Parani10

Enabling Wireless Serial Communication

Users Guide

Version 1.1.2

2005-10-21

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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.

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Technical Support

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

Revision History

Revision	Date	Name	Description
V1.0.0	2005-03-02	D.H. Shin	Initial Release
V1.0.1	2005-08-02	D.H. Shin	Typographical errors are corrected.
V1.1.0	2005-08-29	D.H. Shin	Captured images are replaced. Updates in the package checklist in this manual. Section *3.3 Using Parani10Wizard* is added.
V1.1.1	2005-10-12	D.H. Shin	Updates in the package checklist in this manual.
V1.1.2	2005-10-21	D.H. Shin	Working distance is modified.

Table of Contents

1. Introduction

1.1 Overview

Parani10 is a wireless serial adapter based on Bluetooth technology. It enables the RS232 serial devices to communicate wirelessly throughout the range of 100m ~ 1.2km. It supports both point-to-point connections and point-to-multipoint connections.

Users may configure the Parani10 by using an easy-to-use Windows-based utility software or by using a standard AT command set.

Parani10 allows users to choose various power supply options, i.e. Power by DC power cable, Power by external DC-adapter, Power by USB power cable, Power by pin 9 of DB9 connector.

Typical application areas of the Parani10 include:

- RS232 cable replacement
- Truck/Bus monitoring system
- Car Diagnostics
- Wireless POS system
- Wireless Factory monitoring
- PLC programming
- Wireless machine (healthcare/industrial) monitoring
- Wireless Printing
- Wireless logistics

1.2 Package Check List

- DC Power cable
- USB Power cable
- Stub antenna
- Quick Start Guide
- CD-ROM, including the Parani10 Manager Software, Parani10 Wizard Software and manual

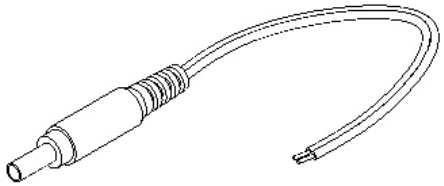


Figure 1.2.1 DC Power Cable

*Red colored wire of DC power cable is for '+'

Figure 1.2.2 USB Power Cable

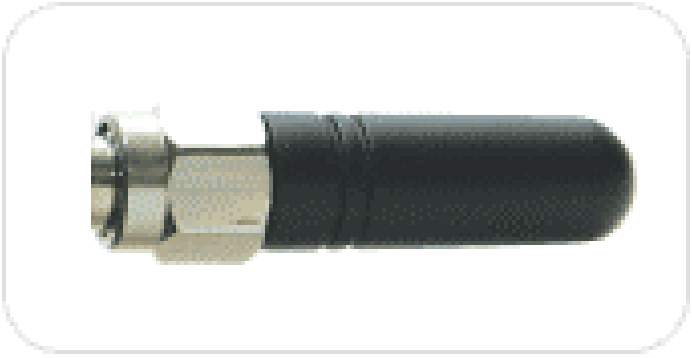


Figure 1.2.3 Stub Antenna

1.3 Product Specification

Serial Interface:

RS232, Female DB9, 1200~230 Kbps

Automatic detection of hardware flow control

DTR/DSR for loop-back & full transfer

Bluetooth Interface:

Bluetooth v1.1

Class I

Level – 18dBm

Protocols – RFCOMM, L2CAP, SDP

Profiles - General Access Profile, Serial Port Profile

Working distance

Default Antenna - Default Antenna	up to 100m
Dipole Antenna - Default Antenna	up to 150m
Dipole Antenna - Dipole Antenna	up to 200m
Patch Antenna - Dipole Antenna	up to 400m
Patch Antenna - Patch Antenna	up to 1200m

Configuration:

Windows Utility, Parani10 Manager

Modem AT command set

Diagnostic LED:

Status and Power LED

Power:

4V~12V, minimum 150mA

Nominal power consumption of 40mA@9600bps and 72mA@115Kbps speed

Power supply options

- Power via a standard AC-plug DC-adapter
- Power via USB power cable
- Power via DC power cable
- Power via pin 9 of DB9 connector

Environmental:

Operating temperature: 5℃ to 50℃

Storage temperature: -4℃ to 66℃

Humidity: 90% Non-condensing

Physical properties:

Dimension **(L x W x H)** 96 x 31 x 16 (mm), 3.8 x 1.2 x 0.6 (in.)

Weight 14g

Approvals:

Bluetooth 1.1

FCC(A), CE

Warranty:

1-year Limited Warranty

2. Getting Started

2.1 LED Indicators

The Parani10 STATUS LED indicates the following:

Lamps		Description
STATUS	**Amber**	Standard mode on Parani10 power-up
	Solid Green	Connected to another Bluetooth device
	Green Flashing At 1 sec interval	INQUIRY operation
	Green Flashing At 3 sec interval	INQUIRY SCAN or PAGE SCAN operation
POWER	**Green**	Power is being supplied

Figure 2.1.1 Parani10

2.2 RS232 Interface

Parani10 has a DB-9 (female) connector as shown below in Fig 2.2.1

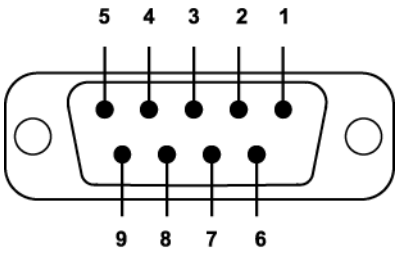


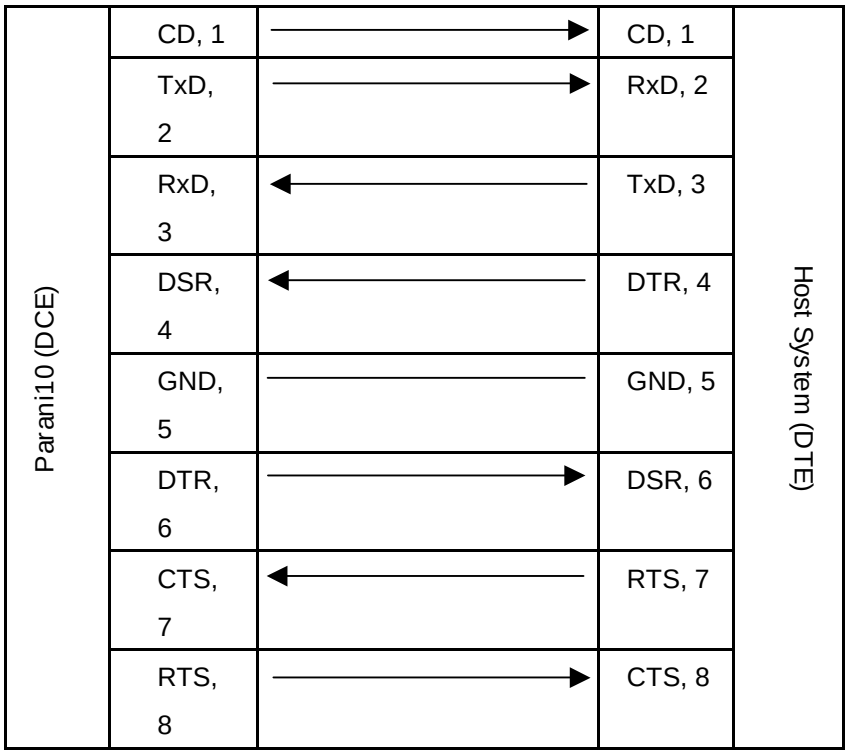
Figure 2.2.1. DB-9 (Female)

- The serial interface is RS232 DCE configured; a DTE device can be connected.
- Baud rate: 1200~230400bps
- Hardware flow control (RTS/CTS)

Pin	Signal	Direction
1	CD	Output
2	TxD	Output
3	RxD	Input
4	DSR	Input
5	GND	-
6	DTR	Output
7	CTS	Input
8	RTS	Output
9	Vcc	Input

Table 2.2.1. Parani10 DB-9 Specification

Parani10 is designed to operate as DCE (Data Communications Equipment).
To connect to DTE (Data Terminal Equipment), for example a PC or a laptop, a straight cable must be used as in below.



*DTR/DSR of Parani10 will function for either a Loop-back operation or for full transfer. Users may select a function of DTR/DSR using AT command- ATS14. Default value of ATS14 is 1.

- ATS14=1<cr>: Default setting. Users may use DTR/DSR lines for communications
- ATS14=0<cr>: Users may use DTR/DSR lines for Loop-back only.
- ATS14? : To see current status of ATS14.

*Default setting of CD line in Parani10 is to show the status of Bluetooth connection. If users want to use CD line to send CDC signal to the other side, such as for a connection between Parani10 and DCE device, users need to configure ATS13.

- ATS13=0<cr>: Default setting. Users may use CDC line for checking a Bluetooth connection.
- ATS13=1<cr>: Users may receive CDC signal from other Parani10.
  (This function will be available from future version of Parani10 for DCE devices)
- ATS13 ?: To see current status of ATS13.

2.3 Connecting Parani10 to host

Step 1. Connect a Parani10 to a serial port of the host computer.

Step 2. Supply power by using one of the following methods:

- Power via DC power cable
- Power via a standard AC-plug DC-adapter (Option)
- Power via USB power cable (Option)

Step 3. Turn on the Parani10 power by using the switch on the side.

Step 4. Check the LED lamps.
The Power LED must display a solid green color, to indicate that power is being supplied properly.

Step 5. Proceed with the steps for the configuration to make Parani10 work.
See **Chapter 3. Configuration** for details.

3. Configuration

3.1 Using Parani10 Manager

With Parani10, Bluetooth wireless connections can be made to any Bluetooth device supporting SPP (Serial Port Profile). Especially when using the Parani10 as a cable replacement, take advantage of the Parani10 automatic connection feature. Once a pair of Parani10's is set for this feature, they automatically connect whenever powered up. A pair of Parani10 units, within their radio range, may be used as a virtual RS-232 cable.

To allow wireless connections between two Bluetooth devices, one device should be in *Discoverable (*INQUIRY SCAN) *and Connectable (*PAGE SCAN). Most Bluetooth devices are set to *Discoverable* and *Connectable* by the manufacture. However, to allow Parani10 to respond to the INQUIRY and PAGE operations of other Bluetooth devices, INQUIRY SCAN and PAGE SCAN modes will need to be activated.

Before making the first Bluetooth connection with Parani10 units, be prepared with a pair of Parani10 units and also install the Parani10_Manager program on the CD enclosed in the Parani10 product package.

***Configuration By Parani10_Manager**

Please prepare two of the Parani10s to make connection.

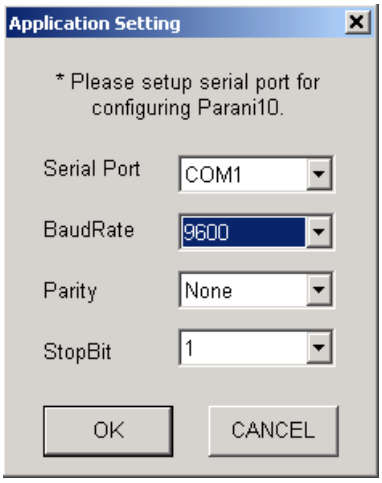
Let's say 1st unit as '**P01**' and 2nd unit as '**P02**' in this guide book. Make sure that power to both **P01** and **P02** are ALWAYS supplied, even when you detach from your computer.

3.1.1 Let's make P01 to be discoverable/connectable.

In this procedure, **P01** will become discoverable/connectable to be able to receive connection from **P02**.

1-1. Attach **P01** to your PC, and start Parani10_Manager

1-2. Start Parani10_Manager then you will see a pop-up window for configuration of Parani10_Manager.



<Fig. 3.1.1>

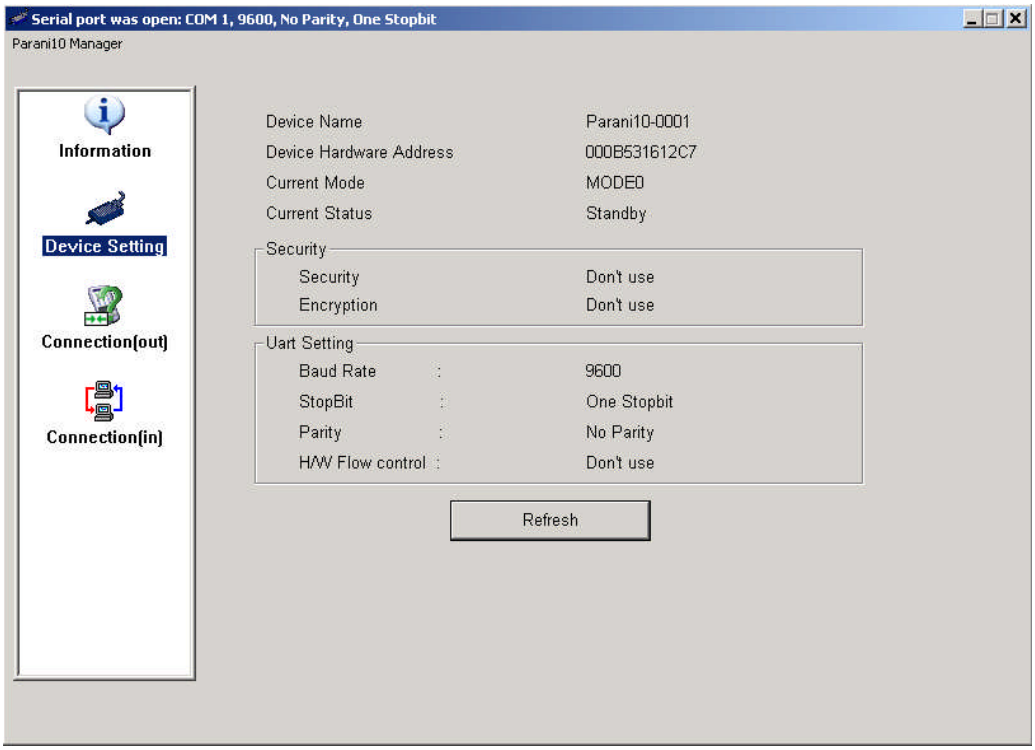
1-3. Select the number of the Serial port where **P01** is attached as in the Fig. 3.1.1 above.

1-4. Users need to select exactly **same** Baud/Parity/StopBit **as real settings of attached P01**. **9600/None/OneStopBit** are default initial settings of all of Parani10s.

1-5. Press OK button when finished.

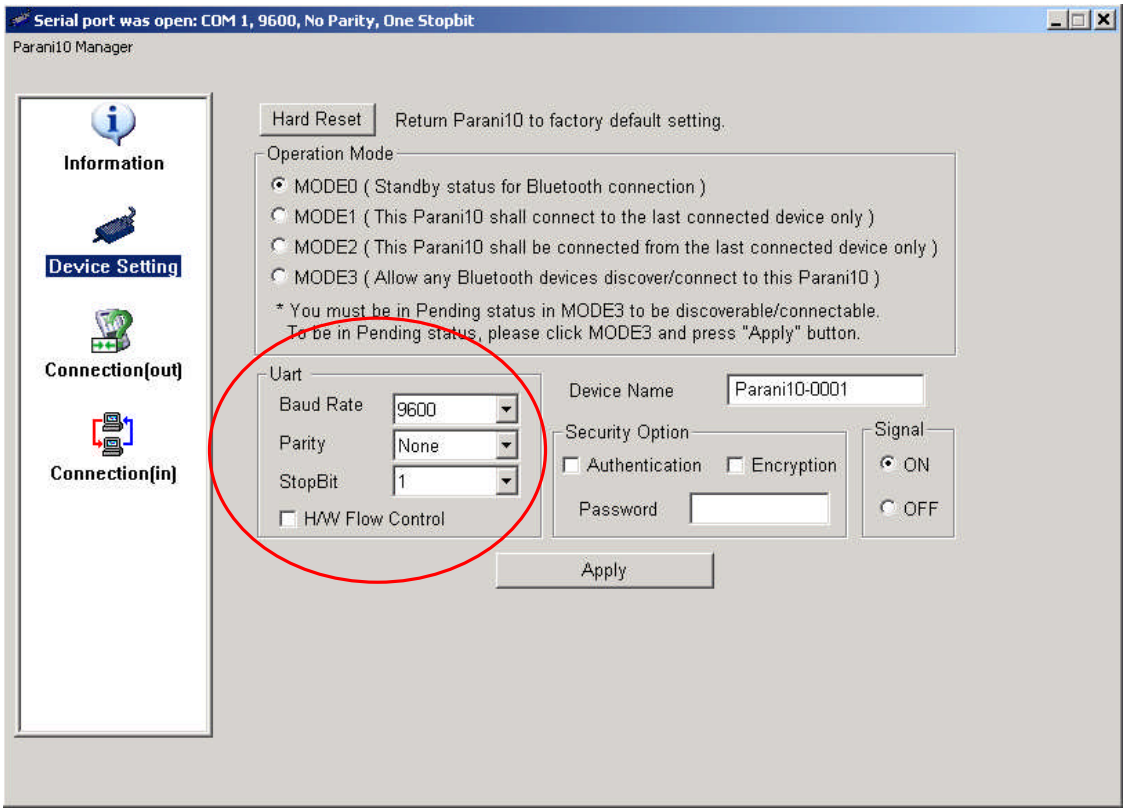
1-6. Open 'Parani10_Manager->Start Configuration' on the upper left menu.

Parani10_Manager will bring the information on the attached **P01** as in Fig. 3.1.2



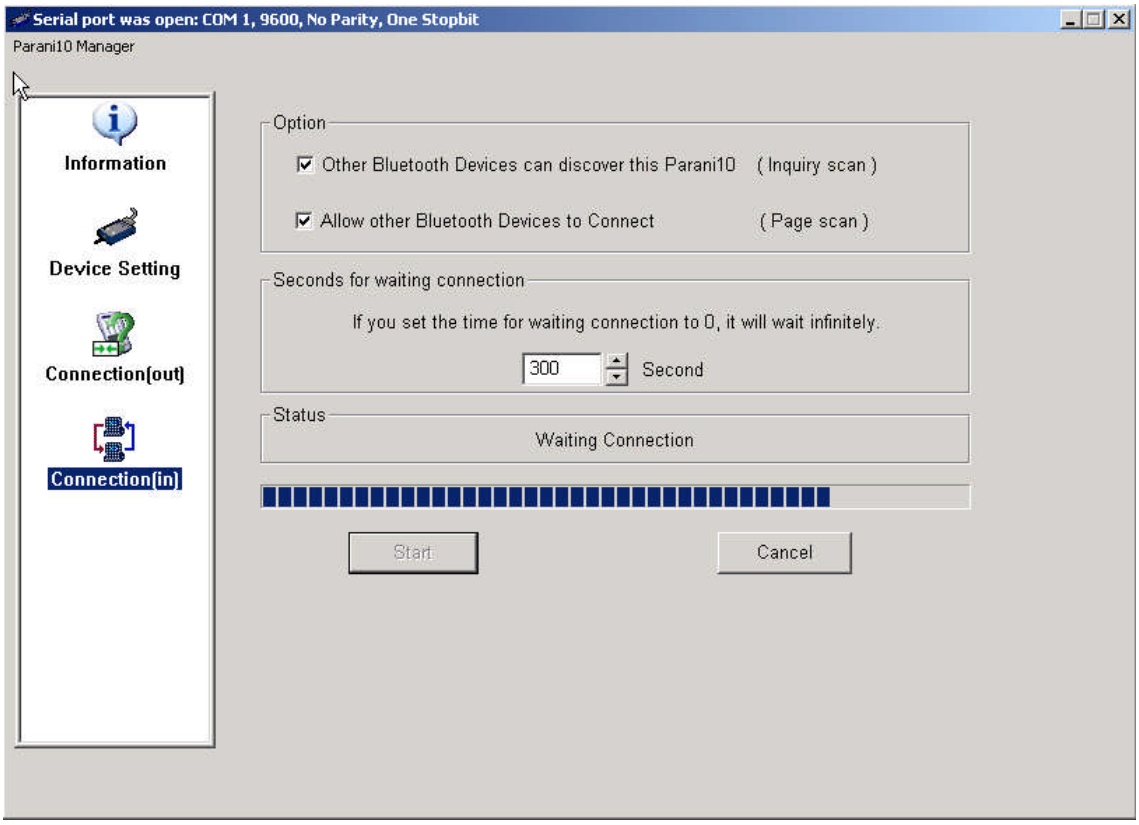
<Fig. 3.1.2>

1-7. Click the ‘Device Setting’ icon in the list control box. Users may change the Baud rate/Parity/StopBit to meet their individual needs.



<Fig. 3.1.3>

1-8. Click the '**Connection(in)**' icon in list control box. Check both options and then click the START button as shown in Fig. 3.1.4.



<Fig. 3.1.4>

1-9. **P01** now became 'Discoverable/Connectable' so it can receive Bluetooth connection from **P02**. **The STATUS LED of P01 will blink green, twice every 3 seconds.**

1-10. Detach **P01** from your computer, making sure its status LED is blinking green.

1-11. Close Parani10_Manager.

3.1.2 Let's make P02 search and connect to P01.

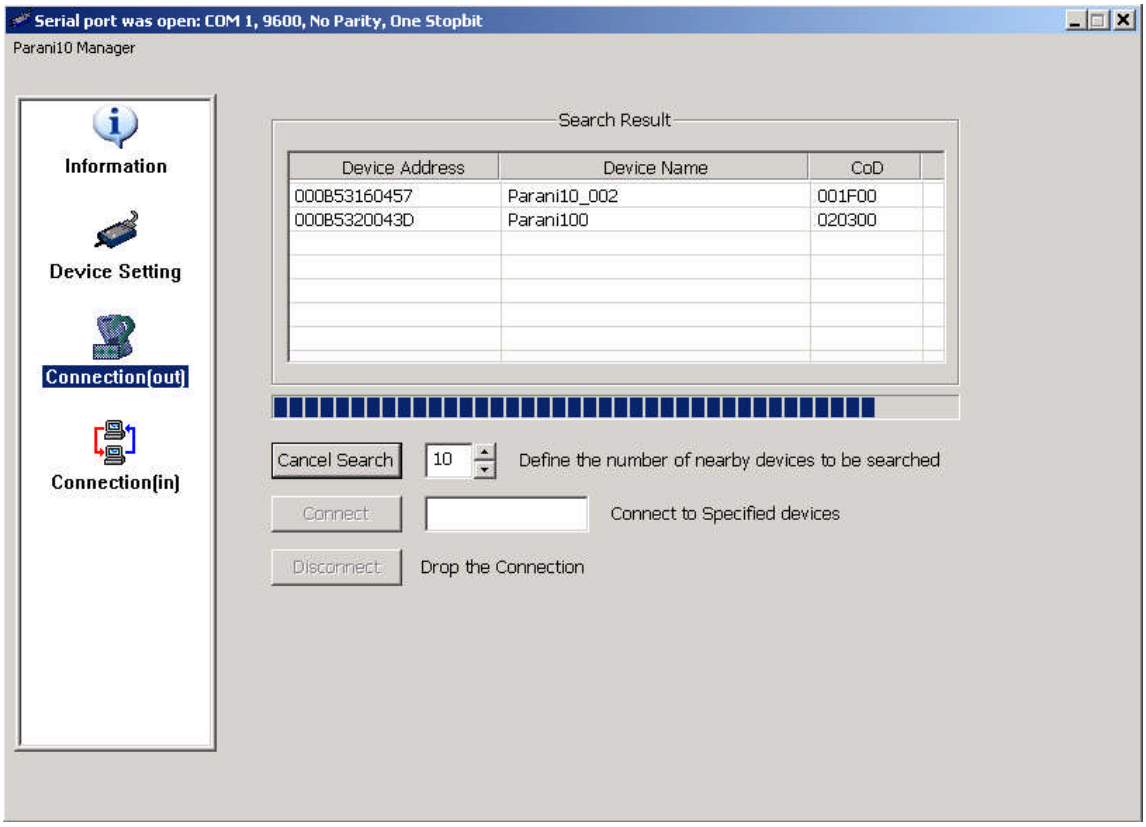
2-1. Attach **P02** to your PC, and start Parani10_Manager.

2-2. Select the number of the Serial port where **P02**.

2-3. Users need to select exactly same Baud/Parity/StopBit as the setting of attached **P02**. 9600/No/OneStopBit is default setting of all of Parani10s.

2-4. Press OK button.

2-5. Select the '**Connection(out)**' icon in the list control box and click the SEARCH button.



<Fig. 3.1.5>

2-6. Search **P01** from the searched list. Device Address of **P01** can be found on the back side of **P01**. If you find **P01**, press Cancel button to finish searching.
Make sure that Status LED of **P01** is still blinking in Green.

2-7. Please select **P01** from the searched list, then press CONNECT TO button.

2-8. You will get Successful Connection message.

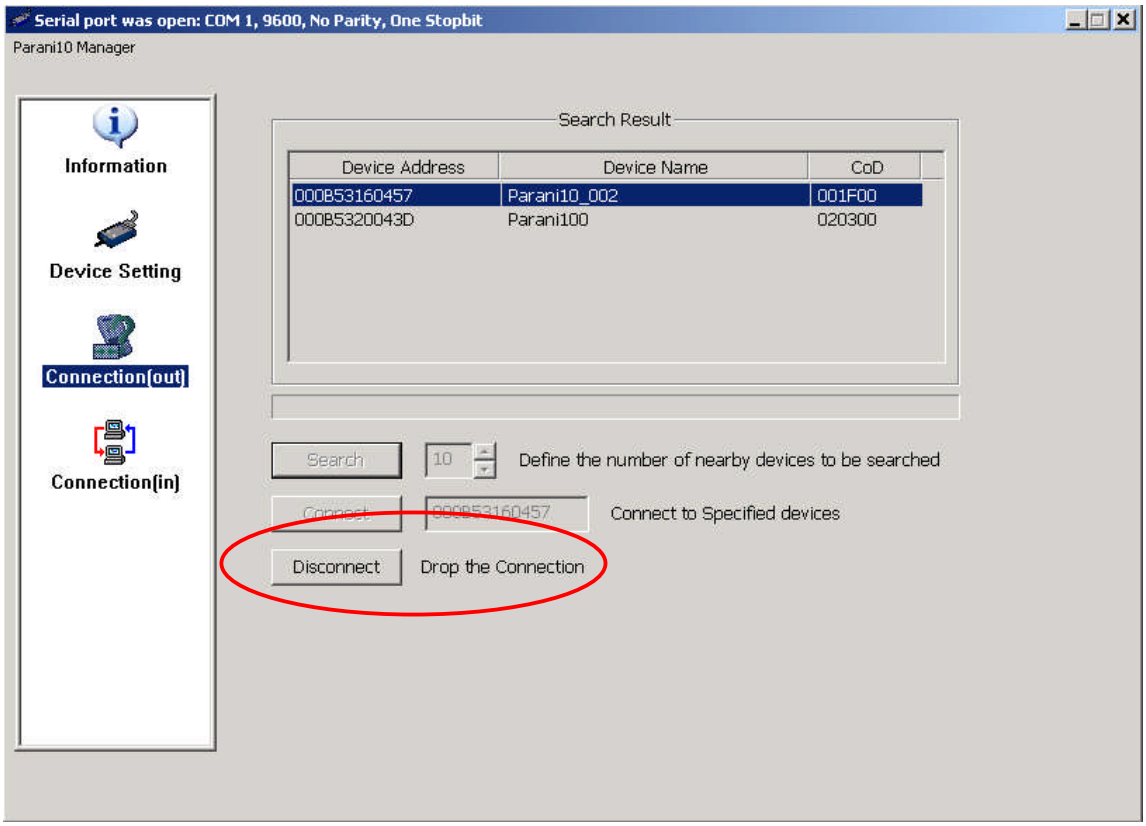
<Fig. 3.1.6>

2-9. Now, Status LEDs on Both **P01** and **P02** are Green, which means they are connected.

2-10. Do not detach **P02** from your computer yet, we will go to next stage for Auto-connection (Always-connection).

3.1.3 Let's make Auto-Connection between P01 and P02

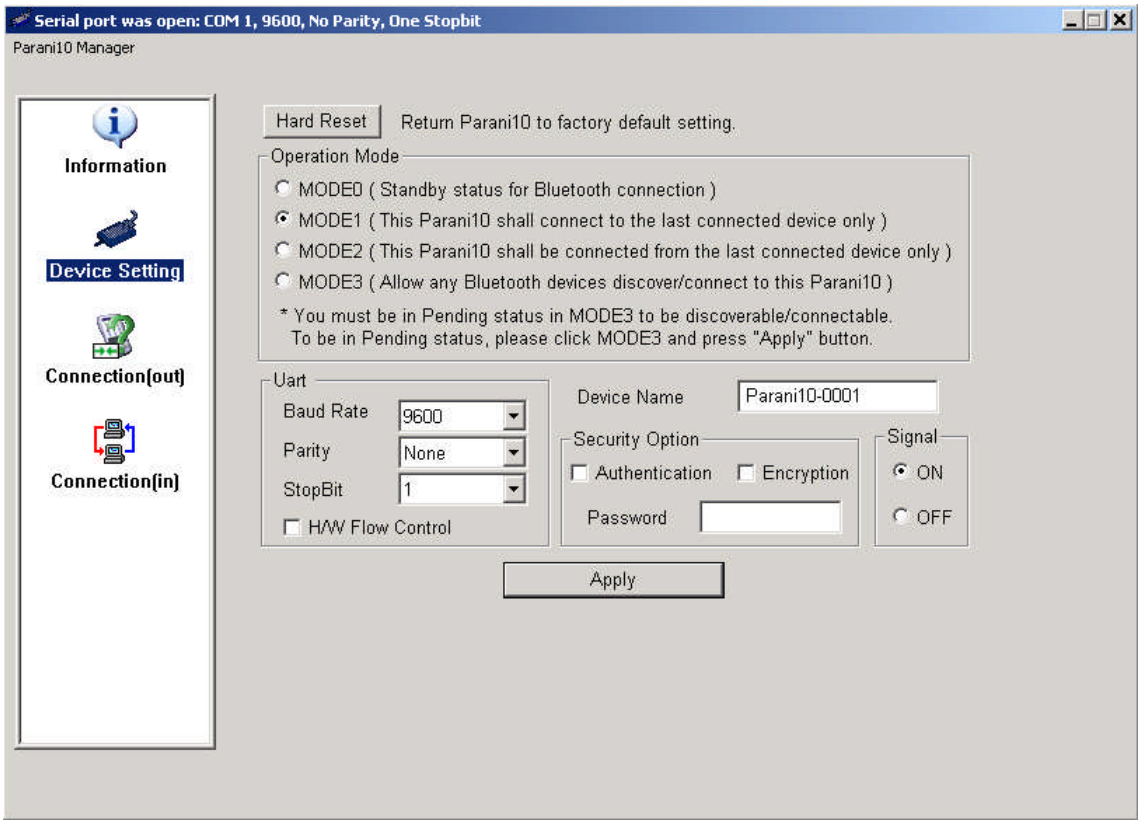
3-1. With **P02** which is still attached to your computer, in **Connection(out)** page,
press the DISCONNECT button at the bottom to release the connection for a while.
P02 will remember the last-connected device, even after disconnection.



<Fig. 3.1.7>

3-2. Now, **Status LEDs of P02 becomes 'Orange'**, as well as **P01**, as they are disconnected.

3-3. Select Device Setting icon in the list control box, and select **MODE1** in Operation Mode and apply.



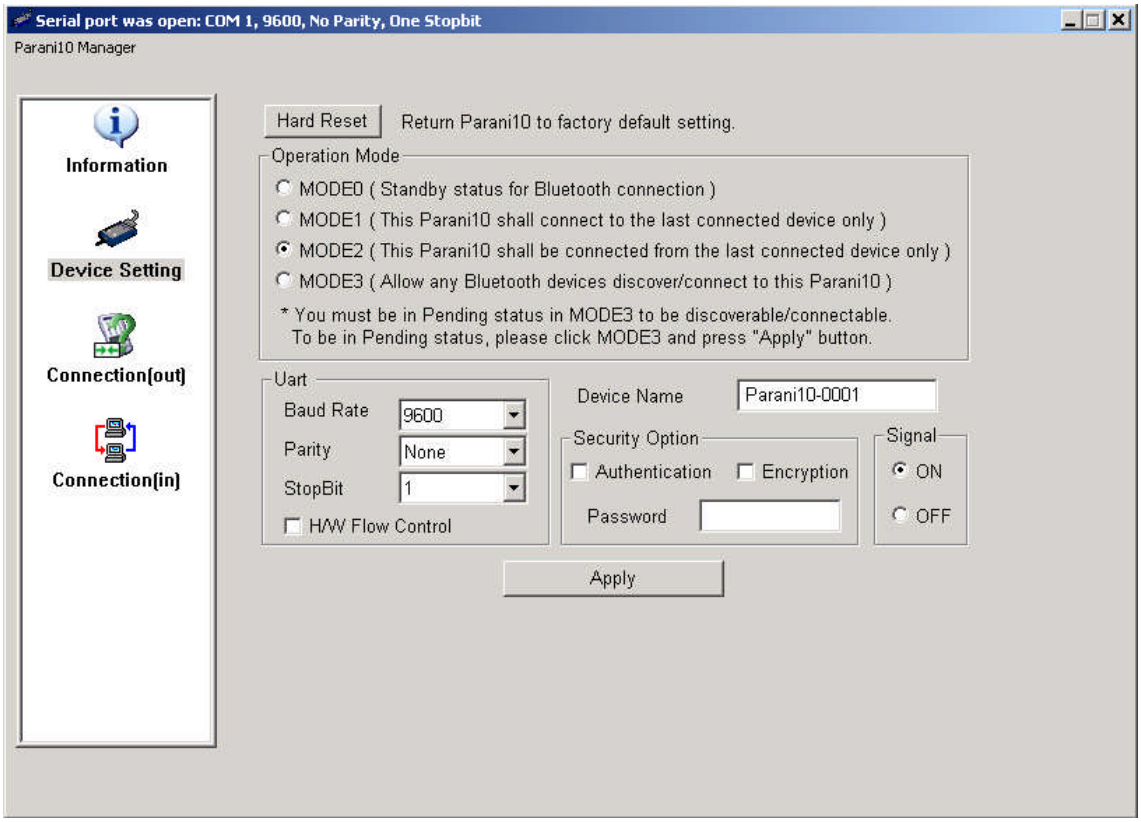
<Fig. 3.1.8>

3-4. Now jobs for P02 are finished. Detach P02 from your computer.

3-5. Attach P01 to your computer.

3-6. Restart Parani10_Manager.

3-7. Select Device Setting icon in the list control box, and select **MODE2** in Operation Mode and apply.



<Fig. 3.1.9>

3-8. Now, detach **P01** from your computer.

3-9. Make sure that power to Both **P01** and **P02** are supplied.

With both, **P01** and **P02**, turn off both units using the Switch located on the side of its body. Then, turn on both **P01** and **P02** almost at the same time.

Now, you will see Green Status LEDs on both units.

P01 and **P02** will be connected automatically, as long as the configuration for both units remains unchanged.

3.2 Using a Terminal Program

Parani10 units are easily controlled and configured via Parani10_Manager. Likewise, AT command sets are supported by Parani10 to allow device control capabilities used by the terminal program of your choice.

3.2.1 Connecting Parani10 to host

For Parani10 use, follow the simple instructions below:

1. Connect a Parani10 to a host serial port. Then, turn on the Parani10.
2. Check the STATUS LED color. Amber indicates standard mode.
3. Execute any terminal program and activate Local Echo.
4. Configure the host serial port to match the Parani10 unit configuration. The Parani10 default configuration is 9600 bps Baud, 8 Data bit, No Parity, 1 Stop bit and H/W flow control.
5. Enter 'AT' command at the prompt. A Parani10 'OK' reply indicates proper operation.

3.2.2 Making the first Parani10/Bluetooth connection

As stated before, Bluetooth wireless connections can be made with any other Bluetooth device supporting Bluetooth SPP (Serial Port Profile). For Bluetooth wireless connections to a Parani10, first make another Parani10 *'Discoverable'* and *'Connectable'*. In this case, refer to section 3.2.3 before following the instructions below.

1. First check the status of the Parani10 by entering 'AT+BTINFO?'. The Parani10 response is comprised of BD_ADDR, Device Name, Operating Mode, Operating Status, Authentication and Encryption flags. To make a connection to other Bluetooth devices, the operating status of the first Parani10 should be 'STANDBY'. A 'PENDING' operating status of the first Parani10 indicates the unit is busy with another operation. In this case, cancel the ongoing operation by entering the 'AT+BTCANCEL' command.

```
AT+BTINFO?
000B530000A9, Parani10-0000A9,MODE0,STANDBY,0,0

OK
```

2. Search other local Bluetooth devices by entering the ‘AT+BTINQ?’ command.

```
AT+BTINQ?
000B53000080, Parani10-000080,001F00

0004B300E205,AP2002:1 #0,020300

OK
```

3. Check the search list. Enter ‘ATD’ command in the BD_ADDR of any Bluetooth device for connection. During the connection process, the STATUS LED will flash green every second.
4. The Parani10 returning a ‘CONNECT’ message and displaying a green STATUS LED indicates connection.

```
ATD000B53000080
OK

CONNECT
```

3.2.3 Making Parani10 do INQUIRY SCAN and PAGE SCAN

To make the Parani10 “*Discoverable”* (INQUIRY SCAN) and “*Connectable”* (PAGE SCAN), these operations must be manually activated.

1. Check the Parani10 status by entering an ‘AT+BTINFO?’ command.

```
AT+BTINFO?
000B530000A9,PARANI10-0000A9,MODE0,STANDBY,0,0

OK
```

2. Enter the ‘AT+BTSCAN’ command. The Parani10 will start INQURY SCAN and PAGE SCAN operation. During the process, the Parani10 will flash twice every 3 seconds until it is connected to another Bluetooth device.

```
AT+BTSCAN
OK
```

3. Try Bluetooth connection to the Parani10 from the other Bluetooth device. Once connected the first Parani10 will return the ‘CONNECT’ message and the STATUS LED will display a continuous green without flashing.

```
AT+BTSCAN
OK

CONNECT
```

3.2.4 Releasing the existing Bluetooth connection

Once connected successfully, the Parani10 becomes transparent to any serial applications on hosts. Data may be transferred within the radio range of the Parani10. According to Parani10 terminology, this operating status is called ‘ONLINE STATUS’. In ONLINE STATUS, all AT commands are treated as characters and are ignored by the command interpreter of the Parani10. Therefore to escape from ONLINE STATUS enters escape string ‘+++’.

1. Transition from ONLINE STATUS to STANDBY STATUS by entering '+++' string to the Parani10. Check the current Parani10 status by entering the 'AT+BTINFO?' command. The Parani10 status should display CONNECT STATUS.

```
+++
OK
AT+BTINFO?
000B530000A9, Parani10-0000A9,MODE0,CONNECT,0,0

OK
```

2. Release the current Bluetooth connection by entering 'ATH' command. Once disconnected successfully, the Parani10 returns the 'DISCONNECT' message.

```
ATH
OK

DISCONNECT
```

3.2.5 Automatic connection of two Parani10 Units

Two Parani10 units connect automatically when powered up. For automatic Parani10 connection first make a Bluetooth connection between two Parani10 units. Once connected, the Parani10 stores the 48-bit BD_ADDR of its counterpart. To expedite 48-bit BD_ADDR input operation, the Parani10 is designed to store the BD_ADDR of its latest counterpart.

1. Set one Parani10 to do INQUIRY SCAN and PAGE SCAN operation as directed in section 3.2.3.
2. Set the other Parani10 to connect to the Parani10 in the previous step.
3. Once connected successfully, both Parani10 units store the BD_ADDR of

their counterpart in their internal Flash. When desired, release the connection as directed in section 3.2.4.

4. Set the operating mode of one Parani10 to MODE 1 by entering an ‘AT+ BTMODE’ command as shown below.

```
AT+BTMODE,1
OK
```

5. Set the operating mode of the other Parani10 to MODE 2 by entering an ‘AT+BTMODE’ command as show below.

```
AT+BTCANCEL
OK
AT+BTMODE,2
OK
```

6. Turn both Parani10 units power off. The Parani10 pair will connect automatically when they are powered up again.

7. To release this paring, set them to MODE 0 by entering ‘AT+BTMODE, 0’. or reset the units by pressing the RESET button.

```
AT+BTMODE,0
OK
```

3.2.6 AT command vs. Operational Status

The AT command sets listed above can be executed per Parani10 operational status. The

following table shows the operational status and executable AT command sets.

AT Command	Standby	Pending	Online
AT<cr>	√	√	
ATZ<cr>	√	√	
AT+BTINQ?<cr>	√[1)]		
ATD112233445566<cr>	√[1)]		
ATD<cr>	√[1)]		
AT+BTSCAN,n<cr>	√[1)]		
AT+BTSCAN,112233445566<cr>	√[1)]		
AT+BTCANCEL<cr>		√	
+++			√
ATO<cr>	√[2)]		
ATH<cr>	√[2)]		
AT+BTAUTH,Auth,Encr<cr>	√[3)]		
AT+BTMODE,n<cr>	√[3) 4)]		
AT+BTNAME=”Name”<cr>	√[3)]		
AT+BTKEY=”nnnn”<cr>	√[3)]		
ATS10=0 or ATS10=1			
AT+BTINFO?<cr>	√	√	
AT+UARTCONFIG,b,p,s<cr>	√[3) 4)]		

1) Effective when Parani10 is not in connection with Bluetooth.
2) Effective when Parani10 is in connection status with Bluetooth.
3) Recommend to be used when Parani10 is not in connections status with Bluetooth
4) To apply new values to Parani10, software reset requires by ATZ command or restart Parani10.

3.3 Using Parani10Wizard

The Parani10Wizard is simple configuration utility for point to point communication. User can easily configure two Parani10s on a local PC.

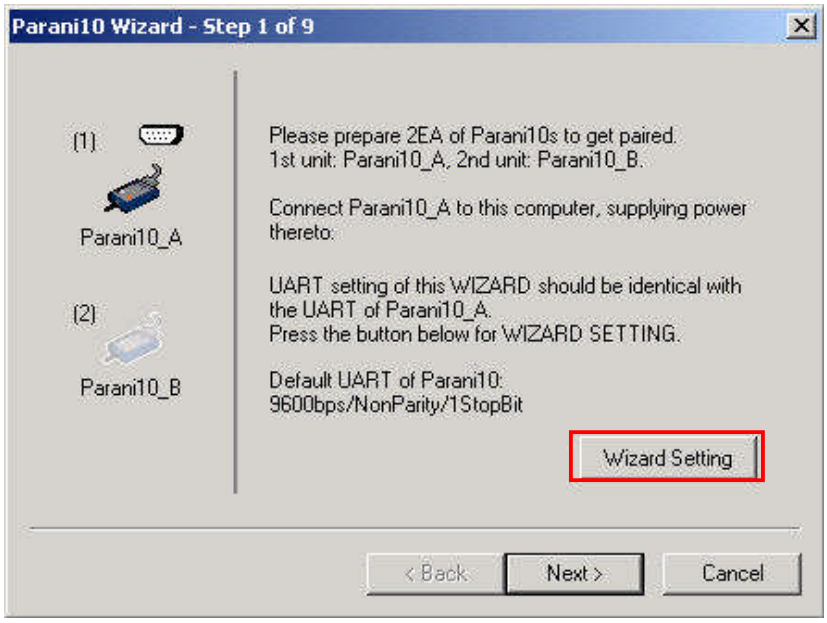
Before starting configuration, you will need to prepare two Parani10s.

Also, remember that two Parani10s must be powered on during configuration.

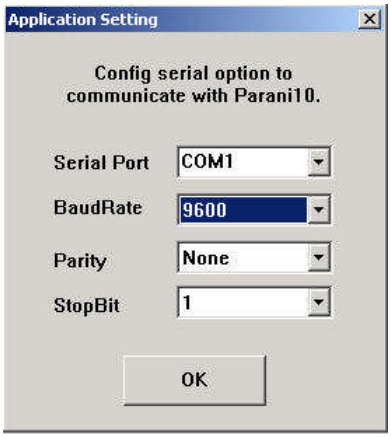
Parani10Wizard is composed all 9 steps:

Two Parani10s which are named as Parani10_A and Parani10_B.

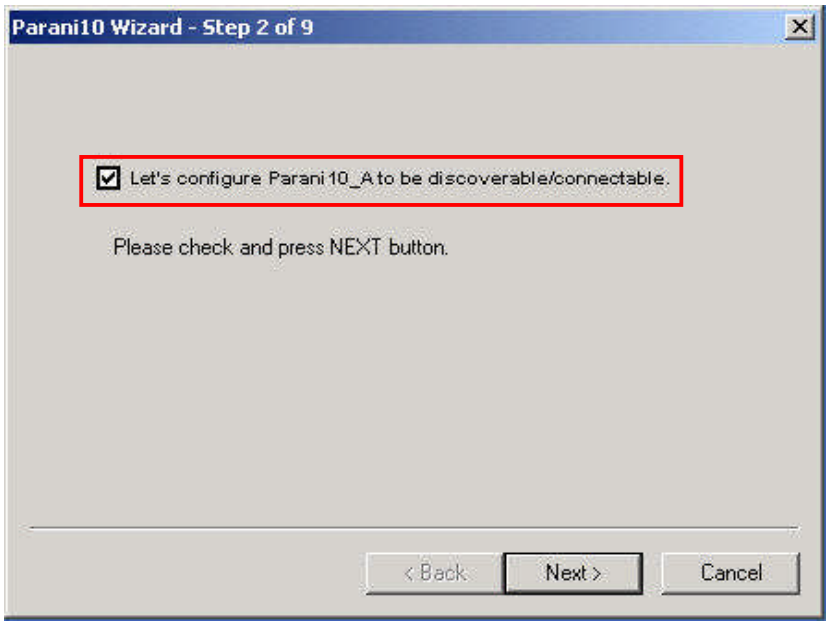
Step 1. Connect to Parani10_A to local PC's Com port.



Click the wizard setting button and configure the serial parameters of Parani10_A. Then, click the next button. Default serial parameters of the Parani10 are 9600 baud rate/none parity bit/1 stop bit.

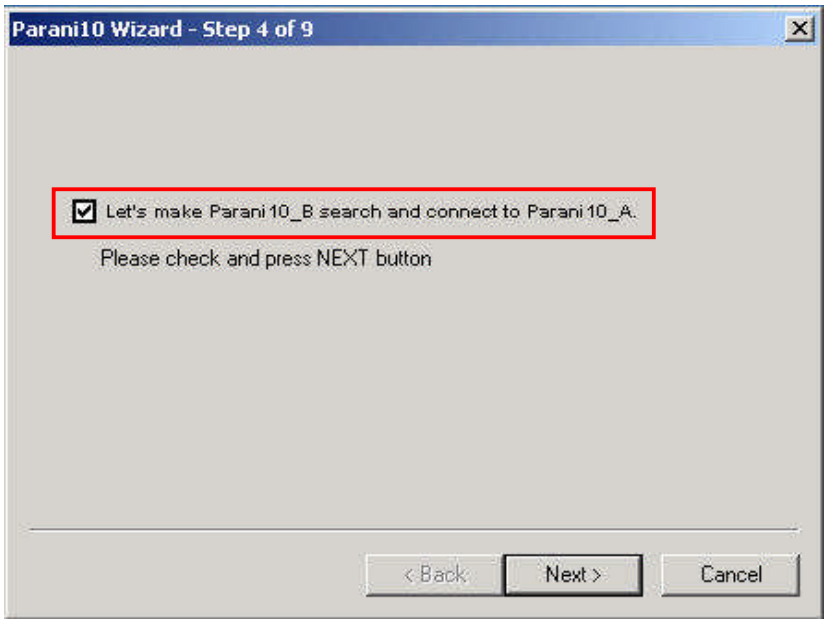


Step 2. Check “ Let’s configure Parani10_A to be discoverable/connectable”.

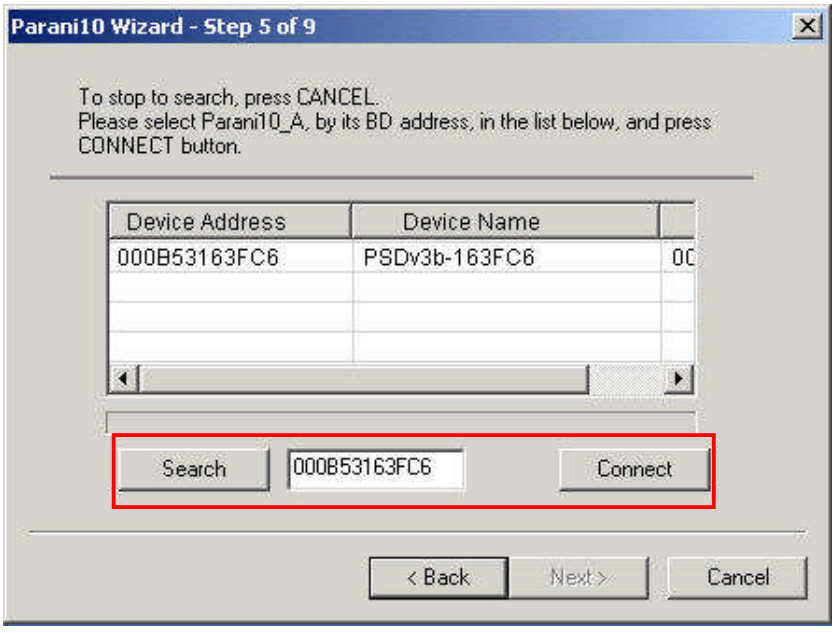


Step 3. Remove the Parani10_A and connect to Parani10_B to the PC’s local com port (The com port should be the same one used for Parani10_A). Then, click the wizard setting button and configure the serial parameters of Parani10_B.

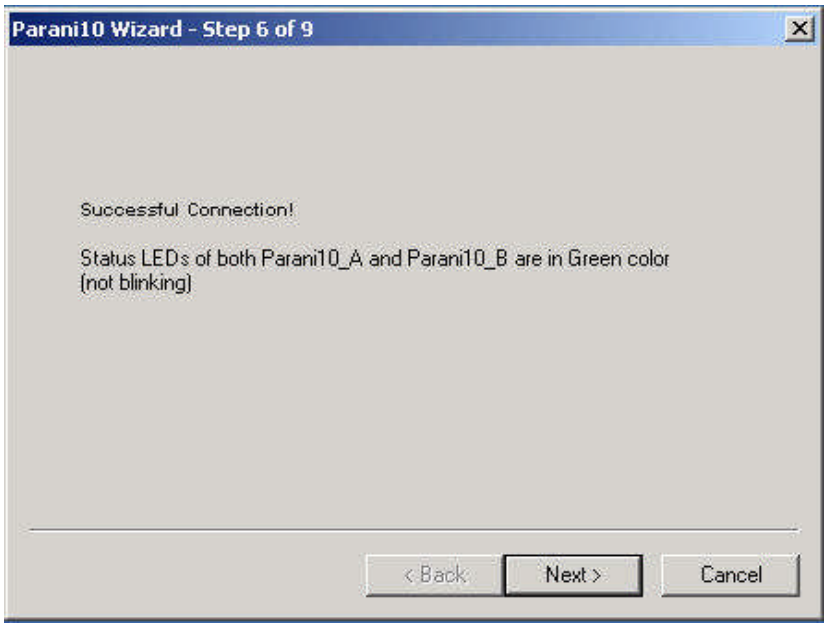
Step 4. Check “ Let’s make Parani10_B search and connect to Parani10_A”, and click the Next button.



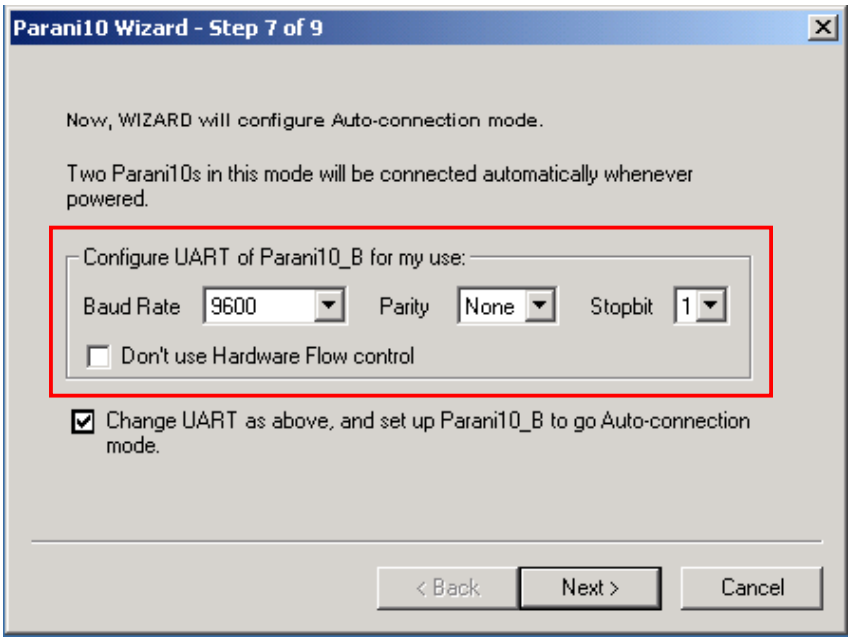
Step 5. Click the search button for to search for Parani10_A. Once Parani10_A has been found, click the corresponding entry, and click connect button.



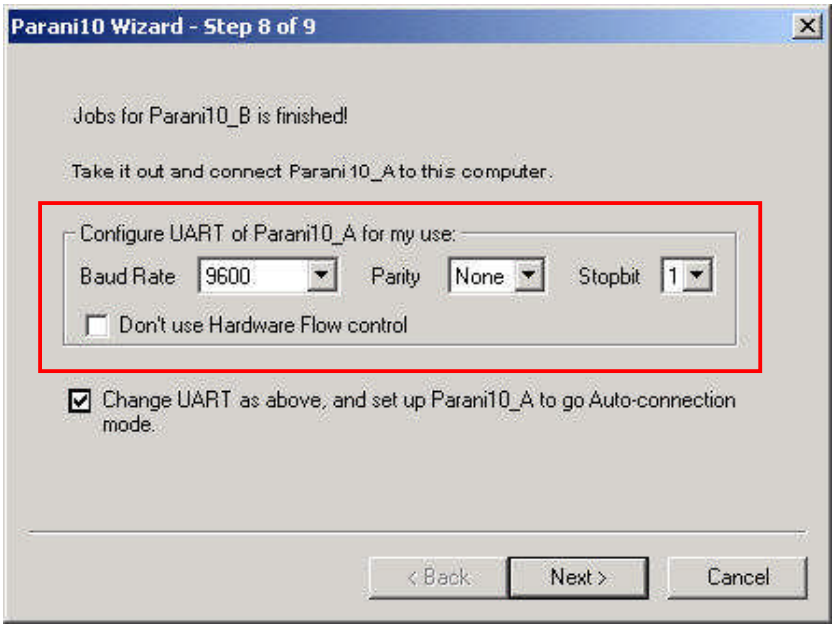
Step 6. Check that the status LEDs of both Parani10_A and Parani10_B are a solid Green color. Then click next button.



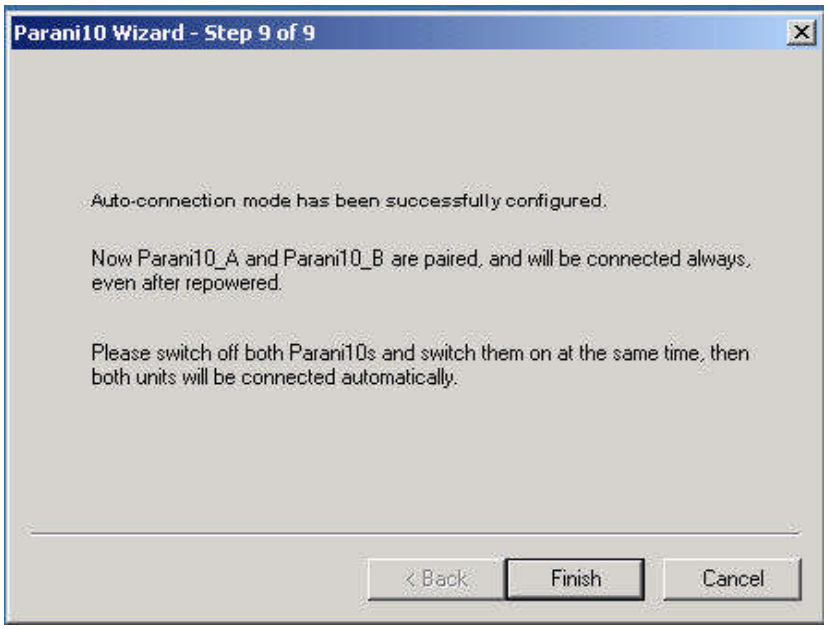
Step 7. User can easily configure UART of Parani10_B as needed.



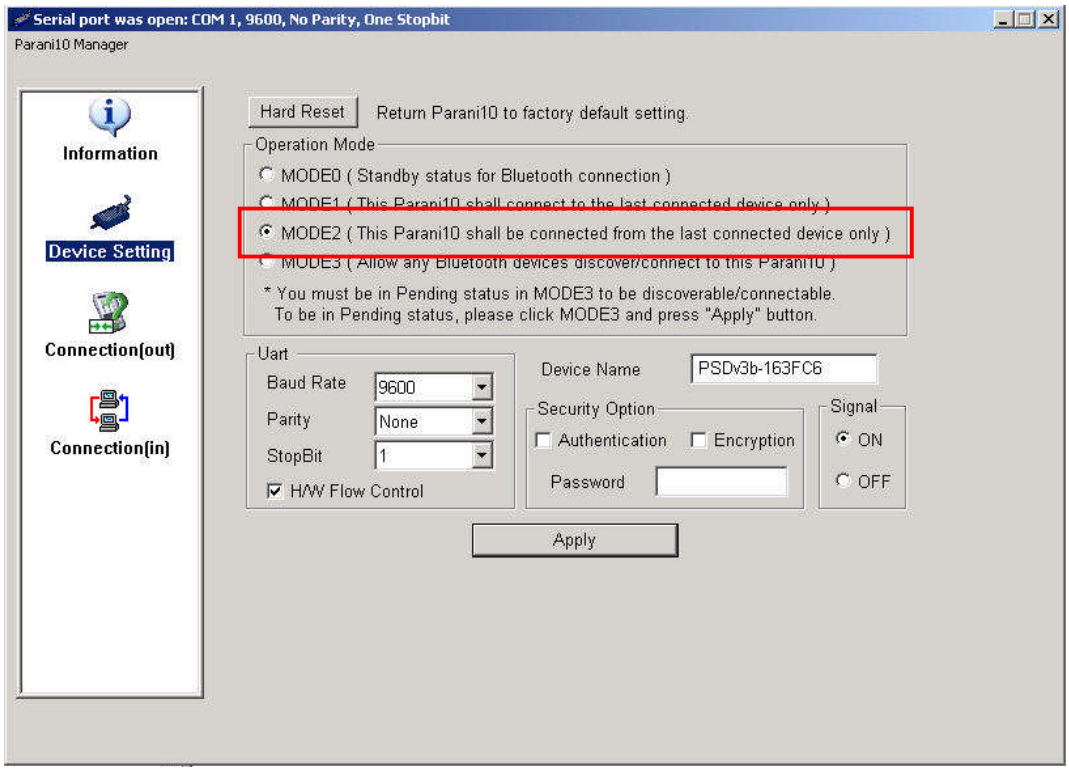
Step 8. User can easily configure UART of Parani10_A as needed.



Step 9. After the configuration, Parani10_A and Parani10_B will be connected automatically.



Operation mode of Parani10_A and Parani10_B become mode 2. User can check status mode of two Parani10s using the Parani10 Manager.



4. Multi-Serial Connections

4.1 Parani100

For multiple wireless serial connections, the Parani100 is recommended as a companion product of the Parani10, wireless serial adapter. The Parani100 is basically a Bluetooth/IP gateway which converts the Bluetooth based data stream to data receivable by various devices in a LAN. It supports 7 Bluetooth connections and equipped with Serial/IP™ COM Port redirector which enables serial data transfer to IP networks so that users may use existing serial program to communicate with the serial devices through IP/Bluetooth network.

<Fig. 4.1.1 The Parani100, Bluetooth/IP Gateway>

Appendix A: AT command sets

The following AT command sets are supported by PARANI10. Here <cr> represents carriage return of ASCII Code (0x0D) and <lf> represents line feed of ASCII Code (0x0A).

AT<cr>

Function : Check the presence of your PARANI10.

Response : <cr><lf>OK<cr><lf> or
<cr><lf>ERROR<cr><lf>

Description : In standard mode, you can check whether your PARANI10 is connected to a host correctly by using this AT command.

ATZ<cr>

Function : Do soft-reset

Response : <cr><lf>OK<cr><lf> or
<cr><lf>ERROR<cr><lf>

Description : You can do soft-reset by using this AT command. When your PARANI10 is already connected to the other device, it disconnects the connected device. You can halt the current ongoing operation by using this command.

AT&F<cr>

Function : Restore the default configuration of your PARANI10.

Response : <cr><lf>OK<cr><lf> or
<cr><lf>ERROR<cr><lf>

Description : You can restore the default configuration of your PARANI10 by executing this AT command.

AT+BTINQ?<cr>

Function : Search (INQUIRY) other Bluetooth devices nearby.

Response : <cr><lf>BD_ADDR, Device Name , Class of Device<cr><lf>
<cr><lf>BD_ADDR, Device Name , Class of Device<cr><lf>
…
<cr><lf>BD_ADDR, Device Name , Class of Device<cr><lf>
<cr><lf>OK<cr><lf>

Description : This command is used to inquiry other Bluetooth devices nearby. The INQUIRY process is carried out during the predefined time duration (30 seconds). The maximum number of INQUIRY result is 10.

ATD BD_ADDR <cr>

Function : Make connection with the given BD_ADDR.

Response : <cr><lf>OK<cr><lf>
<cr><lf>CONNECT<cr><lf>
or
<cr><lf>OK<cr><lf>
<cr><lf>ERROR<cr><lf>.

Description : After getting BD_ADDRs, you can make a connection to another Bluetooth device by using this AT command. Once you input this command, PARANI10 tries to connect the Bluetooth device with the given BD_ADDR for 5 minutes. The connection failure happens when a Bluetooth device with the given BD_ADDR is not in PAGE SCAN mode or is already connected to other Bluetooth device.

ATD<cr>

Function : Make connection with a Bluetooth device connected most recently.

Response : <cr><lf>OK<cr><lf>
<cr><lf>CONNECT<cr><lf>
or
<cr><lf>OK<cr><lf>
<cr><lf>ERROR<cr><lf>.

Description : If you execute this AT command, your PARANI10 will make a connection with a Bluetooth device which your PARANI10 connected to most recently. To make this AT command work successfully, there should be at least one successful connection to another Bluetooth you want to connect to.

AT+BTSCAN <cr>

Function : Make your PARANI10 do INQUIRY SCAN and PAGE SCAN alternately.

Response : <cr><lf>OK<cr><lf>
<cr><lf>CONNECT<cr><lf>

Description : You can force your PARANI10 to do INQUIRY SCAN or PAGE SCAN alternately with this AT command. Your PARANI10 does INQUIRY SCAN and PAGE SCAN until it has a connection from other Bluetooth device. Once connected, your PARANI10 returns ‘CONNECT’ message. You can use ‘AT+BTCANCEL’ to cancel this operation. This AT command has the same effect of ‘AT+BTSCAN,3,0’.

AT+BTSCAN, n, to<cr>

Function : You can force your PARANI10 to do INQUIRY SCAN or PAGE SCAN.

Response : <cr><lf>OK<cr><lf>
<cr><lf>CONNECT<cr><lf>
or
<cr><lf>OK<cr><lf>

<cr><lf>ERROR<cr><lf>

Description : To make PARANI10 to be *Discoverable* and *Connectable* from other Bluetooth devices, you should set its INQUIRY SCAN and PAGE SCAN. To make your PARANI10 do INQUIRY SCAN only, you should set n as 1. To make your PARANI10 do PAGE SCAN only, you should set n as 2. When n is set to 3, your PARANI10 does INQUIRY SCAN and PAGE SCAN alternately. Here, 'to' indicates the time out interval of INQUIRY SCAN and PAGE SCAN operations. If you set 'to' to '0', your PARANI10 does INQUIRY SCAN and PAGE SCAN until it has a connection from other Bluetooth device. Your PARANI10 returns 'CONNECT' message when it is connected from other Bluetooth device within the given time out intervals. Otherwise, it returns 'ERROR' message.

AT+BTSCAN, BD_ADDR, to<cr>

Function : Wait Bluetooth connection from a device with given BD_ADDR.

Response : <cr><lf>OK<cr><lf>
<cr><lf>CONNECT<cr><lf>
or
<cr><lf>OK<cr><lf>
<cr><lf>ERROR<cr><lf>

Description : Once you enter this AT command, your PARANI10 does PAGE SCAN. However, it waits a connection from a Bluetooth device with the given BD_ADDR. This process lasts during 'to' time interval. Especially when 'to' has value of '0', your PARANI10 waits connection infinitely.

AT+BTCANCEL<cr>

Function : Cancel currently ongoing operation of your PARANI10.

Response : <cr><lf>OK <cr><lf>

Description : This AT command works only when your PARANI10 is busy in doing 'AT+BTSCAN', 'ATD' or 'AT+BTINQ?'. Once canceled successfully, your PARANI10 will become STANBY STATUS'.

+++

Function : Make transition from ONLINE STATUS to STANDBY STATUS.

Response : <cr><lf>OK <cr><lf>.

Description : If you input '+++' string to your PARANI10 in ONLINE STATUS, your

PARANI10 goes into STANBY STATUS. Once PARANI10 enters into STANDBY STATUS, you can use any AT command sets supported by PARANI10.

ATO<cr>

Function : Make transition from STANBY STATUS to ONLINE STATUS.

Response : None

Description : This AT command is the counter operation of '+++". You can change the operating status to ONLINE STATUS again by using this command. In ONLINE STATUS, the data can be transferred between two hosts. The existence of your PARANI10 becomes transparent to any host applications which use serial ports.

ATH<cr>

Function : Release the current Bluetooth connection.

Response : <cr><lf>OK<cr><lf>
<cr><lf>DISCONNECT <cr><lf>.

Description : This AT command can be used for disconnecting the existing Bluetooth connection.

AT+BTSEC, Authentication, Encryption <cr>

Function : Set Bluetooth authentication or encryption features selectively.

Response : <cr><lf>OK<cr><lf>.

Description : By using this AT command, you can set authentication or encryption feature of your PARANI10 during Bluetooth connection process. Once you set authentication or encryption features, your PARANI10 stores its status. To release authentication or encryption features you set, you should use this AT commands or do soft-reset. To enable authentication or encryption, set authentication or encryption parameter as 1. Otherwise set either of them as 0.

AT+BTLAST?<cr>

Function : Return BD_ADDR of the Bluetooth device to your host which your PARANI10 is connected most recently.

Response : <cr><lf>BD_ADDR<cr><lf>
<cr><lf>OK< cr><lf>

Description : You can use this AT command if you need to refer the BD_ADDR of most

recently connected Bluetooth device.

AT+BTMODE, n<cr>

Function : Set the operating mode of your PARANI10.

Response : <cr><lf>OK<cr><lf>

Description : Your PARANI10 has 4 different operating mode. According to the current operating mode you set, your PARANI10 behavior differently.

n=0 : This means your PARANI10 is in MODE 0. MODE 0 is the default configuration.

n=1 : In MODE 1, your PARANI10 will try to make connection to most recently connected Bluetooth device.

n=2 : In MODE 2, your PARANI10 will wait connection from most recently connected Bluetooth device.

n=3 : IN MODE 3, your PARANI10 does INQUIRY SCAN and PAGE SCAN alternately.

AT+BTNAME="FriendlyName"<cr>

Function : Assign user friendly device name to your PARANI10.

Response : <cr><lf>OK<cr><lf>

Description : You can assign your PARANI10 user friendly name by using this AT command. With the assigned name, you can distinguish your PARANI10 easily from other Bluetooth devices. Up to 32 characters are permitted as user friendly name.

AT+BTKEY="nnnn"<cr>

Function : Change the passkey.

Response : <cr><lf>OK<cr><lf>

Description : When the authentication is enabled in your PARANI10, you should assign passkey. Two Bluetooth devices which are to be connected should have the same passkey. The default passkey of your PARANI10 is '1234'. You can assign maximum 16 alphanumeric characters as a passkey.

AT+BTINFO?<cr>

Function : Return the internal status of your PARANI10.

Response : <cr><lf>BD_ADDR,Name,Mode,Status,Auth,Encryp<cr><lf>
<cr><lf>OK<cr><lf>

Description : When you enter this AT commands at a host terminal, your PARANI10 returns its device information and status to a host. It encompasses BD_ADDR, user friendly name, operating mode, operating status and authentication/encryption status. Especially when the operating status is PENDING, it means your PARANI10 is busy in processing 'AT+BTINQ?', 'ATD' or 'AT_BTSCAN'. When Authentication or Encryption feature is activated, the corresponding parameter has value of '1'.

AT+BTLPM,n<cr>

Function : Set Bluetooth Low power consumption mode.

Response : <cr><lf>OK<cr><lf>

Description : To minimize power consumption, your PARANI10 supports Bluetooth PARK mode. When you set n as 1, your PARANI10 uses PARK mode. Using PARK mode might cause extra data transmission delay in some cases.

AT+BTSD?<cr>

Function : Return the list of secured devices.

Response : <cr><lf>BD_ADDR<cr><lf>
<cr><lf>BD_ADDR<cr><lf>
…
<cr><lf>BD_ADDR<cr><lf>
<cr><lf>OK<cr><lf>

Description : Your PARANI10 can pair up to 5 Bluetooth devices. Upon receiving this AT command, your PARANI10 returns all the BD_ADDRs of the previously paired Bluetooth devices.

AT+BTCSD<cr>

Function : Delete the info of all the paired devices stored in your PARANI10.

Response : <cr><lf>OK<cr><lf>

Description : This AT command just deletes the info of paired devices stored on PARANI10's Flash memory. To delete the same info resides on PARANI10's RAM, you have to do software reset or hardware reset.

AT+BTFP,n<cr>

Function : Force your PARANI10 to generate passkey automatically.

Response : <cr><lf>OK<cr><lf>

Description : Once paired, your PARANI10 uses the stored link key. By using this AT command, you can make Bluetooth connection with a new link key. When n is set to 1, your PARANI10 newly generates a link key during connection process.

AT+UARTCONFIG, baudrate, parity, stopbit,handshaking<cr>

Function : Configure the serial port of your PARANI10.

Response : <cr><lf>OK<cr><lf>

Description : By using this AT command, you can reconfigure the serial port of your PARANI10. You can set baudrate, parity, stopbit . To make this command result active, you should do soft-reset or turn off/on your PARANI10. The following values are permitted for each parameter.

- Baudrate = 1200, 2400, 9600, 19200, 38400, 57600 or 115200.
  230400 (only for Parani10)
- Parity = N (No parity), E (Even parity) or O (Odd parity).
- Stopbit = 1 or 2.
- Handshaking = 1 or 0

(If '1', hardware handshaking will be used. If '0', handshaking function of Parani10 will be turned off)

Full AT commands set

No.	Command	Response	Comments
1)	AT<cr>	<cr><lf>OK<cr><lf>	
2)	ATZ<cr>	<cr><lf>OK<cr><lf>	Drops all connections, disable Inquiry and Page scans. Reset the Bluetooth module.
3)	AT&F<cr>	<cr><lf>OK<cr><lf>	Reset to factory default state
4)	AT+BTINQ?<cr>	<cr><lf>112233445 5,FriendlyName,Co D<cr><lf> <cr><lf>112233445 5,FriendlyName,Co D<cr><lf> <cr><lf>112233445 5,FriendlyName,Co	Inquiry nearby devices. The OK at the end means end of inquiry.

		D<cr><lf> <cr><lf>OK<cr><lf>	
5)	ATD112233445566<cr>	<cr><lf>OK<cr><lf> <cr><lf>CONNECT <cr><lf> or <cr><lf>ERROR<cr><lf>	Connect to the specified device. If you want to enable Authentication and Encryption, just set variable as 1.
6)	ATD<cr>	<cr><lf>OK<cr><lf> <cr><lf>CONNECT <cr><lf> or <cr><lf>ERROR<cr><lf>	Connect to the device that last successfully connected.
7)	AT+BTSCAN<cr>	<cr><lf>OK<cr><lf>	Enable inquiry and page scans with timeout of infinity.
8)	AT+BTSCAN,n,to<cr>	<cr><lf>OK<cr><lf>	Enable inquiry or Page scans. If n=1, disable page and enable inquiry. If n=2, enable page and disable inquiry. If n=3, enable both page and inquiry. Scan will be performed during <to> seconds.
9)	AT+BTSCAN112233445566,to<cr>	<cr><lf>OK<cr><lf>	Will scan of only specified device.
10)	AT+BTCANCEL<cr>	<cr><lf>OK<cr><lf>	cancel the current pending operation when the device is inquiring, paging or scanning mode.
11)	+++	<cr><lf>OK<cr><lf>	Drop from online mode to command mode.
12)	ATO<cr>	<cr><lf>OK<cr><lf>	Return to online mode if currently being connected.
13)	ATH<cr>	<cr><lf>OK<cr><lf>	Drop the connection.
14)	AT+BTSEC,Authentication,Encryption<cr>	<cr><lf>OK<cr><lf>	Same as AT+BTAUTH

15)	AT+BTLAST?<cr>	<cr><lf>OK<cr><lf>	Query the bd-address of last connected device
16)	AT+BTMODE,n<cr>	<cr><lf>OK<cr><lf>	Sets the mode of device. If n=0, device operates in Standard mode which accepts all AT commands. If n=1, device operates at Master mode which try to connect peer device. If n=2, device operates at Slave mode which waiting for connection. If n=3, device operates at always connectable mode.
17)	AT+BTNAME=”FriendlyName”<cr>	<cr><lf>OK<cr><lf>	Sets the friendly name of this unit.
18)	AT+BTKEY=”nnnn”<cr>	<cr><lf>OK<cr><lf>	Sets the Passkey of this unit. Up to 16 characters.
19)	AT+BTINFO?<cr>	<cr><lf>112233445566,FriendlyName,Mode,State,Authentication,Encryption<cr><lf> <cr><lf>OK<cr><lf>	Retrieve local device information including BD address, Friendly name, mode of device, internal operation state and status of authentication and encryption features.
20)	AT+BTLPM,n<cr>	<cr><lf>OK<cr><lf>	Enable or disable the low power mode of dongle. n = 1 or 0
21)	AT&V<cr>	<cr><lf>S0: m0;S1: m1; … Sn: mn<cr><lf> <cr><lf>OK<cr><lf>	View all the values of internal S-registers
22)	AT+BTSD?<cr>	<cr><lf>bdaddr of secured device 1<cr><lf> <cr><lf>bdaddr of secured device 1<cr><lf> <cr><lf>OK<cr><lf>	Query the bd-addresses of secured devices

23)	AT+BTCSD<cr>	<cr><lf>OK<cr><lf>	Clear the list of secured devices
24)	AT+BTFP,n<cr>	<cr><lf>OK<cr><lf>	Force paring when connecting as master
25)	AT+UARTCONFIG,baudrate,parity,stopbit,handshaking<cr>	<cr><lf>OK<cr><lf>	Sets the configuration of UART interface. Possible values are; baud rate =1200,4800,9600,19200,38400,57600 or 115200. parity = (No parity), (Even parity) or (Odd parity). stop = 1 or 2. Handshaking = 1 or 0 (If '1', hardware handshaking will be used. If '0', handshaking function of Parani10 will be turned off)
26)	AT+SETESC,nn<cr>	<cr><lf>OK<cr><lf>	Sets the escape sequence character. 'nn' should be ASCII code (Decimal), and printable character. Default escape character is '+++'
27)	AT+PINQ?<cr>	<cr><lf>OK<cr><lf>	For Periodic Inquiry. Parani10 will try to inquire nearby Bluetooth devices periodically and deliver the inquired result to Host. To lease periodic inquiry function, AT+BTCANCEL.
28)	AT&V		Shows S-register values
S-register command: If you change the values of S-register, please reboot Parani10. ATSnn=mm<cr>: To change ATSnn register value ATSnn?: To check current ATSnn register value.			
29)	ATS3	Stream UART policy (Default 0) If set as '0', throughput is the priority, if set as '1', Latency is the priority.	
30)	ATS4	Enable Remote name query (default 1) Get BDaddress and device name during Inquiry. If set as '0', only get BD address. Inquiry time can be	

		faster.
31)	ATS10	Default 1 ATS10=1<cr> : Enabling all of the response messages- OK, CONNECT, DISCONNECT, and ERROR. ATS10=0<cr> : Disabling all of the response messages- OK, CONNECT, DISCONNECT, and ERROR. ATS10?<cr> : To see current status of ATS10
32)	ATS11	Enable Escape (default 1) Escape sequence character enable change from on-line mode to command mode. If set to '0', transmission speed can be improved.
33)	ATS12	Clear UART buffer at Disconnect. (default 0) If set to '1', when disconnected, data stored in Parani10 will be removed.
34)	ATS13	Enable CDC accept (default 0) If set to '0', Parani10 will use CDC signal to let Host know Bluetooth connection status. If set to '1', Parani10 will accept CDC signal from other peer (DCE-configured) Bluetooth device.
35)	ATS14	ATS14=1<cr>: Users may use DTR/DSR lines for communications ATS14=0<cr>: Users may use DTR/DSR lines for Loop-back only. Default value of ATS14 is 0.
36)	ATS15	ATS15=1<cr>: If users set ATS15=1, users may use DTR signal to disconnect Bluetooth connection. If ATS15=1, and DTR signal is changed from state ON to OFF, your connection will be disconnected. ATS15=0<cr>: If ATS15=0, users may NOT use DTR

		signal to disconnect the Bluetooth connection.
37)	ATS24	Maximum number of inquiry result (default 10)
38)	ATS29	Error Code for last occurred error. Users can not change this value
39)	ATS31	Page Timeout (default 300) Unit: second.
40)	ATS33	Inquiry Timeout (default 30) Unit: second.
41)	ATS46	BD address of last connected device

Appendix B: Power Adaptor Specification

Manufacturer: Anam Instruments Inc.

Emerald B/D 7F, 1042, Hogea-dong, Dongan-gu, Anyang, Korea

Tel.: +82-31-347-6140

Fax: +82-31-347-7019

www.anamic.co.kr

Manufacturer's Model Name: AP1015

1. STANDARD FEATURES

1.1. 10WATT AC/DC SWITCHING MODE ADAPTOR

1.2. WALL MOUNT DESIGN

1.3. 100~240Vac UNIVERSAL VOLTAGE INPUT

1.4. 5V 2A REGULATED OUTPUT

1.5. SHORT CIRCUIT PROTECTION

1.6. DESIGN TO MEET CLASS B LIMIT OF EN55022 AND FCC PART 15

1.7. VACUUM IMPREGNATED TRANSFORMER

1.8. 100% BURN-IN PROCESS

2. ELECTRICAL CHARACTERISTCS

2.1 INPUT CHARACTERISTICS

2.1.1. AC INPUT VOLTAGE

2.1.1.1. Nominal input voltage : 110 / 220 Vac

2.1.1.2. Rated input voltage range : 100 to 240 Vac

2.1.1.3. Operating input voltage range : 90 to 264 Vac

2.1.2. AC INPUT FREQUENCY

2.1.2.1. Nominal input frequency : 50 / 60 Hz

2.1.2.2. Rated input frequency : 47 - 63 Hz

2.1.3. AC INPUT CURRENT : MAX 0.3 A (RMS) at 90 Vac

2.2 OUTPUT CHARACTERISTICS

2.2.1. DC OUTPUT

OUTPUT VOLTAGE	LOAD			OUTPUT RANGE	OUTPUT RIPPLE
	MIN	MAX	PEAK		
5 VDC	0.2 A	2 A	-	4.75 ~ 5.25 V	50 mVpp

2.2.1.1. Specified output regulation limit includes line regulation and load regulation.

2.2.1.2. Continuous output shall not exceed 10 W.

2.2.1.3. Ripple and noise is measured at the end of output connector with 20MHz oscilloscope bandwidth.

2.2.1.4. A 22uF Electrolytic capacitor and a 0.22uF Ceramic capacitor should be connected in parallel with output load..

2.2.2. EFFICINCY : Minimum 70 % at 2A load condition.

2.2.3. SHORT CIRCUIT PROTECTION : CYCLING

2.2.4. NO LOAD OPERATION : NO DAMAGE

2.2.5. DI-ELECTRIC WITHSTANDING VOLTAGE

2.2.5.1. Primary to Secondary : 3 KV, 1 Second

2.2.5.2. Cut-Off Current : 10mA

2.2.6. EMI

2.2.6.1. Shall be designed to meet CLASS B Limit of FCC part 15.

2.2.6.2. Shall be designed to meet EN 55022

2.2.7. SAFETY

2.2.7.1. UL & cUL : UL1950

2.2.7.2. TUV - CE : EN60950

2.2.7.3. ek-mark : K60950

2.2.7.4. CB / QAS / CCIB / PSE

2.3. GENERAL CHARACTERISTICS

2.3.1 OPERATING TEMPERATURE RANGE: 0'C to 35'C at 100% Load condition.
0'C to 40'C at 90% Load condition.

2.3.2. OPERATING HUMIDITY: 15 to 80% RELATIVE HUMIDITY

2.3.3. STORAGE TEMPERATURE: -20'C to 85'C

2.3.4. STORAGE HUMIDITY: 90 % RELATIVE

2.3.5. BURN-IN PROCESS

2.3.5.1. All unit shall be subjected to burn-in process of mass production.

2.3.5.2. TEMPERATURE: 30 +/-5'C

2.3.5.3. LOAD CONDITION: 2 A

2.3.5.4. INPUT VOLTAGE: 110 / 220 Vac

3. MECHANICAL CHARACTERISTICS

3.1. DIMENSIONAL SIZE
LENGTH: 66 mm
WIDTH: 48.5 mm
HIGHT: 35 mm

3.2. OUTPUT CABLE
CABLE LENGTH : 1850 +/- 50

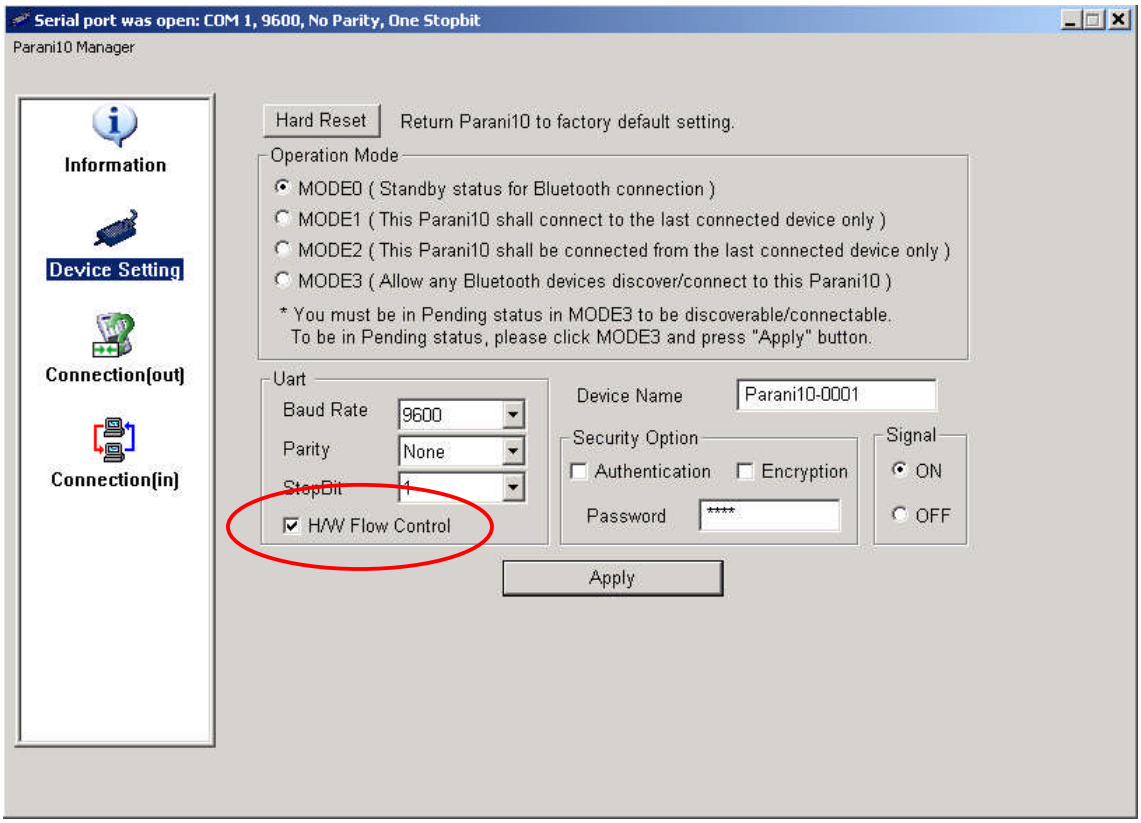
Appendix C: Troubleshooting

C.1 ON/OFF of Hardware Flow Control

Parani10 is designed to use CTS/RTS for handshaking. For equipment that is not using Hardware flow control for serial communications, Parani10's firmware should be set to turn OFF hardware flow control (CTS/RTS).
Customers may indicate preferences when ordering or turn off the handshaking by bridging CTS and RTS (no. 7 and no. 8 lines) using a Gender changer.

Parani10 has automatic detection feature of hardware flow control, but in certain environment such as PC, this function may not operate correctly.

* Customers may choose the usage of hardware flow control using Parani10_Manager software.



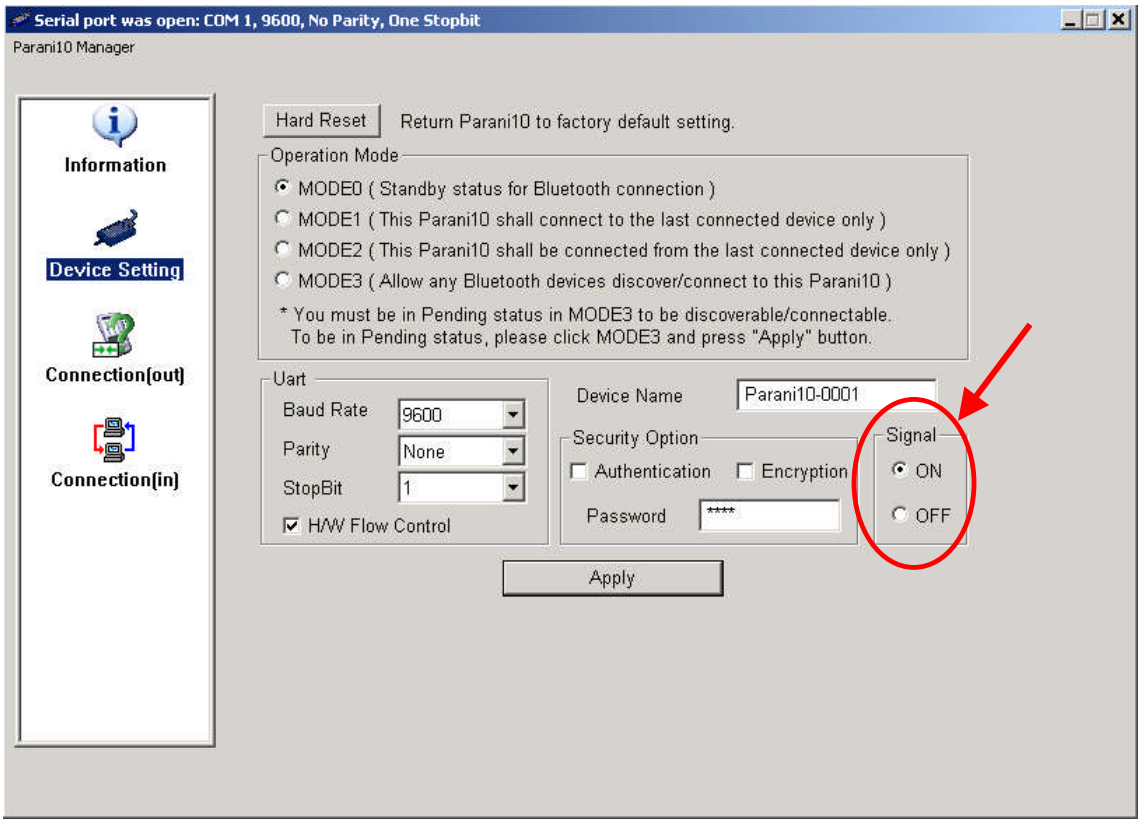
If checked, Parani10 will use hardware flow control. If you do not want to use the function, please uncheck and press Apply button.

C.2 Enabling/Disabling of Response Signals OK, CONNECT & ERROR

Parani10 will respond to users on the current status, success & failure of connections, and error mode. Both Parani10_Manager and Terminal Programs will receive related response signals from Parani10.

In some cases, various equipment may regard these four response signals incorrectly and react inappropriately. To avoid these possible errors, users may disable the response signals via Parani10_Manager or AT commands at Terminal.

1) By Parani10_Manager, check OFF at Signal pane at Device Setting panel to disable 4 response signals from Parani10.



2) By AT commands at your Terminal program.

ATS10=1 : Enabling/ON 4 signals

ATS10=0 : Disabling/OFF 4 signals

ATS10? : To see current status

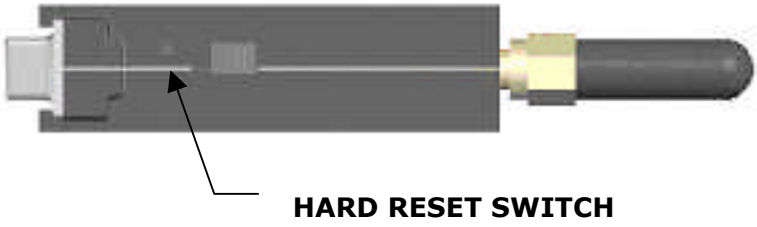
C.3 For DCE connection

Parani10 is twisted Rx/Tx-ready for direct DTE connection. For connection to DCE equipment such as modem etc., customers need to use a gender changer that twisted Tx/Rx, CTS/RTS, and DTR/DSR for correct operation.

For more information, please contact support@sena.com

C.4 Hardware Reset

For Hardware reset, press the button on the right side of the Parani10 unit with a narrow tool such as a ballpoint pen.



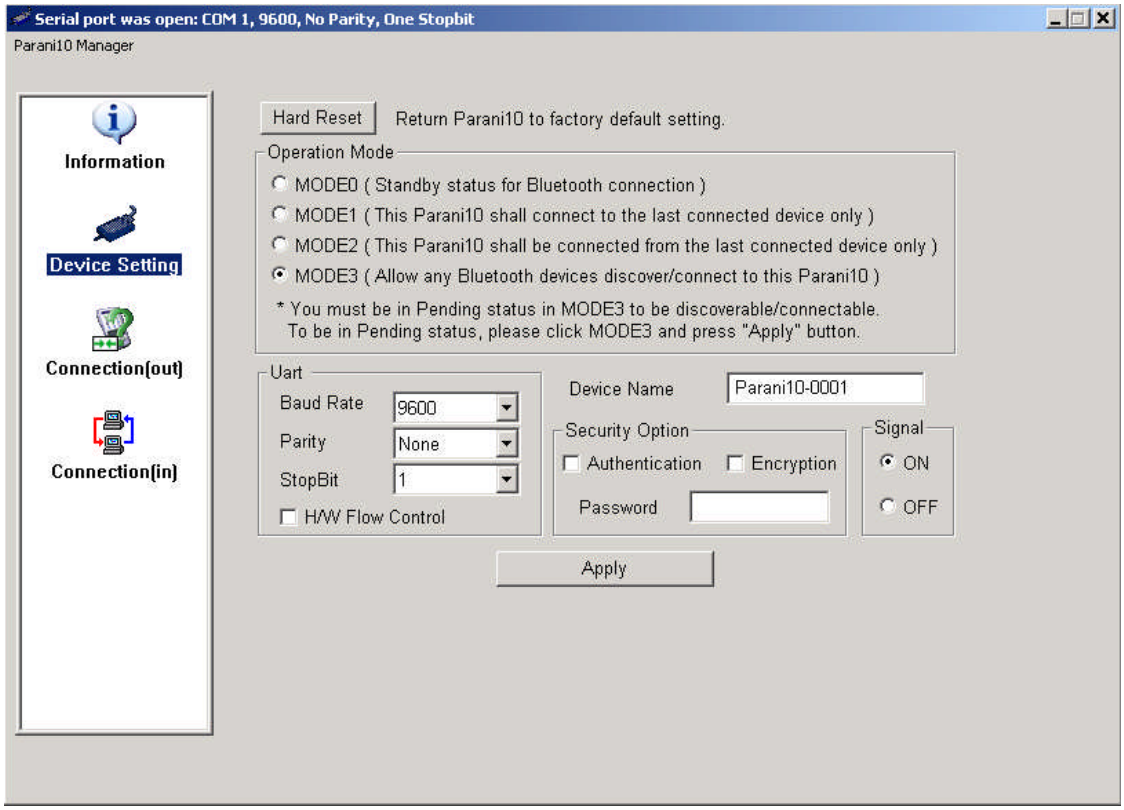
C.5 How to get Bluetooth CF cards connected to Parani10

If you are using Bluetooth CF cards or USB adaptors from other manufacturers, please use Parani10_Manager software of latest version, which will be more familiar to consumers. Parani10_Manager can be downloaded from our website at:

http://www.sena.com/support/downloads

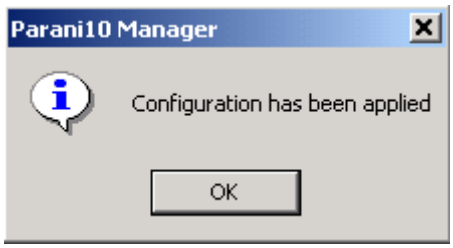
1) In Parani10_Manager, start and go to the Device Setting menu.

2) Select **MODE3** to allow any Bluetooth device can discover and connect to this Parani10.

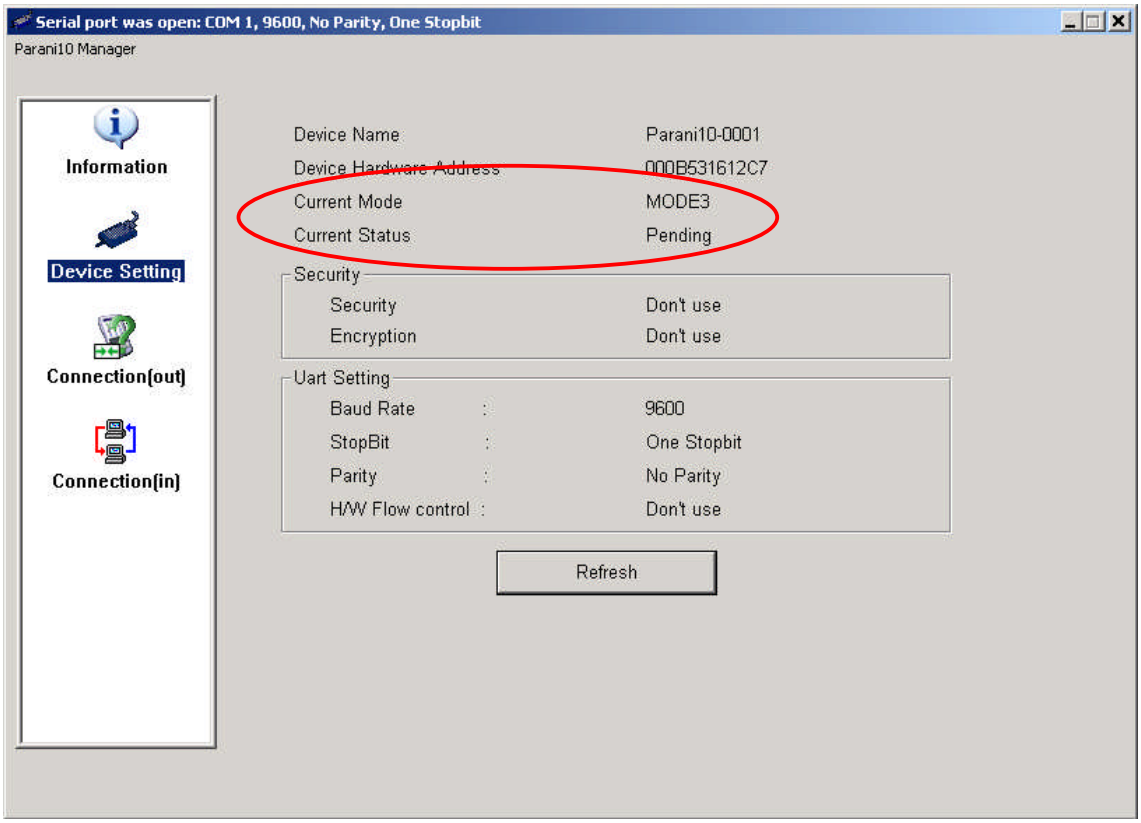


3) Press “Apply” button.

4) You will get Configuration has been applied message.



5) If you confirm, the page will show the current device **information** as in below.



6) Please CONFIRM that now the Parani10 is in MODE3 and PENDING status as displayed in the Red circle above. If the Parani10 is in STANBY status, connection WILL NOT be made.

7) At this stage, Parani10 is DICOVERABLE & CONNECTABLE MODE

Get your Bluetooth CF cards or USB adaptors connected to this Parani10 now. To finish connecting your Bluetooth devices to Parani10, open your COM port of Serial Communication program to verify communication status.