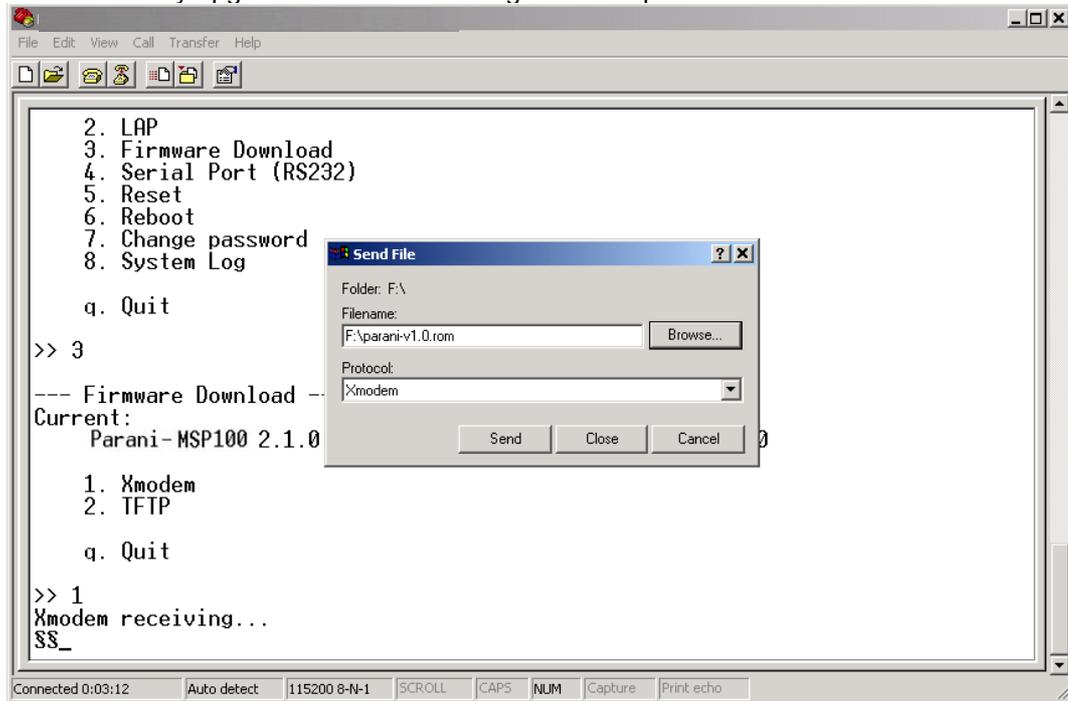
-

Connected 0:05:28 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo

```

3.3.2 Firmware Upgrade via Xmodem

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



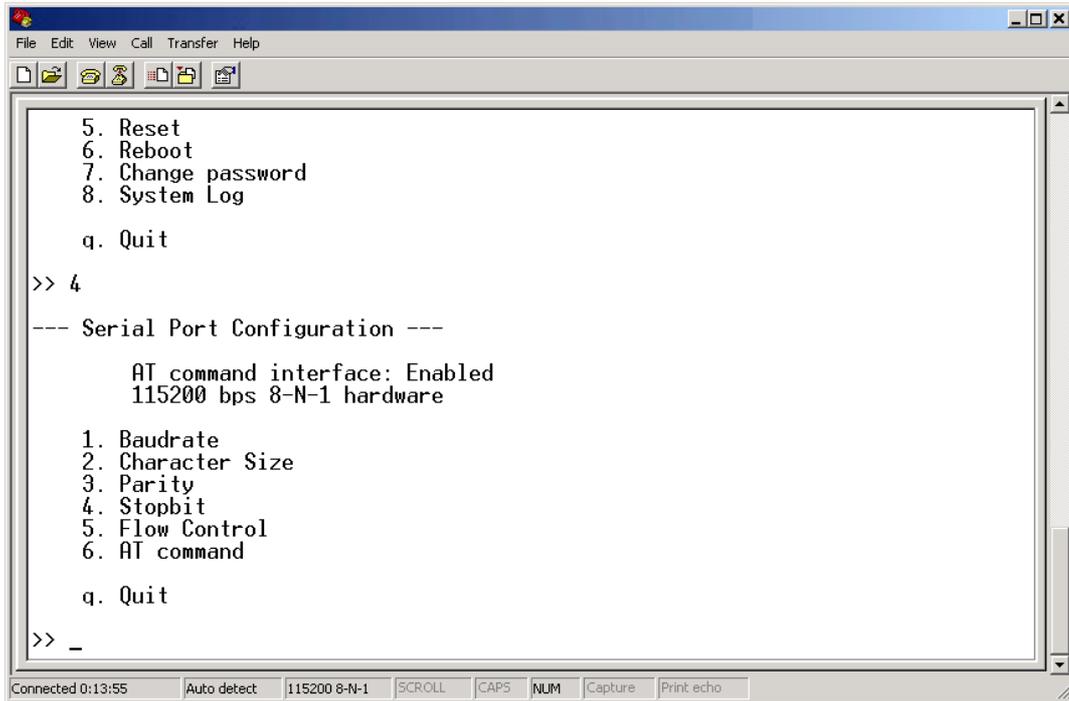
<Upgrade firmware via Xmodem>

3.4 Serial Port

Serial port of Parani-MSP100 can be used for both Configuration and Data communication. For configuration, users need to change the DIPswitch of Parani-MSP100 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:

Baud rate	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

For applying changed configuration, please RESUPPLY the power, and then Parani-MSP100 will start to operate as RS232 mode.

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

3.5 Reset/Reboot/Quit

Entering no. 5, Parani-MSP100 RESET, in the main menu, restores all factory Default value settings. REBOOT restarts Parani-MSP100 for new configuration application. QUIT instantly aborts current processing.

4. Configuration

Once users are finished configuring network settings using serial console. Users need to select the operation mode of Parani-MSP100. Following three (3) ways can be used for selection of operation mode:

1. Via Parani-MSP100 configuration software
2. Via Telnet (Control port)
3. Via Web browser (Internet Explorer, etc.)

In this chapter, a guide on usage of the Parani-MSP100 configuration software will be introduced. How to configure via Telnet or Web browser will be introduced in the Appendix.

4.1. Configuration via Parani-MSP100 Manager

4.1.1. When Parani-MSP100 is connected to PC directly

If users are going to connect Host PC and Parani-MSP100 directly using a crossed cable, network settings as in the chapter 3.1 will not be required.

Parani-MSP100 has factory settings: Static IP 192.168.1.10

For communication with Parani-MSP100, set the IP of Host PC to have proper address.

If you connected Parani-MSP100 to the Network, not to the Host PC, skip this chapter and go to next chapter 4.1.2.

Open your Network Connections and see Property information of Local Network.

Change your IP address to Static:

IP: 192.168.1.11

Subnet: 255.255.255.0

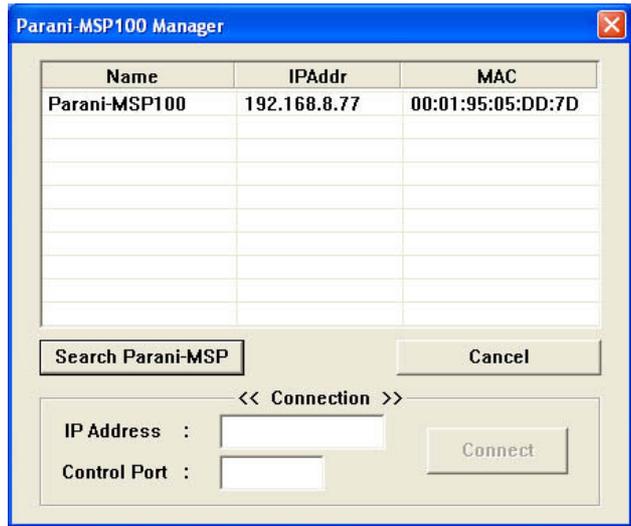
Gateway: 192.168.1.1

These settings for direct communication only with Parani-MSP100 connected.

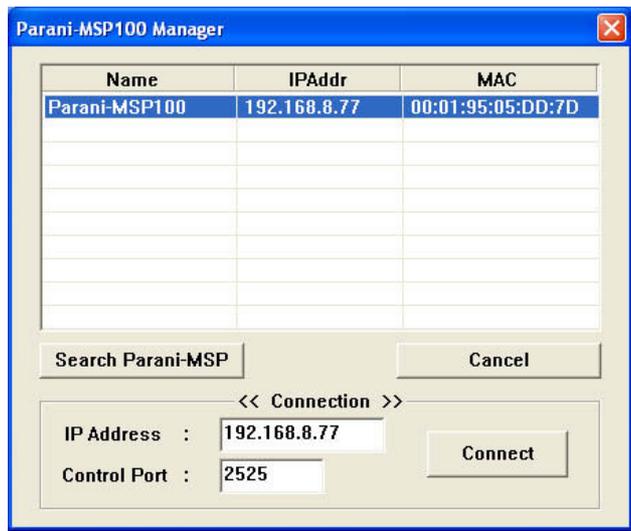
4.1.2. Log in Parani-MSP100 Manager

For easier configuration and **monitoring** on a specific Parani-MSP100, which has been installed locally or remotely, users may use Parani-MSP100 software.

Start Parani-MSP100 software, and press "Search" button on the left side.



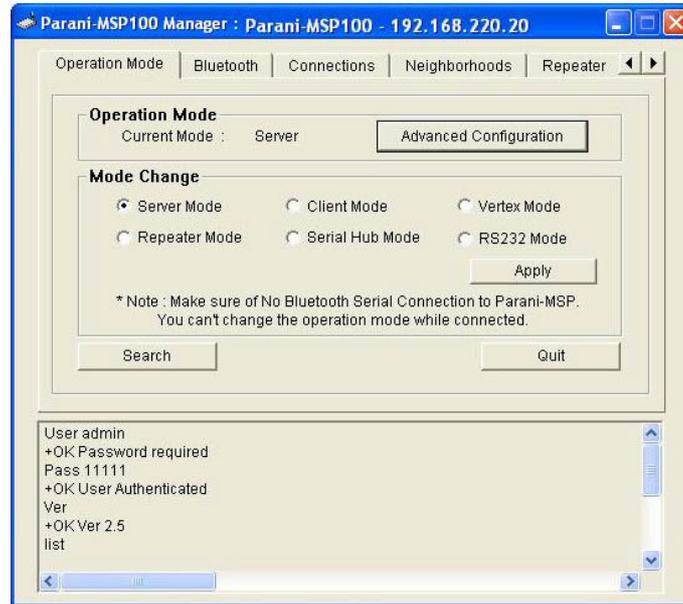
Please select one Parani-MSP100 you would like to access and press “Connect” button.”



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



4.1.3. Operation Mode



Parani-MSP100 may be set to different type of modes, so users may have to select one for its own application. There are 6 types of modes: Server, Client, Vertex, Repeater, Serial Hub, and RS232.

- **Operation Mode**

This shows current type of Mode.

- **Mode Change**

Users may change and select the type of Operation.

- **Search**

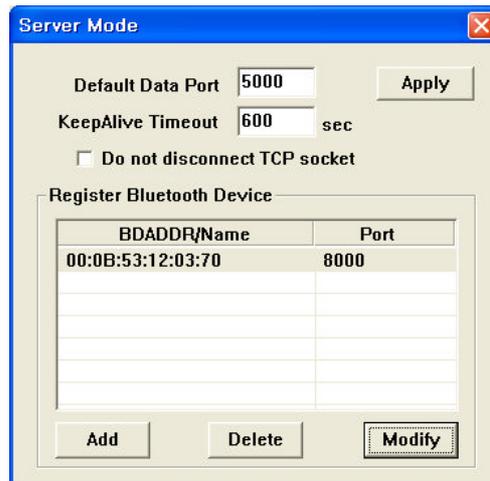
Users may search Parani-MSP100 on the network.

Note: While Bluetooth devices are connected to Parani-MSP100, mode change is not possible.

A) Server Mode

In Sever Mode, Parani-MSP100 will operate as a Server on the network. Host PC will connect to Parani-MSP100 via TCP/IP Ethernet and Parani-MSP100 will recieve the connection. After connection, full duplexing is possible.

Users need to select the Port number to standby to receive connection from Host PC.



<Configuration of Server Mode>

- Default Data Port

If unregistered device tries to connect to Parani-MSP100, Parani-MSP100 will assign the port number consecutively from Default Data port.

- KeepAlive Timeout

When TCP connection is stopped unexpectedly (Ex. Power off of Host PC), Parani-MSP100 will request NULL during KeepAlive Timeout (second). If there is no response during this Timeout, TCP connection will be finished.

- 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, if Bluetooth connection is stopped, TCP connection can be finished.

To prevent this, users may use this option, so does not need to make TCP connection whenever Bluetooth connection is stopped.

- Register Bluetooth Device: Shows the Bluetooth devices registered.

- Add: Add Bluetooth device to register.

- Delete: Remove Bluetooth device registered.

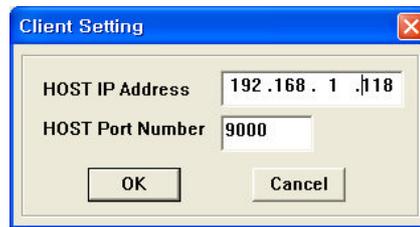
- Modify: Modify Port of the selected device.

B) Client Mode

In Client Mode, Parani-MSP100 will act as a TCP client. When a Bluetooth device connects to Parani-MSP100, Parani-MSP100 will try to connect to the designated Host PC. So, Host PC

should be in standby status.

In Client Mode, please select the IP address and port number of the Host PC to connect.



A dialog box titled "Client Setting" with a close button (X) in the top right corner. It contains two input fields: "HOST IP Address" with the value "192.168.1.118" and "HOST Port Number" with the value "9000". Below the fields are two buttons: "OK" and "Cancel".

<Configuration of IP address of Host>

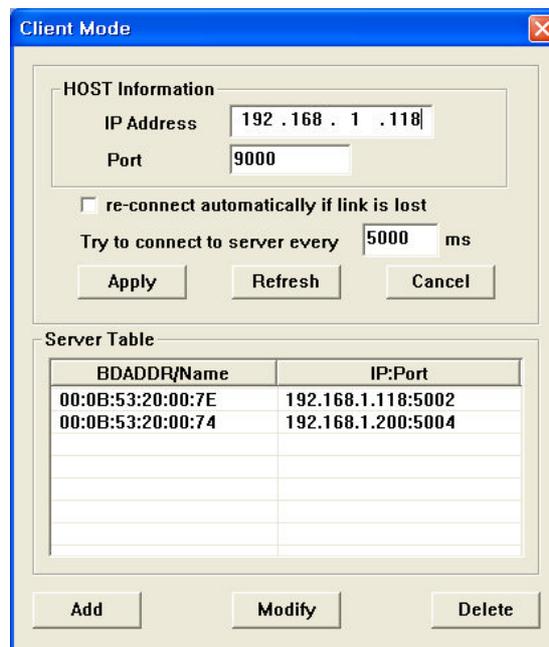
Select "Advanced Configuration" button.

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

Bluetooth device "00:0B:53:16:12:C7" will connect to Host "192.168.20.251", port no. 5002.

Bluetooth device "00:0B:53:16:12:74" will connect to Host "192.168.20.252", port no. 5004.

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



A dialog box titled "Client Mode" with a close button (X) in the top right corner. It contains a "HOST Information" section with "IP Address" (192.168.1.118) and "Port" (9000). Below this is a checkbox "re-connect automatically if link is lost" which is unchecked, and a field "Try to connect to server every" set to "5000 ms". There are "Apply", "Refresh", and "Cancel" buttons. Below is a "Server Table" with two columns: "BDADDR/Name" and "IP:Port". The table contains two rows: "00:0B:53:20:00:7E" with "192.168.1.118:5002" and "00:0B:53:20:00:74" with "192.168.1.200:5004". At the bottom are "Add", "Modify", and "Delete" buttons.

BDADDR/Name	IP:Port
00:0B:53:20:00:7E	192.168.1.118:5002
00:0B:53:20:00:74	192.168.1.200:5004

<Configuration of Client Mode>

- Host IP Address
For network Host Server IP address entry
- Host Port Number
For Server Host 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 Parani-MSP100 fails to open a data channel connecting to Host, enter the connection retry frequency. Entering 0 [zero] obtains retry abort.

C) Vertex Mode

Parani-MSP100 Vertex Mode avails Wireless RS485 multidrop service when assigned at this site.



<Configuration of Vertex Mode>

- Vertex Port

For Parani-MSP100 Vertex port no. entry.

- Max Number of Connections

For entering the number of Hosts connectable to Parani-MSP100.

D) Repeater Mode

In Repeater Mode, Parani-MSP100 will act as a Repeater to expand the coverage of Bluetooth. Let's call the Parani-MSP100 that will act as Repeater, "Repeater", and call the Parani-MSP100 of normal operation as "Station".

In Repeater Mode, configuration required is only the Address of the Station Parani-MSP100.

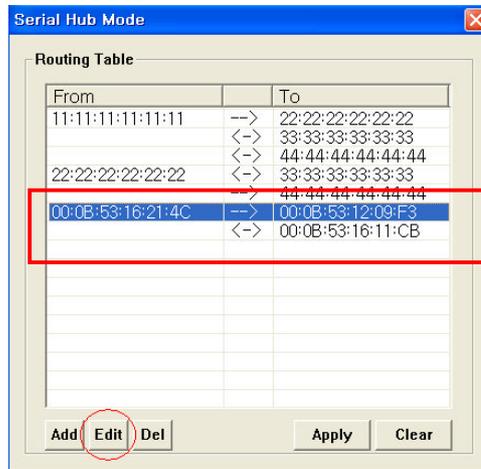
When Repeater is connecting the Station, Status LED of Repeater is blinking.

E) Serial Hub Mode

Users may transmit/receive data via Parani-MSP100 in Serial Hub mode (Serial Hub).

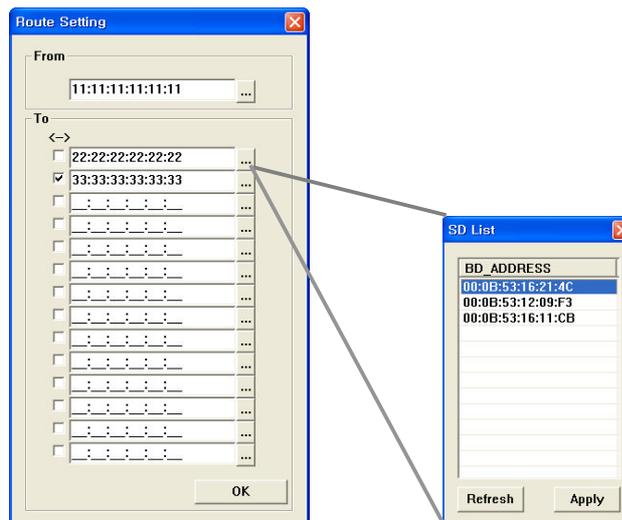
Parani-MSP100 in serial hub mode relay the data from a Bluetooth device to another Bluetooth device connected to Parani-MSP100. No network host is involved.

Users may configure Parani-MSP100 how to handle data from Bluetooth devices in advanced configuration of Parani-MSP100 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.

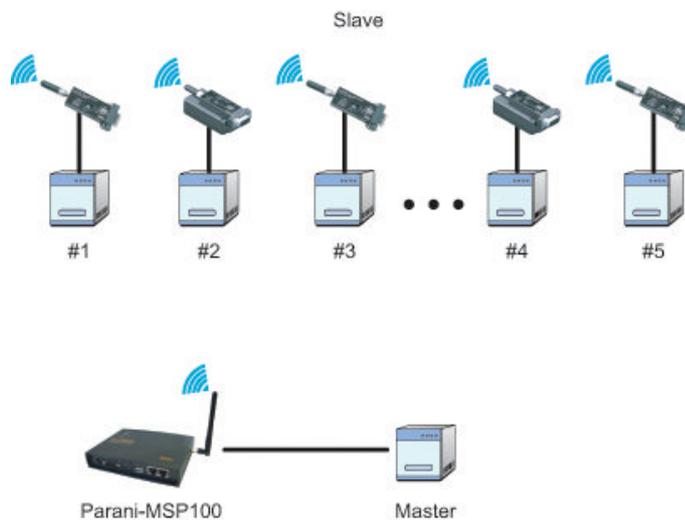
F) RS232 Mode

In RS232 Mode, Parani-MSP100 may communicate with other Bluetooth devices via a RS232 serial cable.

Users can communicate point to multi point communication via Parani-MSP100 with Parani-SD. In this case, the master is the serial port of the Parani-MSP100 and slaves are the Parani-SD units.

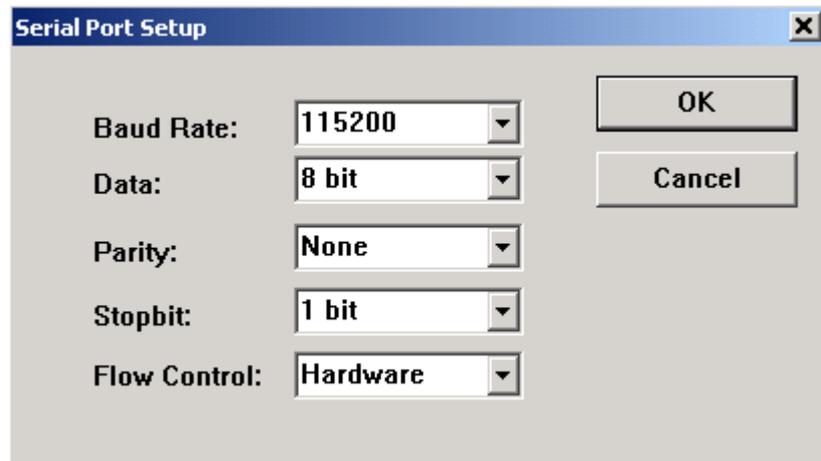
RS232 Mode works very similar to a 485 multi-drop connection, where the Parani-MSP100 is a master unit and each Parani-SD will act as the slaves. When data is transmitted to the serial port of the Parani-MSP100, Parani-MSP100 transmits the same data to each of the Parani-SD units. If one of the Parani-SD units transmit data, only Parani-MSP100 serial port will receive that data.

In the RS232 Mode, Parani-MSP100 transmits the serial port data to all of the Parani-SD units at the same time. Consequently, if some slaves transmit data to Parani-MSP100 at the same time then serial data to the Parani-MSP100 will be blended together.



i) Set the serial configuration of Parani-MSP100

As RS232 port has been configured to be used as a Configuration port, which allows users to access the configuration utility of the Parani-MSP100. When the Parani-MSP100 is set to RS232 Mode, users will need to change the Switch on the left side of Parani-MSP100 to the Data position to allow for proper data communication to occur.



- Login the console of Parani-MSP100 (Default: 115200-N-8-1-Flowcontrol None)
- Select menu #4. Serial Port (RS232)
- Set the serial parameters like below.

```
Parani-MSP Configuration Console ----
-- Press Enter ---

login: admin
Password: *****

Parani-MSP100 Version v1.0.0 -----
Copyright (C) 2006 Sena Technologies, Inc.
-----

SN : MSP060900003
Bluetooth
    dev0 - 00:01:95:20:04:51
Network [dhcp]
    IPaddr 192.168.222.16  HWaddr 00:01:95:00:00:32
    Netmask 255.255.0.0  Gateway 192.168.1.1
    DNS1 168.126.63.1  DNS2 168.126.63.2
LAP profile : [disabled]

--- Main Menu ---
1. Network Settings
2. LAP
3. Firmware Download
4. Serial Port (RS232)
```

```
5. Reset
6. Reboot
7. Change password
8. System Log

q. Quit
>> 4
--- Serial Port Configuration ---

    AT command interface: Disabled
    115200 bps 8-N-1 hardware

1. Baudrate
2. Character Size
3. Parity
4. Stopbit
5. Flow Control
6. AT command

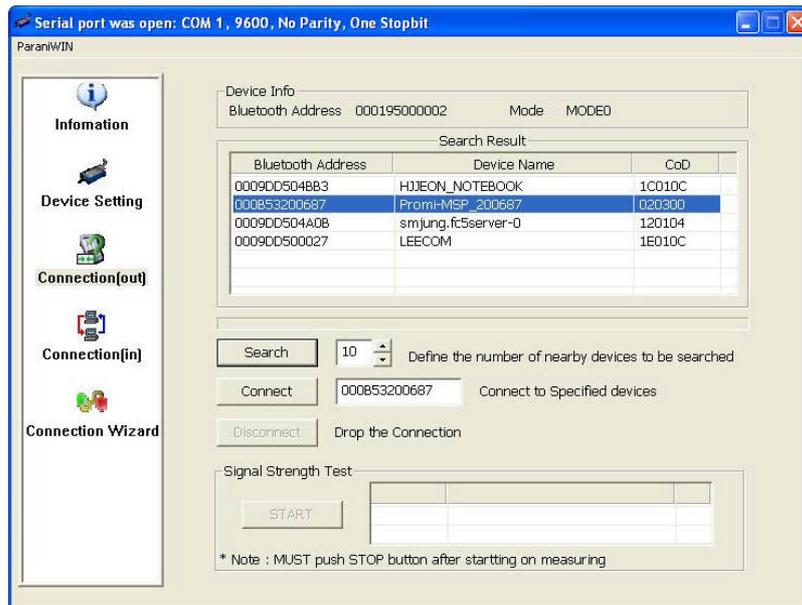
q. Quit
>>
```

- Logout the console (q.Quit)
- To apply changes to the configuration, turn off the Parani-MSP100.
- Users will need to move the Switch on the left side of Parani-MSP100 to right side position for Data communication.
- Turn on the Parani-MSP100, and then Parani-MSP100 will start operating in RS232 mode.

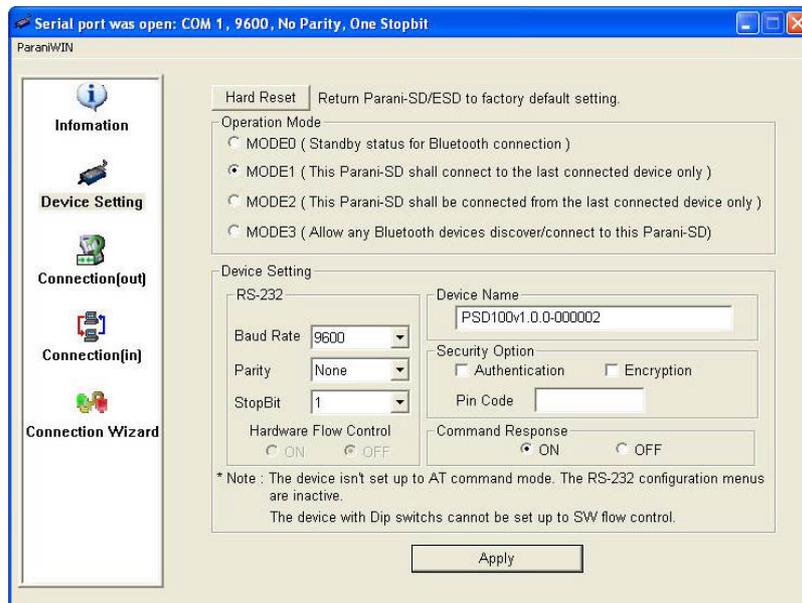
Please note that if you need to make use of data communication via RS232 port, you will not need to configure Network settings.

ii) Set the Parani-SD configuration

- Make connection from Parani-SD to the Parani-MSP100.



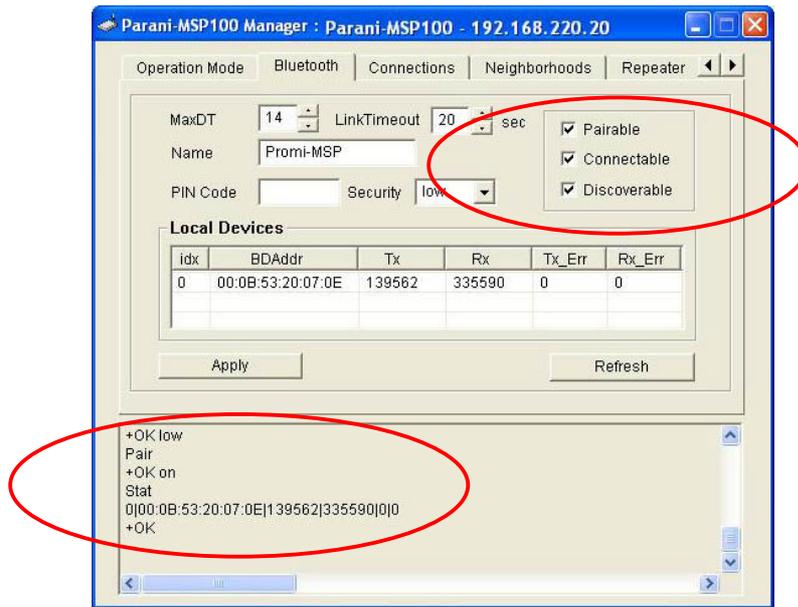
- Press [Disconnect] button in the connection window of Parani-SD Manager.
- See the Device Setting window in the Parani-SD Manager and set operation mode as MODE1 like below.



- For configuration of multiple Parani-SD's please use the connection techniques as described above.

4.1.4. Bluetooth

In this page, users can find current status of Parani-MSP100.



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



TIP:

For 14 connections in Parani-MSP100+USB Dongle, please change the MaxDT to 12 above, after installing USB extension dongle provided.



TIP:

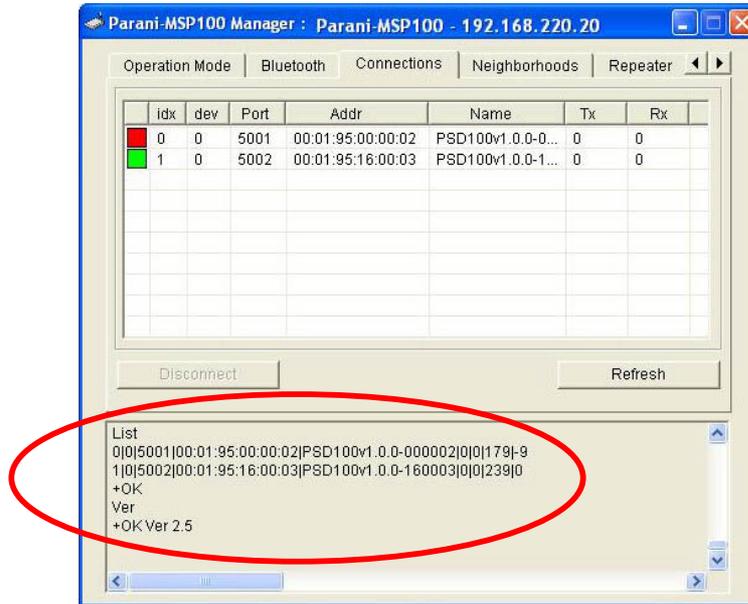
It may take more than 5 minutes to be connected with MSP if SD are close by 1-to-n relationship.

4.1.5. Connection

In this page, users may MONITOR the connection status of devices to Parani-MSP100.

Now, three Bluetooth devices have been connected for Wireless serial communications as below.

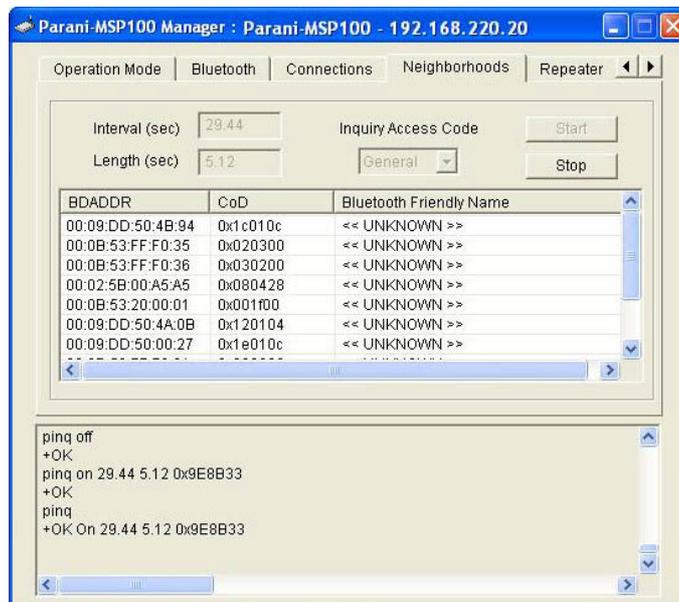
Left square shows quality of connection. Green square is good, red square is poor quality.



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

4.1.6. Neighborhoods

This page is used to search nearby Bluetooth devices, configuration of search Interval, and the Length.

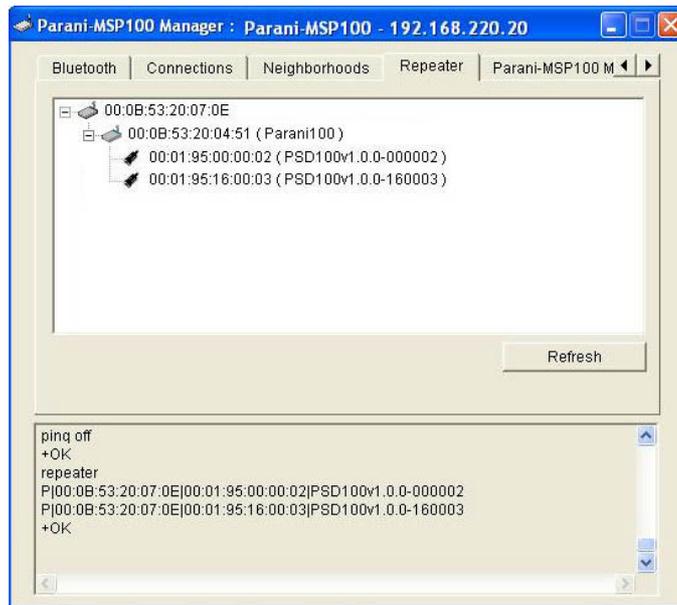


< Neighborhoods >

Bluetooth Friendly Name of devices that were connected previously will appear in the Bluetooth Friendly name box.

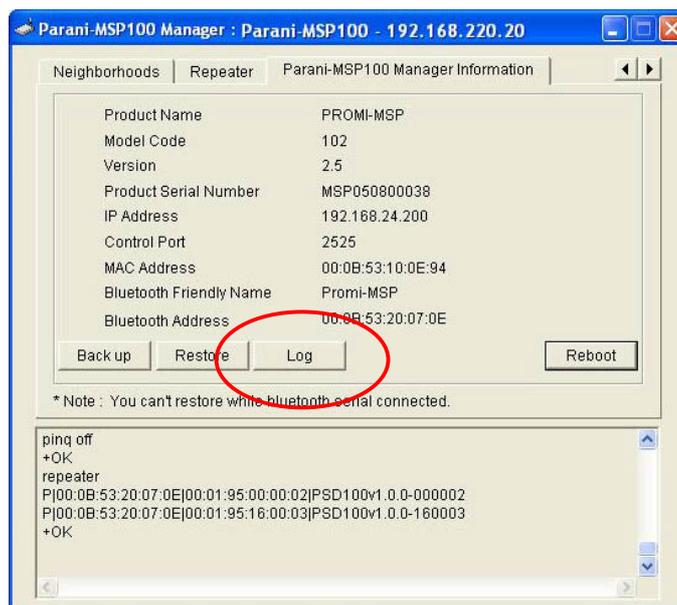
4.1.7. Repeater

This page shows tree-structure how Repeater Parani-MSP100 and terminal devices are connected to the Station Parani-MSP100. If user's Parani-MSP100 is in Repeater Mode, nothing will be showed. In the captured window below, Repeater Parani-MSP100 is connected to a Station Parani-MSP100 and a Parani-SD is connected Repeater (00:0B:53:20:04:51).



4.1.8. Parani-MSP100 information

Users may see Parani-MSP100 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.



```
<46>Jan 1 00:00:08 syslogd started: BusyBox v1.00 (2005.02.04-04:48
<30>Jan 1 00:00:09 msp: Promi-MSP ver 2.1 started
<30>Jan 1 00:00:09 msp: Loading configurations...
<30>Jan 1 00:00:09 msp: Maximum number of bluetooth devices: 15
<30>Jan 1 00:00:09 msp: Bluetooth link supervision timeout: 20000 m
<30>Jan 1 00:00:09 msp: Operation mode: hub
<30>Jan 1 00:00:09 msp: Connection try interval (Client mode): 5000
<30>Jan 1 00:00:09 msp: Automatic network reconnection (Client mode
<30>Jan 1 00:00:09 msp: Base port (Server mode): 5000
<30>Jan 1 00:00:09 msp: Control port: 2525
<30>Jan 1 00:00:09 msp: Vertex port: 55555
<30>Jan 1 00:00:09 msp: Maximum concurrent vertex connections: 0
<30>Jan 1 00:00:09 msp: Preserve network connection: false
<30>Jan 1 00:00:09 msp: Station: 11:11:11:11:11:11
<30>Jan 1 00:00:09 msp: Frame-buffering: false
<30>Jan 1 00:00:09 msp: TCP Keepalive time: 700 secs
<30>Jan 1 00:00:09 msp: TCP Keepalive interval: 10 secs
<30>Jan 1 00:00:09 msp: TCP Keepalive probes: 4 times
<30>Jan 1 00:00:09 msp: RS232 mode 0
<30>Jan 1 00:00:09 msp: bt_set_max_connections: 15
<30>Jan 1 00:00:10 btman: Initialize bt0...
<30>Jan 1 00:00:10 btman: bt0: setting scan mode INQUIRY PAGE
<30>Jan 1 00:00:10 btman: bt0: security mode high
<30>Jan 1 00:00:10 btman: bt0: encryption enabled
<30>Jan 1 00:00:10 btman: bt0: Class of Device 0x020300
<30>Jan 1 00:00:10 btman: bt0: Bluetooth friendly name "Promi-MSP"
<30>Jan 1 00:00:10 btman: bt0: Configured.
<30>Jan 1 00:00:10 btman: bt0: Security manager started. (00:00:53::
<30>Jan 1 00:00:10 btman: Chip Rev. 0x008a
<30>Jan 1 00:00:10 btman: Build: HCI 18.2
<14>Jan 1 00:00:10 syslog: SDP Server starting
<30>Jan 1 00:00:10 watchdog: Watchdog started
<30>Jan 1 00:00:11 thttpd[83]: thttpd/2.04 10aug98 starting on port
<26>Jan 1 00:00:11 thttpd[83]: started as root without requesting c
+OK
```

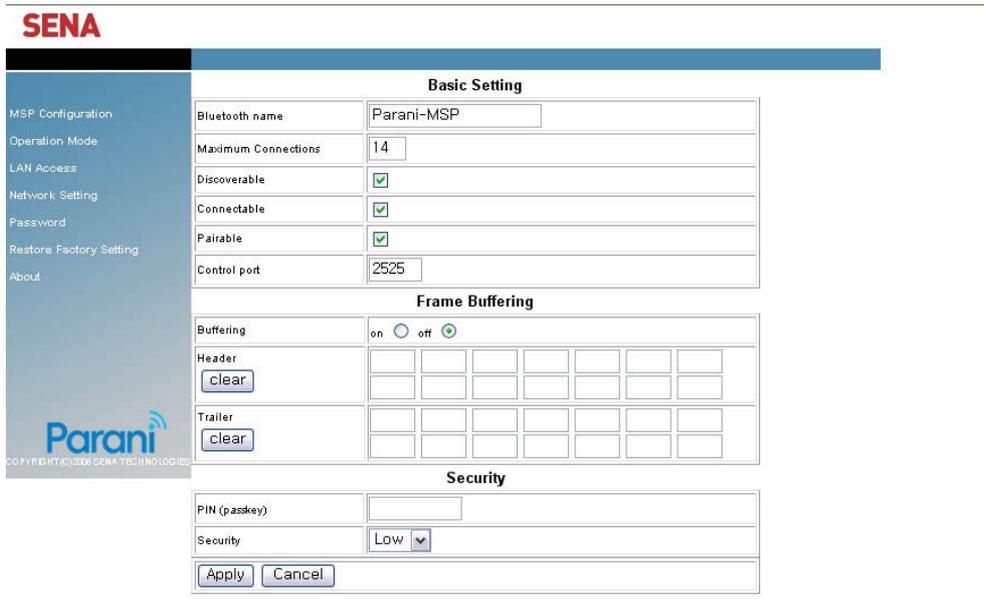
4.2. Configuration via WEB

Parani-MSP100 configuration access is available via Telnet or a local Web browser.

SENA provides Web user interface to expedite Parani-MSP100 configure/manage and current status check functions. To access Parani-MSP100 via Web interface, open a web browser and enter the Parani-MSP100 IP address in the address area.

Here is shown the 192.168.222.7 address assigned to Parani-MSP100 in the preceding configuration example.

Enter the default ID: admin, Password: admin.



4.2.1. Parani-MSP100 Configuration

- **Basic Setting**

- (1) Bluetooth name: For user Parani-MSP100 name revision
- (2) Maximum Connection: For configuring the maximum number of Bluetooth devices connectable to Parani-MSP100. Default maximum is 7.
- (3) Discoverable: When checked, Parani-MSP100 is in INQUIRY mode, discovering in-range Bluetooth devices.
- (4) Connectable: When checked, Parani-MSP100 is in PAGE mode, connecting to Bluetooth devices.
- (5) Pairable: For Pairing 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 previously connected to Parani-MSP100, cannot connect to Parani-MSP100, even via PIN code.
- (6) Control port: For control port number entry. Default value is 2525.

- **Buffering**

- (1) Buffering: For Buffering function enable/disable
- * Firstly set Header and Trailer, secondly turn on Buffering option.**
- (2) Header: For buffer frame header entry. Enter alphabet or HexaCode.
 - (3) Trailer: For buffer frame trailer entry. Enter alphabet or HexaCode.

- **Security**

- (1) Pin code: For Bluetooth Pin code entry
- (2) Security: For security level entry

4.2.2. Operation Mode

Parani-MSP100 accesses 3 types of operation modes. Select according to user requirement and application.

The screenshot shows the SENA web interface with a navigation menu on the left and three configuration panels. The 'Server Mode' panel has a radio button selected for 'Server mode', a 'Base port' field with '5000', an empty list box, 'BDAddr' and 'Port' fields, and 'Add', 'Delete', and 'Clear' buttons. The 'Client Mode' panel has a radio button selected for 'Client mode', an 'IP' field with '0.0.0.0', a 'port' field with '0', a checked checkbox for 'Try to connect to server every 5 sec', and an unchecked checkbox for 're-connect automatically if link is lost'. The 'Vertex Mode' panel has a radio button selected for 'Vertex mode', a 'Vertex port' field with '3000', and an 'Allow' field with '1' and the text 'TCP connections to vertex port.'. At the bottom are 'Apply' and 'Cancel' buttons.

- **Server Mode**

- (1) Base port: For Parani-MSP100 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) vBIND buttons: Add/Delete/Clear

To delete more than one device from the bound list, press Shift or Ctrl key while using the left-click button on your computer mouse.

- **Client Mode**

In Client Mode, Parani-MSP100 operates as client; 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 Parani-MSP100 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**

Parani-MSP100 Vertex Mode avails Wireless RS485 multidrop service when assigned at this site.

(1) Vertex port: For Parani-MSP100 Vertex port no. entry.

(2) Allow TCP connections to vertex port:

For entering the number of Hosts connectable to Parani-MSP100.

4.2.3. Network Setting

SENA

Network Setting

use DHCP

IP address: 192, 168, 220, 9

Network mask: 255, 255, 0, 0

Gateway: 192, 168, 1, 1

DNS: 168, 126, 63, 1
168, 126, 63, 2

MAC: 08 : 00 : 2b : 00 : 01 : 45

use ADSL

user:

pass:

keepalive time: 600

keepalive interval: 10

keepalive probes: 3

Apply Cancel Reboot

For user Parani-MSP100 network setting.

(1) use DHCP: When checked, Parani-MSP100 receives IP address from DHCP server.

(2) IP address/Network mask/Gateway/DNS: Enter appropriate data to assign static IP address for Parani-MSP100.

(3) MAC: Displays MAC Parani-MSP100 address; non-user entry

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

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

4.2.4. Restore Factory Setting

To reset to Parani-MSP100 default factory settings, click the 'Restore' button.

- MSP Configuration
- Operation Mode
- LAN Access
- Network Setting
- Password
- Restore Factory Setting
- About

Restore Factory Setting

Restore



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5. Approval Information

5.1. FCC

5.1.1. FCC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received,

Including interference that may cause undesired operation

5.1.2. RF Exposure Statement

The equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter.

5.1.3. Do not

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

5.2. CE

5.2.1. EC-R&TTE Directive

Directive 1999/5/EC.

5.3. MIC

5.4. Telec

Construction Design Certification No. 006NYC0070

6. RF Information

6.1. Radio Frequency Range

2.402~2.480GHz

6.2. Number of Frequency Channel

79 channels

6.3. Transmission Method

FHSS(Frequency Hopping Spread Spectrum)

6.4. Modulation Method

GFSK(Gaussian-filtered Frequency Shift Keying)

6.5. Radio Output Power

+18dBm

6.6. Receiving Sensitivity

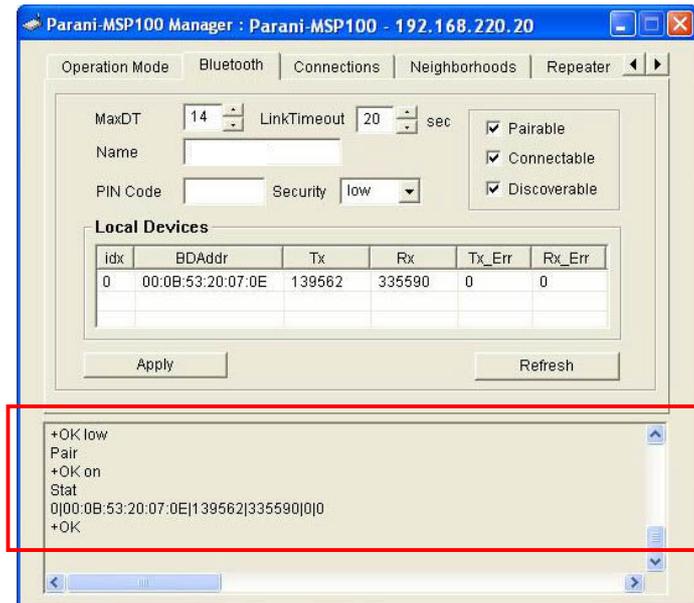
-88dBm

6.7. Power Supply

DC5V

Appendix A: Control Commands

Parani-MSP100 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 Parani-MSP100 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 Parani-MSP100 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. Parani-MSP100™ 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>

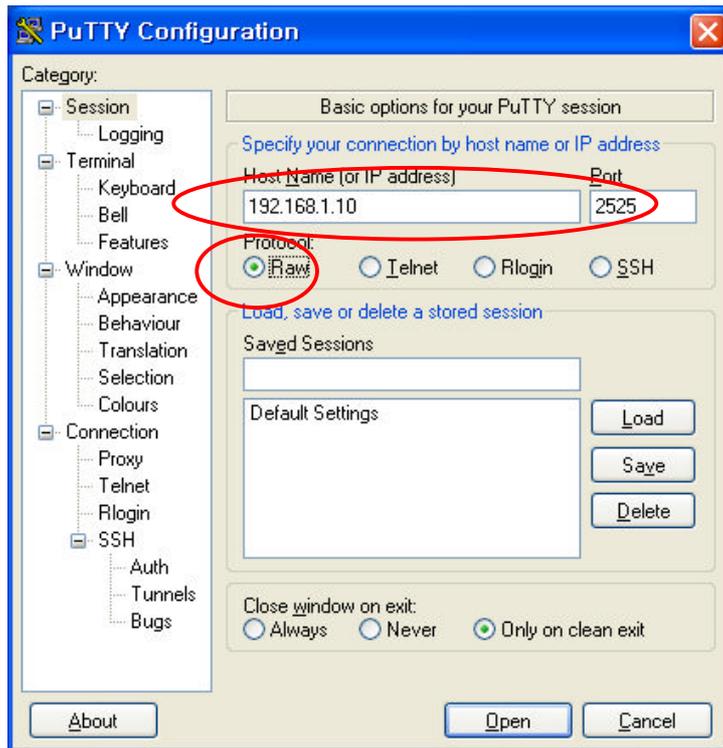
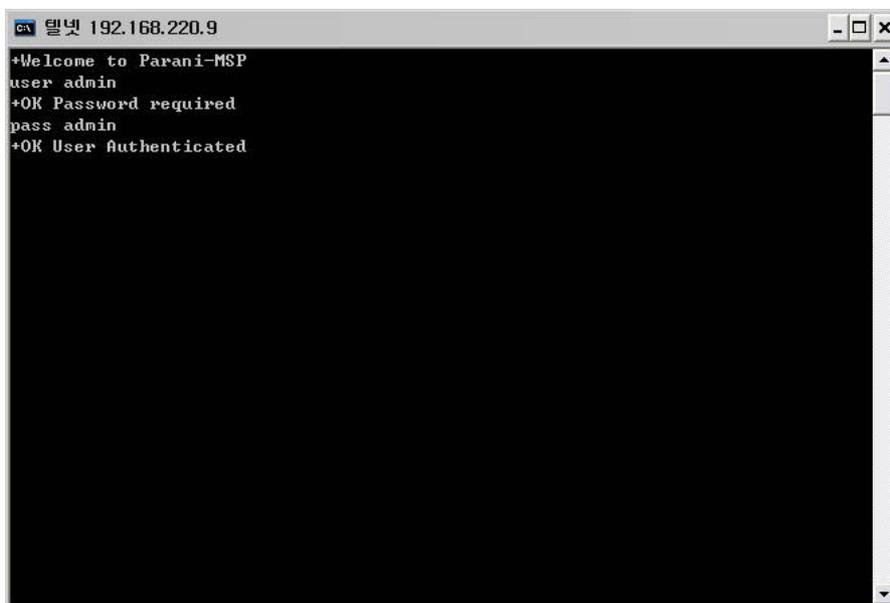


Fig. 2.1.1 PuTTY

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

Enter 'user admin' and 'pass admin' to access Parani-MSP100 via Control Commands.



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

A.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 'admin' to '1234'

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

QUIT

: To quit the communication with Parani-MSP100

Ex.: **QUIT**
+OK
Disconnected

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

: To check or change the current Operation MODE of Parani-MSP100.

If any of Bluetooth devices are connected to Parani-MSP100, 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

A.2. Commands for Server Mode

PORT [port no.]

: To configure default data port number of Server Mode Parani-MSP100.

If a Bluetooth device, which is not pre-registered to Parani-MSP100, has connected to Parani-MSP100, port number will be assigned automatically by Parani-MSP100. 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 Parani-SD 8001
+OK
BIND
0||00:0B:53:00:00:01|8000
1|Parani-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 Parani-MSP100 via network, is

stalled unintentionally, Parani-MSP100 cannot aware this unexpected disconnection. Accordingly, Parani-MSP100 sends beacon packets to monitor connection status when there is no data communication for certain time.

When there is no data communication for <time>, Parani-MSP100 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., Parani-MSP100 will send beacon packets 3 times by 10 seconds interval.

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

A.3. Commands for Client Mode

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

: To assign IP address and port number of server host where Parani-MSP100 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 Parani-SD
+OK
SERV
0|Parani-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 Parani-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', Parani-MSP100 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, Parani-MSP100™ 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

A.4. Commands for Vertex Mode

VERTEX <port no.> [number of clients]

: To assign port number where Parani-MSP100 waits for connection in Vertex mode.

Parani-MSP100™ Vertex Mode avails Wireless RS485 multi-drop service when assigned at this site.

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

A.5. Commands for Serial Hub Mode

ROUTE <add> <src> <dst>

** <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

A.6. Commands for Repeater Mode

STATION <bdaddr>

: To configure Bluetooth address of station Parani-MSP100.

In repeater mode Parani-MSP100 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|Parani-MSP100_001002
P|00:0B:53:00:00:02|00:0B:53:00:00:10|PSDv3b-000010
+OK

A.7. Commands for Bluetooth Configuration

BTNAME <name>

: BTNAME command audits or revises Parani-MSP100™ Device Names exposed to other Bluetooth devices.
If configured with default name (i.e., Parani-MSP100), lower part of Bluetooth address will be appended to the name.

Ex.: **BTNAME My Parani-MSP100**
+OK
BTNAME
+OK My Parani-MSP100

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 Parani-MSP100™ (non-pairable mode)

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

LKEY

: For auditing currently paired Bluetooth devices sharing Parani-MSP100™. 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 Parani-MSP100's flash memory to wear out in the long period. With TEMPKEY on, Parani-MSP100 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 Parani-MSP100™ 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 Parani-MSP100 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

A.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]

: Parani-MSP100 may try to CONNECT to Bluetooth devices. If you specify a channel, Parani-MSP100 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:

Parani-MSP100 normally acts as an acceptor. Do not use CONN command in operating sequence as Parani-MSP100 will freeze during CONN operation.

If using with Parani-SD, please configure Parani-SD as Mode 1 and make it initiate connection to Parani-MSP100.

DISC <idx>

: Parani-MSP100 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, Parani-MSP100 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 Parani-MSP100™. Default value is 7. Each additional USB extension module adds up to 7 more Parani-MSP100™ connectable Bluetooth devices.

Ex.: **MAXDT 7**
+OK

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

: If PINQ (periodic inquiry) is ON, Parani-MSP100 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 Parani-MSP100
+OK

DTINFO <on|off>

: The information of the corresponding data terminal is sent from Parani-MSP100 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

A.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: Parani-MSP100 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 Parani-MSP100

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 Parani-MSP100™ 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

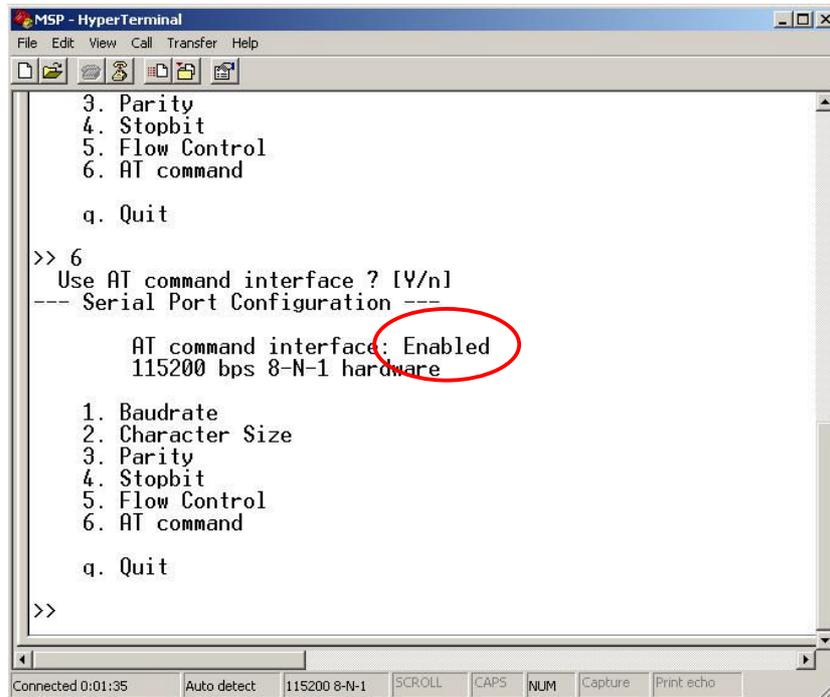
REBOOT

: To reboot Parani-MSP100

Ex.: **REBOOT**
+OK Rebooting...

Appendix B: AT Commands

Parani-MSP100 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 Parani-SD but some have differences in their usage and some commands are appended for Parani-MSP100 exclusive use.

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

Command	Description	Example
AT	Check if the connection to host equipment is operating normally. The serial parameters of Parani-MSP100 must be same as those of host equipment. If not, the MSP will not respond or 'ERROR' message will appear or an abnormal sequence of strings will appear.	
ATZ	This has the same effects as Powercycling the unit. This command disconnects any connected Bluetooth device, and stops	

	ongoing tasks. After rebooting, the status will be decided by the preset operation mode. Some AT commands require the ATZ command be run so that the commands can take effect.	
AT&F	This has the same effect as initialization by pressing the factory reset button. All parameters are initialized to factory defaults.	
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. Parani-MSP100 responds with CONNECT.	ato000b53123456<cr> CONNECT 000B53123456
AT+BTSCAN	Scan mode can be specified. 1: Discoverable 2: Connectable 3: Discoverable and Connectable	at+btscan,3<cr>
AT+BTINQ?	The Bluetooth devices in Inquiry scan mode nearby are displayed with their BD addresses, Device names, and Class of device. Maximum 15 devices are scanned for 30 seconds.	
AT+BTINFO?	The current Bluetooth settings are displayed including BD address, Device name, Operation mode, Operation status, Authentication, Data Encryption, and Hardware Flow Control.	
AT+BTNAME	Parani-MSP100 can have a user friendly name for easy identification. The name allows up to 30 alpha-numeric characters.	
AT+BTKEY	Pin code is a string, which allows up to 16 alpha-numeric characters. Based on this pin code, Parani-MSP100 generates a link key which is used in actual authentication process	
AT+UARTCONFIG	The Serial parameters can be set or changed. The factory default is 9600, N, 1. To take effect the ATZ command must be used or Powercycle the unit.	AT+UARTCONFIG,9600,N,1,1
AT+BTCANCEL	This terminates a current executing task, such	

	as Inquiry scan and Page scan, then converts the operation status to 'Standby'	
AT+SETESC	Escape sequence character set to '+' by default is changeable. The parameter nn must be a printable character.	AT+SETESC,42
AT+BTLAST?	The Bluetooth device last connected to this Parani-MSP100 is displayed with its BD address.	
AT+BTSEC	If the authentication is activated, the pin code must be set by AT+BTKEY command. Data encryption cannot be used when authentication is not enabled, i.e. <i>Authentication=0</i> and <i>Encryption=1</i> will not work properly.	
AT+BTSD?	Once a connection is made with a pin code, Parani-MSP100 saves the Bluetooth device with its link key, generated by the pin code. The connection to a device listed in Parani-MSP100 can be made automatically without the authentication process. The maximum number kept on the list is 5.	
AT+BTCSD	This clears the list of Bluetooth devices linked with the same key in flash memory. To take effect the ATZ command must be used or Powercycle the unit.	
AT+BTMODE	When the operation status is 'Pending' currently, change the status to 'Standby' with AT+BTCANCEL prior to this command. To take effect the ATZ must be executed or Powercycle the unit. 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 Parani-MSP100.

Command	Description	Example
AT+BTCHAN?	Show currently selected device.	AT+BTCHAN?

	Parani-MSP100 only communicates with selected device.	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

Parani-MSP100 can communicate with Parani-SDs up to 14 devices via RS232 interface, while Parani-SD can be only used as 1:1 cable replacement.

Even though Parani-MSP100 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 Parani-SD is buffered on Parani-MSP100 and retrieved when corresponding Parani-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, Parani-MSP100 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 Parani-MSP100 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,Parani-MSP100,MODE0,STANDBY,0,0,HWFC
OK
ATD000B53000001
OK
CONNECT 000B53000001
...           ← connected to 000b53000001
+++
OK
ATO
CONNECT 000B53000001
+++
OK
ATD000B53000002   ← making new connection to 000B53000002
                     while connected with 000B53000001
CONNECT 000b53000002
...           ← connected and routed to 000B53000002
+++
OK
AT+BTCNN?
000B53000001,PSDv3b-000001
000B53000002,PSDv3b-000002
OK
ATO000B53000001   ← changing route back to 000B53000001
CONNECT 000b53000001
...           ← communicating with 000B53000001
```

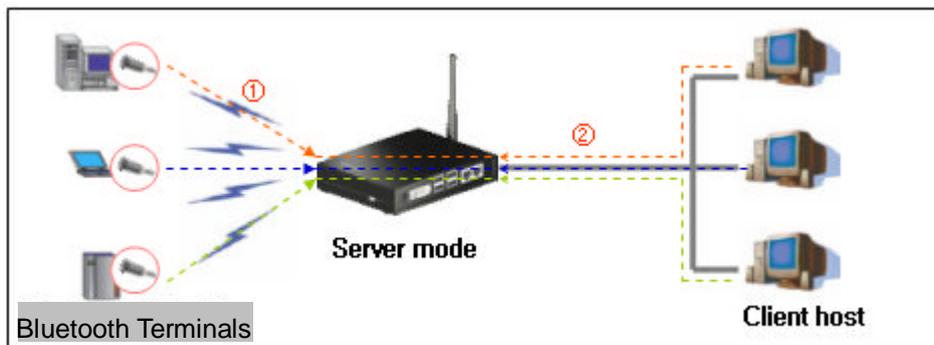
Appendix C: Operation Mode Information

With Parani-MSP100™, 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.

C.1 Server Mode

In Server Mode, Parani-MSP100 will act as TCP server. If a Bluetooth device is connected to Parani-MSP100, 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 Parani-MSP100.

Please refer to the drawing below for your better understanding.



<Fig. C.1> Server Mode

If a Bluetooth device has been registered to Parani-MSP100, the Bluetooth device will communicate with client host via the designated port at Parani-MSP100.

If not registered, Parani-MSP100 will assign arbitrary port number to connect.

Pre-registered Bluetooth devices are distinguishable by the different port numbers at Parani-MSP100.

C.2 Client Mode

In a Client mode, Parani-MSP100™ will act as a “TCP client”.

When a Bluetooth device connects to Parani-MSP100, Parani-MSP100 will send TCP connection request to the designated Host. Once TCP connection is established, Bluetooth devices and a Host may communicate via Parani-MSP100, same as in Server mode.

Only difference from Server mode is that the initiator is now Parani-MSP100. Please refer to the drawing below for your better understanding.

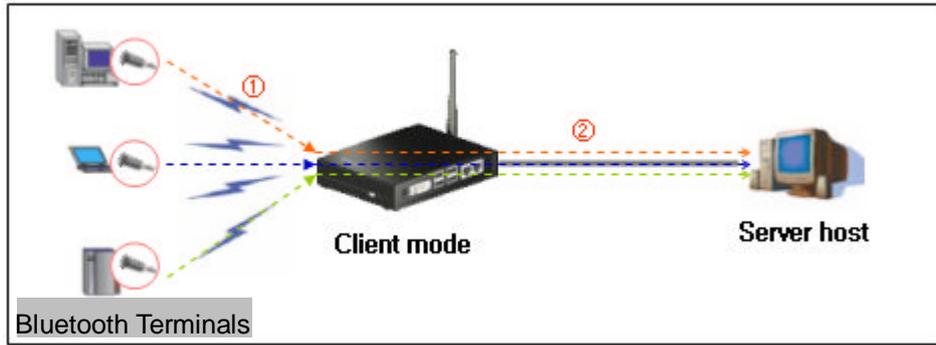


Fig. C.2 Client Mode

C.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.

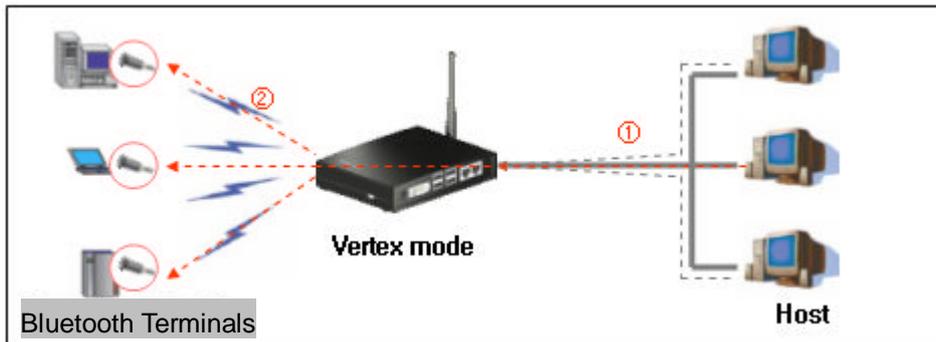
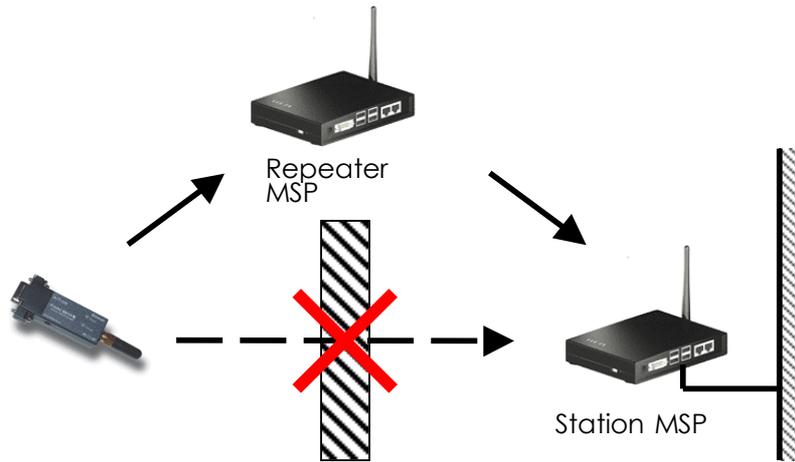


Fig. C.3 Vertex Mode

Default data port number in Vertex mode is 3000. If you need to use other port number, please change the configuration using Parani-MSP100 software->Advanced configuration.

C.4 Repeater Mode

Parani-MSP100 in Repeater Mode can be used to function as a Repeater to extend the range of Bluetooth network or avoid obstacles between Parani-MSP100 and Bluetooth devices. Please refer to the drawing below.



Multiple Repeater Parani-MSP100s up to 7 can be connected to one Station Parani-MSP100, but Repeater-to-Repeater connection (Multi-level repeater) is not allowed. Parani-MSP100 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.**

C.5 Serial Hub Mode

In Serial Hub Mode, Parani-MSP100 relays data communication between Bluetooth devices. With Parani-SD only 1:1 cable replacement is possible, however, incorporating Parani-MSP100 multiple Parani-SDs can communicate each other, 1:N multi-serial with Parani-SD.

In Serial Hub mode, Parani-MSP100 handles data according to Route Table, which shows which data frame should go where. Route Table needs to be configured in advance using Parani-MSP100 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 Parani-MSP100 and not be transferred to destination device.

****INI+DST,<dst1>,<dst2>,...****

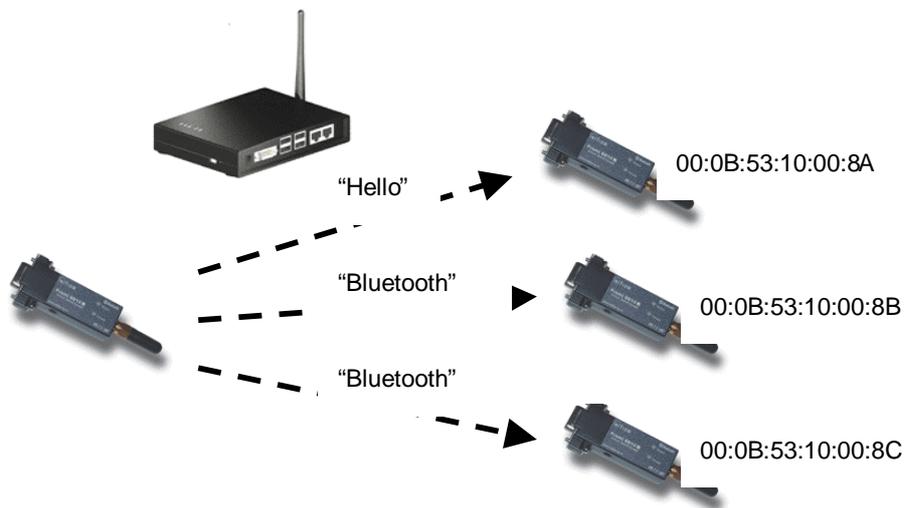
where, dstX means Bluetooth address of destination.

ex)

****INI+DST,00:0B:53:10:00:8A**Hello**INI+DST,00:0B:53:10:00:8B,00:0B:53:10:00:8C**Bluetooth**

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

All Parani-SD should be connected to Parani-MSP100.



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

C.6 RS232 mode

Multi-drop

If users set Parani-MSP100 to RS232 mode, Parani-MSP100 may act as 1:N multi-serial port by its RS232 port. In RS232 mode, Parani-MSP100 will send data to external serial port, not via Ethernet network.

In RS232 mode, Parani-MSP100 handles data in Multi-drop way, so data written to RS232 interface of Parani-MSP100 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 Parani-MSP100 software.

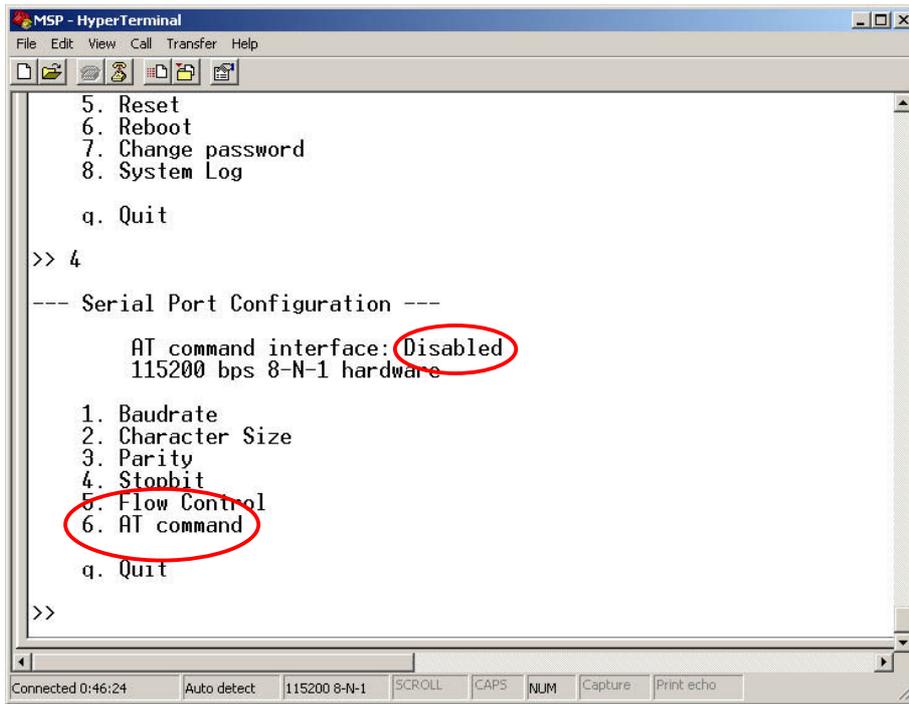
Baudrate	1200 ~ 115200 bps
Character size	5,6,7,8 bit
Parity	None, Odd, Even
Stop bit	1 bit, 2 bits
Flow Control	None, XOn/Off, Hardware (CTS,RTS)
DTR/DSR	not used
RI	not used
Auto probe	not supported

As default, RS232 interface of Parani-MSP100 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 Parani-MSP100. Please restart Parani-MSP100.

AT Commands

AT command is very familiar with the legacy serial application developers. So, AT command interface of Parani-SD eases a lot of efforts to develop their own application from developers. So does Parani-MSP100. Moreover, AT commands of Parani-MSP100 are so similar to one of Parani-SD that developers who have experiences with Parani-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.

Appendix D: Using Parani-MSP100 with Serial/IP

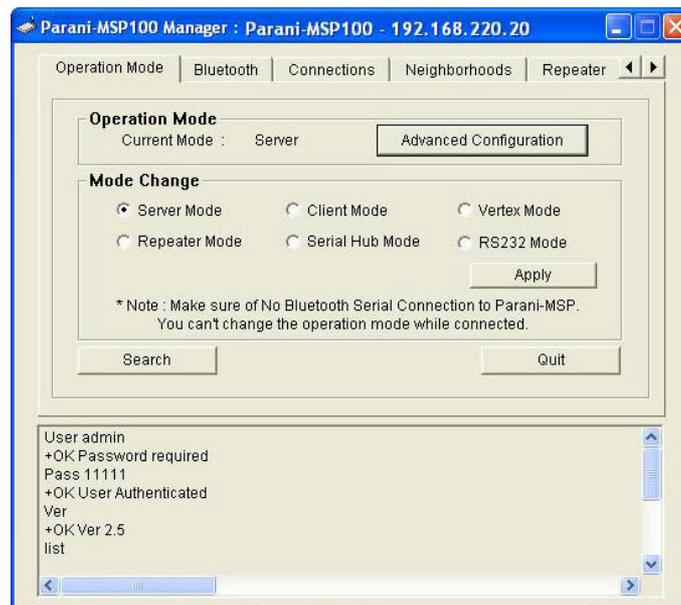
The Parani-MSP100 supports the use of Serial/IP COM Port redirection software. The Serial/IP allows COM port based applications to be used with TCP/IP based networks. By using virtual COM ports created by the Serial/IP software, Com port based applications can use the Parani-MSP100's network port or serial ports as if they were local serial ports.

Serial/IP can be used with the Parani-MSP100's server and client modes. However, Parani-MSP100 and Parani-SD should be connected in advance so that Serial/IP can be used.

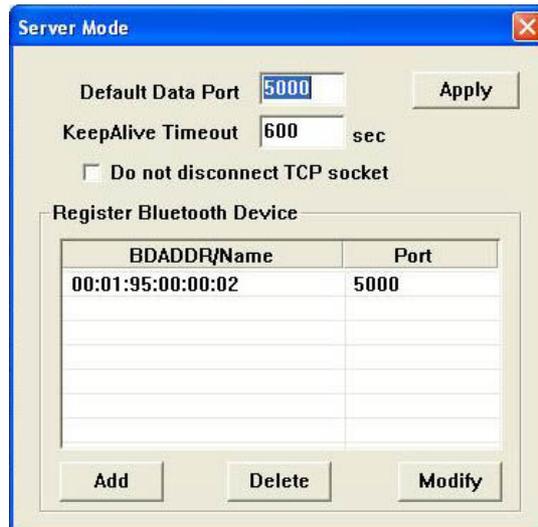
The following are examples of the Parani-MSP100 being used in-conjunction with Serial/IP:

D.1 Configuration when working with Serial/IP and Parani-MSP100 in Server Mode

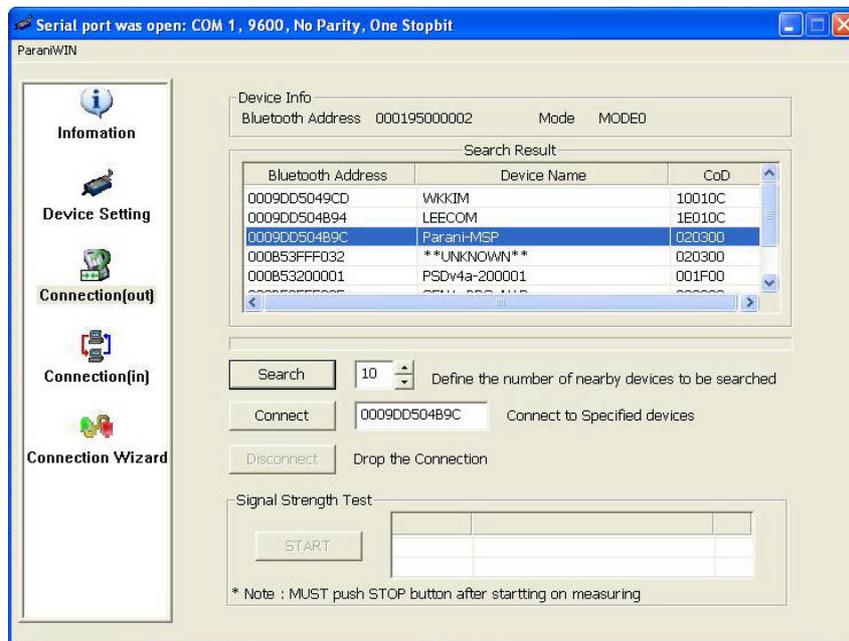
Step1. Set the Operation Mode of Parani-MSP100 as "Server Mode"



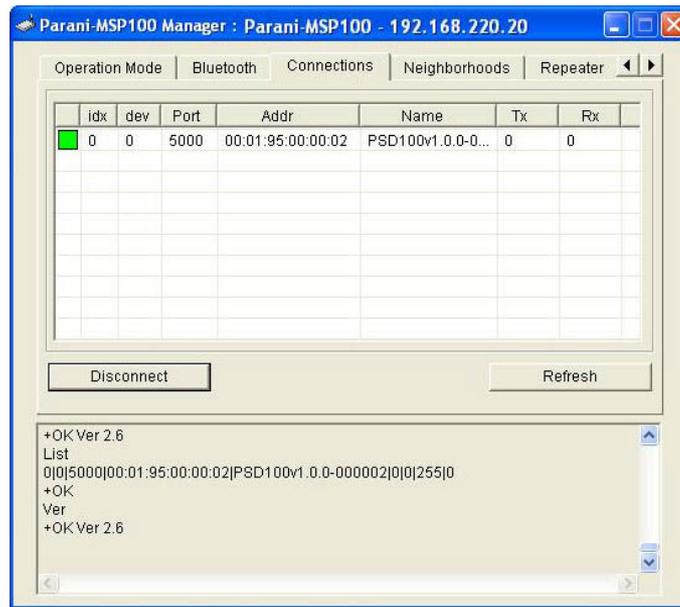
Step2. Set the Parani-MSP100 data port number and input the BD address of Parani-SD by clicking the "Advanced Configuration" button.



Step3. Connect the Parani-SD to Parani-MSP100

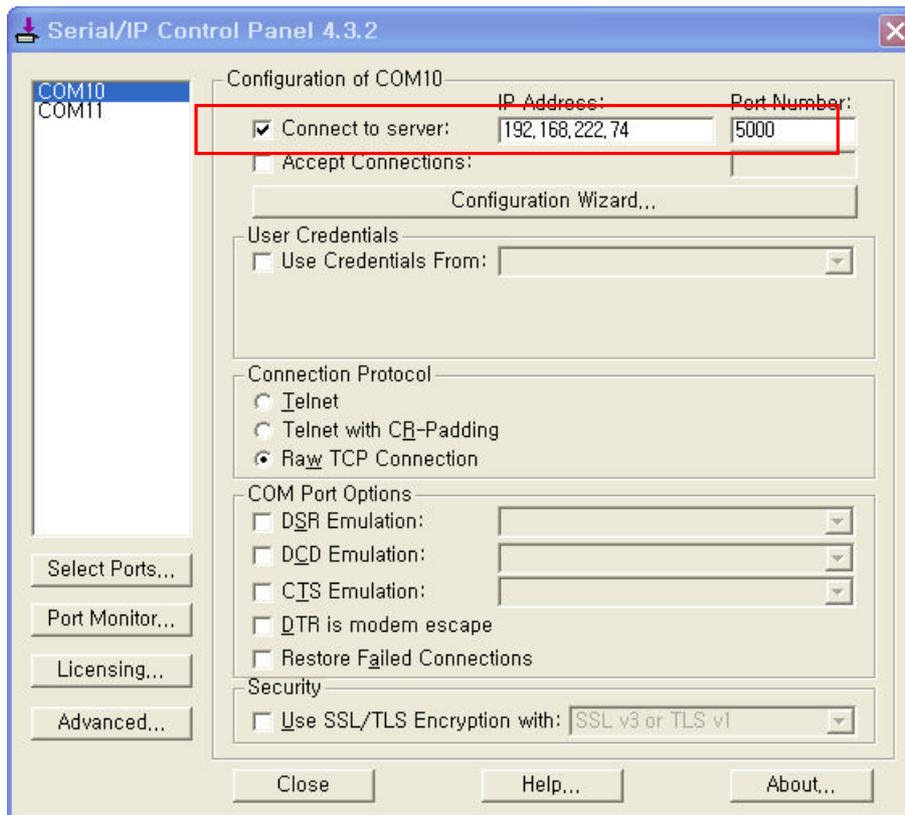


Go to the connection tab in the Parani-MSP100 Manager and make sure that Parani-SD and Parani-MSP100 are connected (The connection will be denoted by a solid green square).

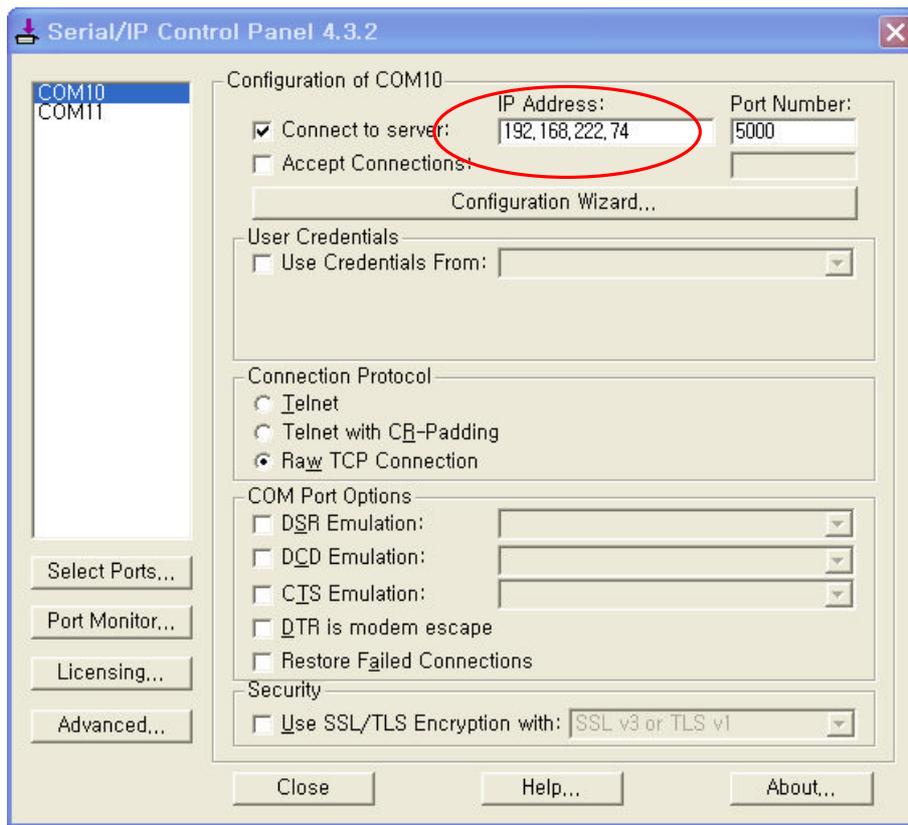


Step4. Check the "Connect to Server" in Serial/IP.

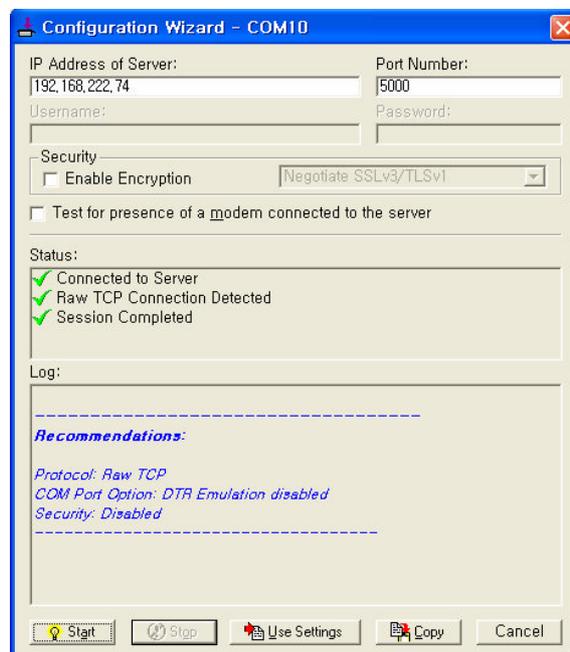
Step5. Set the IP address and Port number of the Parani-MSP100 in Serial/IP.



Step6. Open the configuration wizard of Serial/IP.



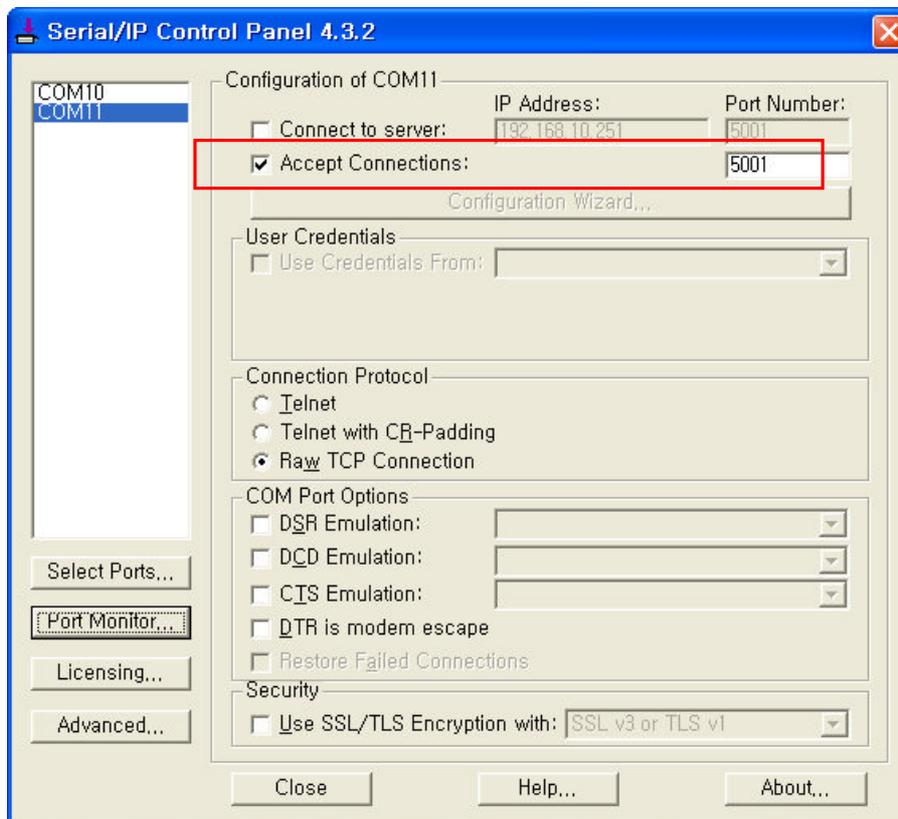
Step7. Click on the [Start] button in the Configuration Wizard so that Virtual COM port will be created.



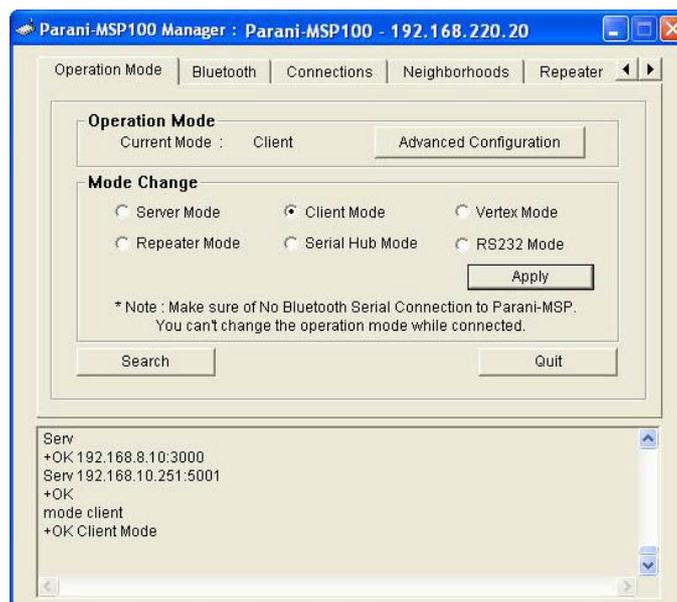
D.2 Configuration when working with Serial/IP and Parani-MSP100 in Client Mode

Step1. Check the “Accept Connections” in Serial/IP

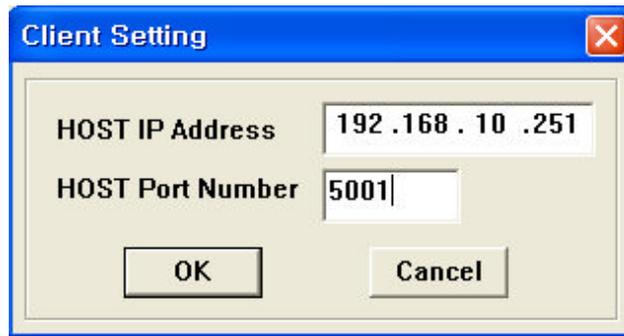
Step2. Set Port number in Serial/IP.



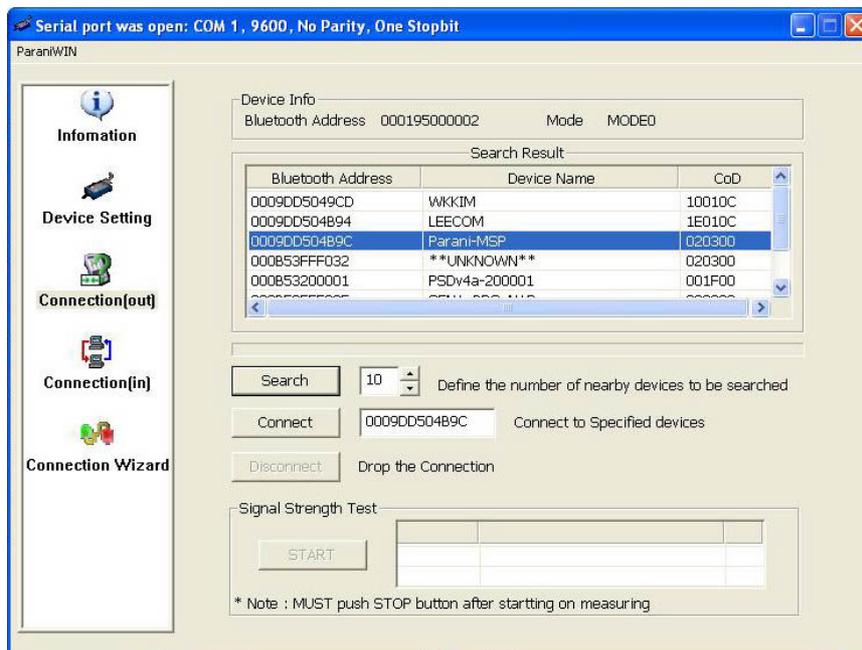
Step3. Set the operation mode of Parani-MSP100 as “Client Mode”



Step4. Input the TCP Server's (PC running Serial/IP) IP address and Port number (refer to Step2 for the Port number).



Step5. Connect the Parani-SD to Parani-MSP100



Go to the connection tab in the Parani-MSP100 Manager and make sure that Parani-SD and Parani-MSP100 are connected (The connection will be denoted by a solid green square).

Appendix E: Discovery Protocol

UDP Broadcast on 9097 port

Magic Number (4 bytes)

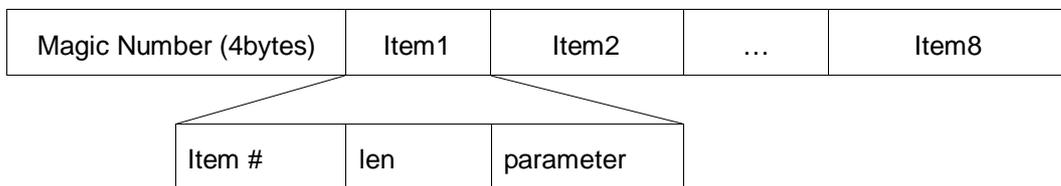
Searching

FA	05	21	EA
----	----	----	----

Response

FA	05	21	EF
----	----	----	----

Format



Item list

Item #	length	Parameter	Example
0x01	Var.	Product Name	PARANI-MSP100
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	Parani-MSP100
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	

...

Appendix F: Warranty

F.1. GENERAL WARRANTY POLICY

Sena Technologies, Inc. (hereinafter referred to as SENA) warrants that the Product shall conform to and perform in accordance with published technical specifications and the accompanying written materials, and shall be free of defects in materials and workmanship, for the period of time herein indicated, such warranty period commencing upon receipt of the Product.

This warranty is limited to the repair and/or replacement, at SENA's discretion, of defective or non-conforming Product, and SENA shall not be responsible for the failure of the Product to perform specified functions, or any other non-conformance caused by or attributable to: (a) any misapplication or misuse of the Product; (b) failure of Customer to adhere to any of SENA's specifications or instructions; (c) neglect of, abuse of, or accident to, the Product; or (d) any associated or complementary equipment or software not furnished by SENA.

Limited warranty service may be obtained by delivering the Product to SENA or to the international distributor it was purchased through and providing proof of purchase or receipt date. Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to SENA, and to use the original shipping container or equivalent.

F.2. LIMITATION OF LIABILITY

EXCEPT AS EXPRESSLY PROVIDED HEREIN, SENA MAKES NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY EQUIPMENT, PARTS OR SERVICES PROVIDED PURSUANT TO THIS AGREEMENT, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER SENA NOR ITS DEALER SHALL BE LIABLE FOR ANY OTHER DAMAGES, INCLUDING BUT NOT LIMITED TO DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, WHETHER IN AN ACTION IN CONTRACT OR TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY), SUCH AS, BUT NOT LIMITED TO, LOSS OF ANTICIPATED PROFITS OR BENEFITS RESULTING FROM, OR ARISING OUT OF, OR IN CONNECTION WITH THE USE OF FURNISHING OF EQUIPMENT, PARTS OR SERVICES HEREUNDER OR THE PERFORMANCE, USE OR INABILITY TO USE THE SAME, EVEN IF SENA OR ITS DEALER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT WILL SENA OR ITS DEALERS TOTAL LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT.

F.3. HARDWARE PRODUCT WARRANTY DETAILS

WARRANTY PERIOD: SENA warranties embedded hardware Product for a period of one (1) year, and external hardware Product for a period of three (3) or five (5) years according to the Product type.

WARRANTY PROCEDURE: Upon return of the hardware Product SENA will, at its option, repair or replace Product at no additional charge, freight prepaid, except as set forth below. Repair parts and replacement Product will be furnished on an exchange basis and will be either reconditioned or new. All replaced Product and parts become the property of SENA. If SENA determines that the Product is not under warranty, it will, at the Customers option, repair the Product using current SENA standard rates for parts and labor, and return the Product at no charge in or out of warranty.

WARRANTY EXCLUSIONS: Damages caused by

- Accidents, falls, objects striking the SENA product,
- Operating the Product in environments that exceed SENA's temperature and humidity specifications,
- Power fluctuations, high voltage discharges,
- Improper grounding, incorrect cabling,
- Misuse, negligence by the customer or any other third party,
- Failure to install or operate the product (s) in accordance to their SENA User Manual,
- Failure caused by improper or inadequate maintenance by the customer or any other third party,
- Floods, lightning, earthquakes,
- Water spills,
- Replacement of parts due to normal wear and tear,
- Hardware has been altered in any way,
- Product that has been exposed to repair attempts by a third party without SENA's written consent,
- Hardware hosting modified SENA Software, or non-SENA Software, unless modifications have been approved by SENA.
- Battery component capacity degradation due to usage, aging, and with some chemistry, lack of maintenance.

F.4. SOFTWARE PRODUCT WARRANTY DETAILS

WARRANTY PERIOD: SENA warranties software Product for a period of one (1) year.

WARRANTY COVERAGE: SENA warranty will be limited to providing a software bug fix or a software patch, at a reasonable time after the user notifies SENA of software non-conformance.

F.5. THIRD-PARTY SOFTWARE PRODUCT WARRANTY DETAILS

The warranty policy of the third-party software is conformed to the policy of the corresponding vendor