Appendix C2 client-server installation and utilization manuel

1 Bluetooth Gateway installation and Running manual

1.1 Introduction

This manual contains all the information needed to install, configure and run correctly the Bluetooth Gateway.

The goal of the Bluetooth Gateway is to make the link between the Bluetooth client and the HCS.

The Bluetooth Gateway has been programmed with Java J2SE version 5.0 but works with the version 1.4.2 of Java.

1.2 Installation of the Bluetooth Gateway

Pre-requisite to run Bluetooth Gateway

To run correctly, the Bluetooth Gateway must have the next system requisite:

Hardware:

- 1 connection through Internet.
- 1 Bluetooth dongle connected on your PC and correctly installed[1]

[1] *The Bluetooth Gateway has been tested and works with the BlueZ Bluetooth stack, WIDCOMM Bluetooth stack and Windows Bluetooth stack.*

Software:

- Java JDK 5.0, or 1.4.2
  (http://java.sun.com/j2se/1.5.0/download.jsp)
  (Oct. 2005)

- Avetana Bluetooth library[2]
  (http://www.avetana-gmbh.de/avetana-gmbh/produkte/Readme.xml)
  (Oct. 2005)

[2] *The Avetana library is not free. The cost to have full time license is 25 Euros for 3 Bluetooth dongle. If you do not want to pay for this library, the Bluetooth gateway also works with the Roccoco library using the Bluez Linux stack (only for Linux).*

Installing the Bluetooth Gateway on Windows:

- Put the SmartHome CD into your CD ROM driver, open a MS-DOS window and type:

```
cd c:\
mkdir c:\BTGateway
copy d:\java\BTGateway\ c:\BTGateway\
```

**it is supposed your CDROM driver is on d:*

1.3 Configuration of the Bluetooth Gateway

The HCS folder contains these files:

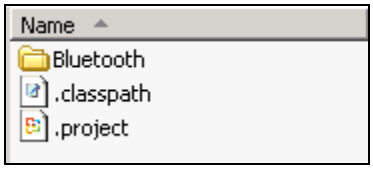
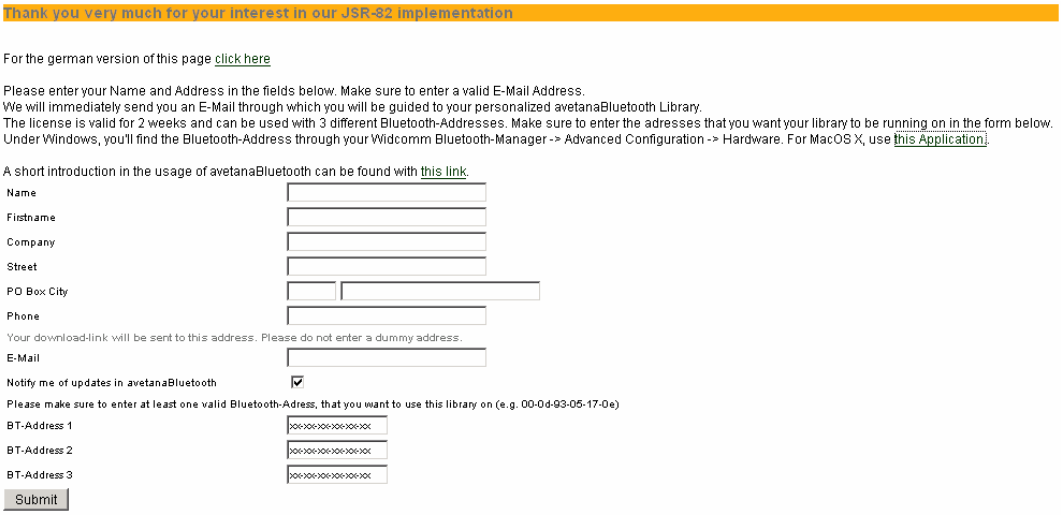


Figure 1 : BTGateway folder contains the class used by the Bluetooth Gateway

Step 1: Download, and set in your CLASSPATH the Avetana library

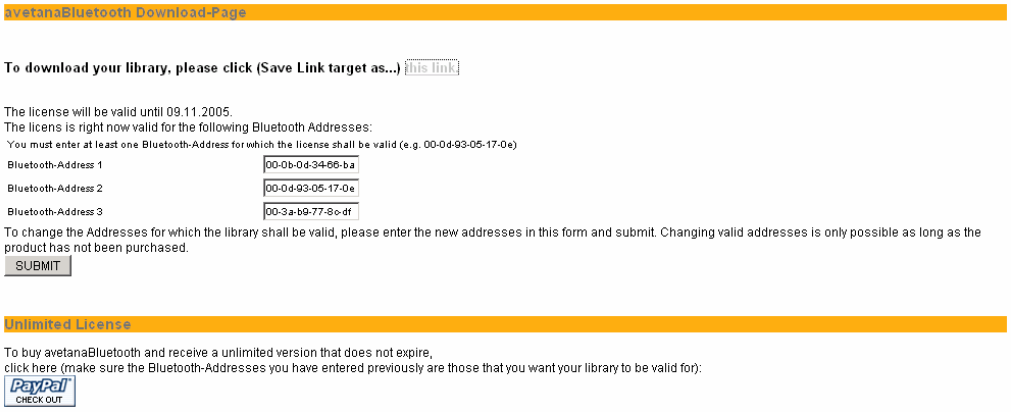
This step explains how to download Avetana and set the library into your CLASSPATH:

- Open your Internet Browser and go to the web site: (http://www.avetana-gmbh.de/avetana-gmbh/produkte/bestellung.eng.xml) (Nov 2005)

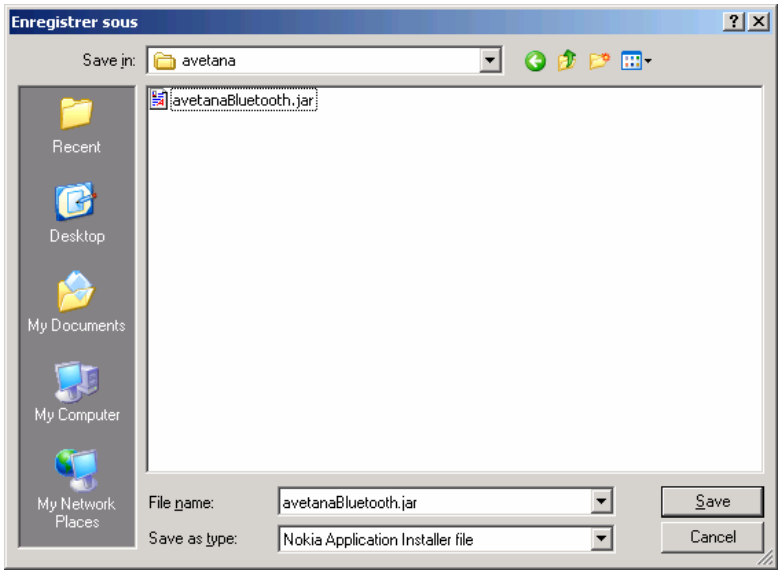


- You will have to complete a formulary and give the address of your Bluetooth dongle. (It is explained on website how to know the address of your BT dongle.)

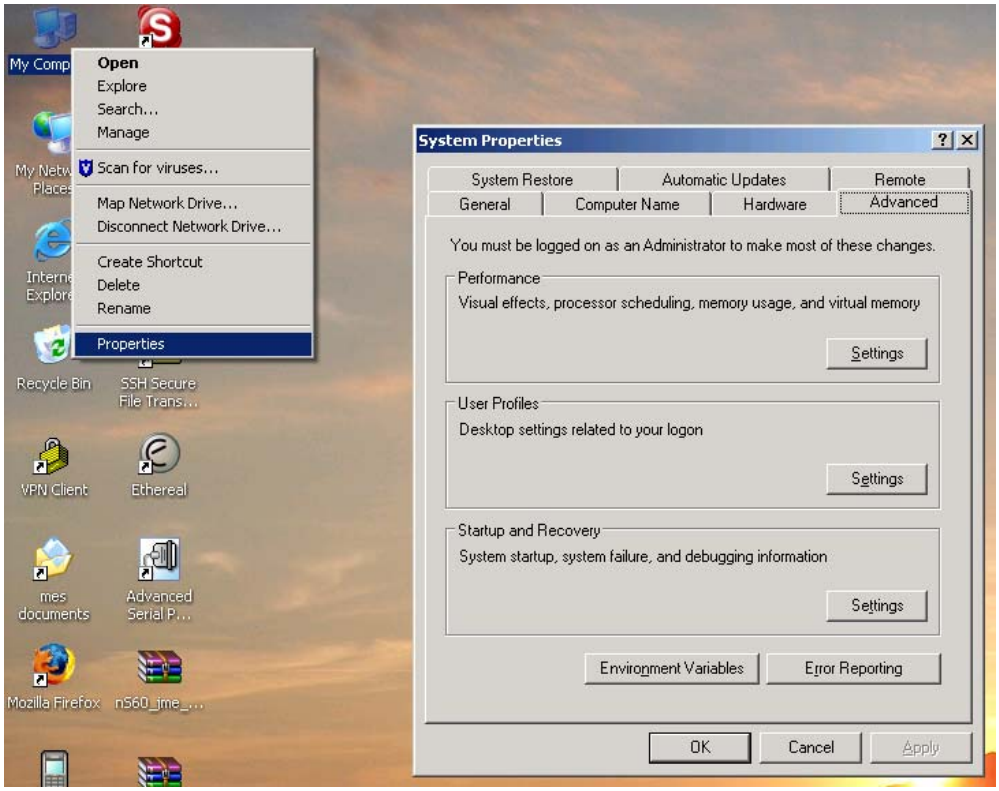
- You will receive a few minutes after complete registration, an email with a link where you can download your library.



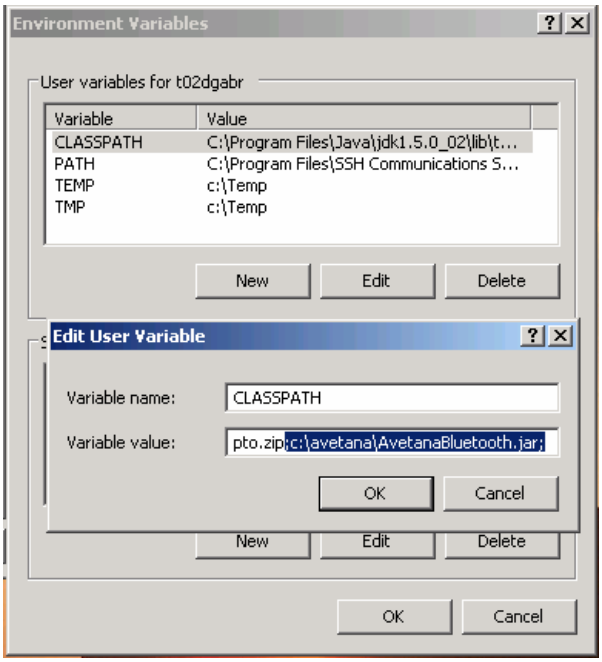
- Click on the link of the website and save the avetanaBluetooth.jar file under c:\avetana.



- Right-click on "My Computer" → Properties, tab Advanced, click on Environment variables.



- Edit the CLASSPATH user & system variables and add ;c:\avetana\avetanaBluetooth.jar;



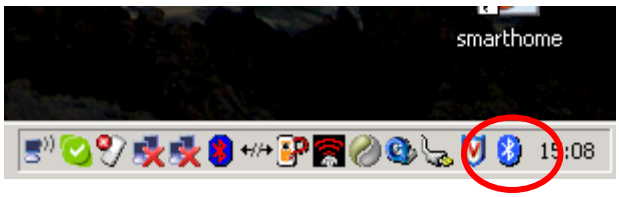
- Click OK.

Step 2: Change the friendly name of your Bluetooth device

Before running your Bluetooth your Bluetooth Gateway, you have to change the friendly name of your Bluetooth device, to permit to your Bluetooth client to find the Bluetooth service:

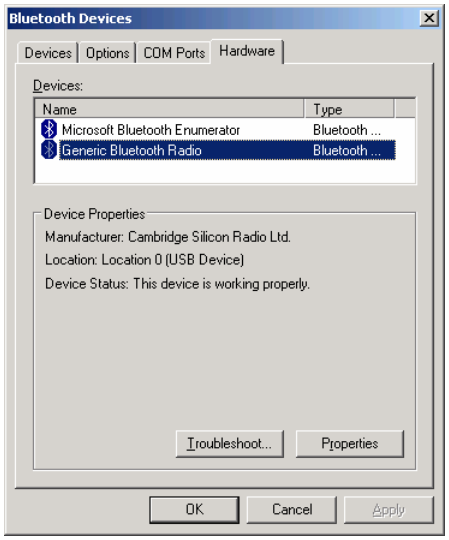
THESE EXPLANATIONS ARE GOOD ONLY FOR WINDOWS BLUETOOTH STACK!

- Plug your Bluetooth dongle on a free USB port of your PC
- A small blue icon should appear at the bottom right of your screen:

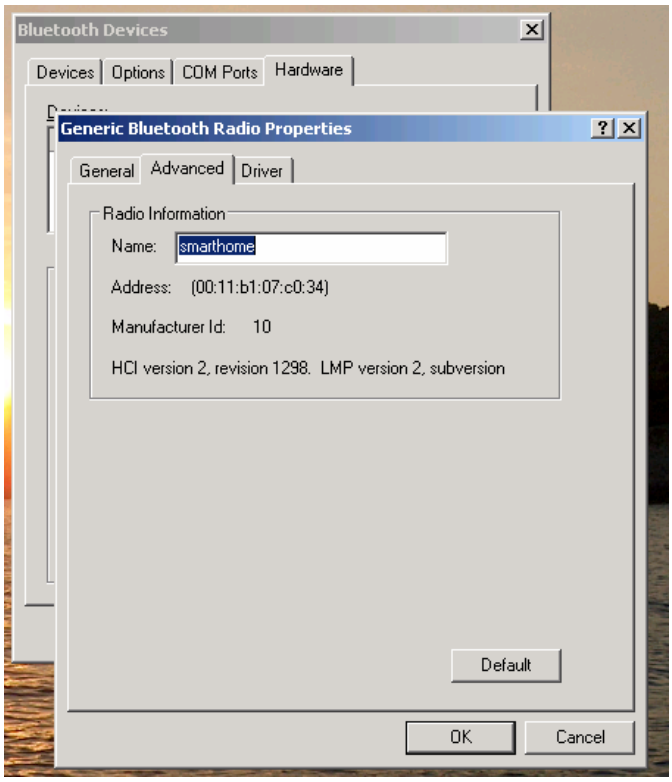


- Right click on it and choose "Open Bluetooth Settings":

- In the tab "Hardware" choose "Generic Bluetooth Radio" and click "Properties"



- In the tab "Advanced" change the friendly name of your Bluetooth device and rename it "smarthome"



- Now you can run your Bluetooth Gateway!

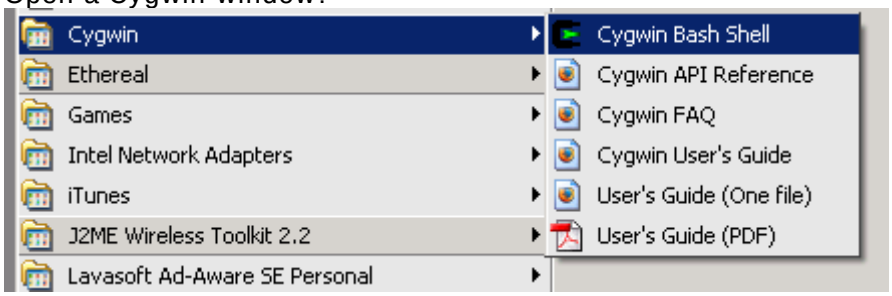
1.4 Running the Bluetooth Gateway

If your Bluetooth Gateway is running on the same PC or in the same subnet (same house) as your HCS, you must run the Bluetooth Gateway in **local mode**, so follow the instructions of chapter **4.1**.

If your Bluetooth Gateway is running anywhere else of the HCS (for example at work), you must run the Bluetooth Gateway in **remote mode**, so follow the instructions of chapter **4.2**.

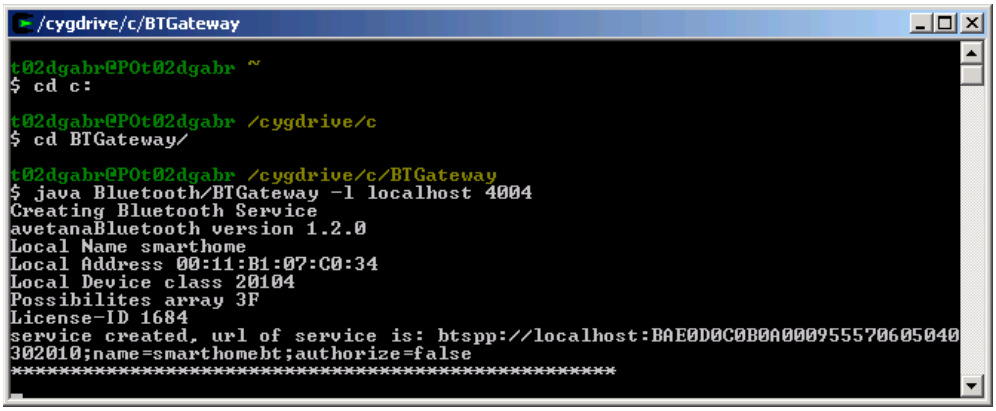
1.4.1 Running in local mode:

- Open a Cygwin window:



- Go to your Bluetooth Gateway folder and type:
  `java Bluetooth/BTGateway –l "address of HCS*" "port of HCS" :`

  **localhost if HCS is on the same PC as Bluetooth Gateway*

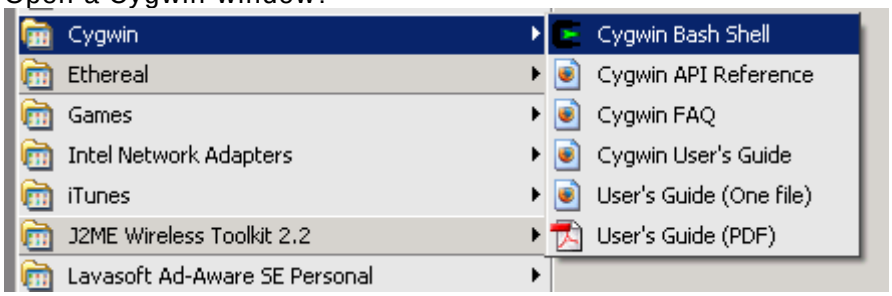


- If your Bluetooth Gateway runs successfully, you should see the same messages as the print screen above.

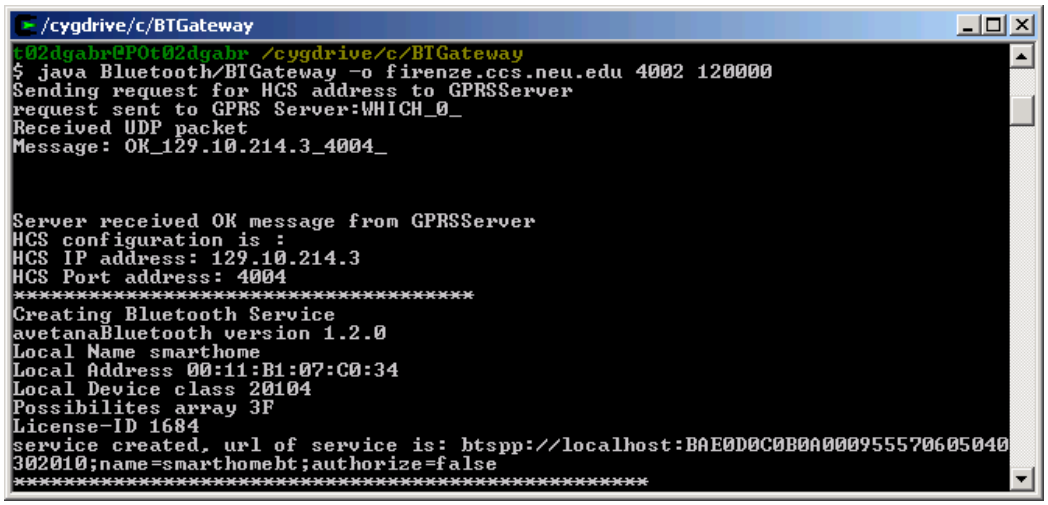
- Now your Bluetooth Gateway is ready to work!

1.4.2 Running in remote mode:

- Be sure the GPRS Server and the HCS are already running.
- Open a Cygwin window:



- Go to your Bluetooth Gateway folder and type:
  `java Bluetooth/BTGateway –o "GPRSServ addr" "GPRSServ prt" "time":`



"GPRSServ addr" is the address of the GPRS Server
"GPRSServ prt" is the port number of the GPRS Server
"time" is the time between two request to GPRS Server (in ms), the time recommended is 120000.

- If your Bluetooth Gateway runs successfully, you should see the same messages as the print screen above.

- Now your Bluetooth Gateway is ready to work!

2 GPRS Server installation and Running manual

2.1 Introduction

This manual contains all the information needed to install, configure and run correctly the GPRS Server.

The GPRS Server is usually situated outside the home of client and store the address where the HCS can be reached.

The GPRS Server has been programmed with Java J2SE version 5.0 but works with the version 1.4.2 of Java.

2.2 Installation of the GPRS Server

Pre-requisite to run the GPRS Server

To run correctly the GPRS Server, you must have the following hardware and software requisites:

Hardware:

- 1 connection through Internet with a fix public IP address.

Software:

- Windows XP, Service Pack 2
- Java SDK 1.4.2 or 5.0

Installing the GPRS Server on Windows:

- Put the SmartHome CD into your CD ROM driver, open a MS-DOS window and type:

```
cd c:\
mkdir c:\GPRSServer
copy d:\java\GPRSServer\ c:\GPRSServer\
```

**it is supposed your CDROM driver is on d:*

2.3 Configuration of the GPRS Server

The GPRS Server folder contains these files:

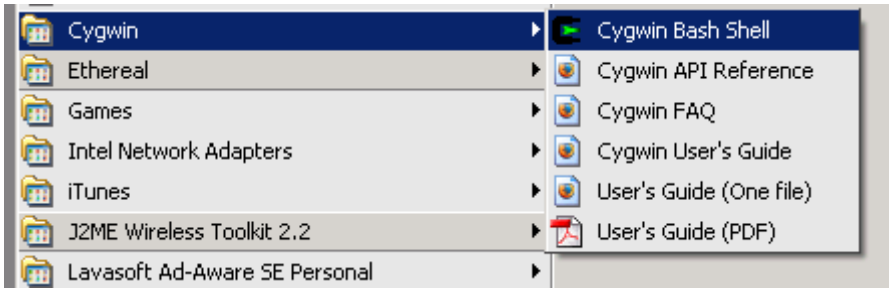
Figure 2 : GPRSServer folder contains the class used by GPRS Server

No special configuration is needed to run the GPRS Server.

2.4 Running the GPRS Server

To run the GPRSServer follow these steps:

- Open a Cygwin window:



- Go to your GPRS Server folder and type `java GPRSServer "port number"` :
  **"port number" is the number of port that your GPRS must wait for HCS or Client requests*

- If your server run correctly, you should see the message :

  "Socket created on port: …"
- Now your GPRS Server is ready to receive requests!

3 Installation and user manual for HCS

3.1 Introduction

This manual contains all the information needed to install, configure and run correctly the HCS.

The HCS (Home Control Server) is the "manager" of the Smart Home and is the interface between the clients and the sensor network.

The HCS has been programmed with Java J2SE version 5.0 but works with the version 1.4.2 of Java.

3.2 Installation of the HCS

Pre-requisite to run HCS

To run correctly, the HCS must have the following hardware and software requisites:

Hardware:
- 1 USB port to connect the HCS Mote.
- 1 connection through Internet.

Software:
- Windows XP, Service Pack 2
- The Moteiv Telos Tools CD v1.08 must be installed before running the HCS. For installation description please see the "tmote_install_guide.pdf" of SmartHome CD (folder references) and follow precisely the steps.

For people who do not want to install Moteiv Telos Tools CD (expert mode):

It is not necessary to install the complete Moteiv Telos tools. You can add manually the libraries needed and install manually the USB serial COM driver.

The libraries used by the HCS are:

- *Library Xerces version 1.4.4 (http://archive.apache.org/dist/xml/xerces-j/) (Xerces-J-bin.1.4.4.zip) (link verified on October 2005)*
- *Java communication API (http://java.sun.com/products/javacomm/index.jsp) (javacomm20-win32.zip) (link verified on October 2005)*

These libraries are also available in the CDROM in the folder "java/libraries"
Warning: do not forget to set these libraries into your CLASSPATH !!!!!

Installing the HCS on Windows:

When you have installed the Moteiv Telos Tools environment, you can copy the folder of HCS (HCServer) on your hard drive:

- Put the SmartHome CD into your CD ROM driver, open a MS-DOS window and type:

```
cd c:\
mkdir c:\HCServer
copy d:\java\HCServer\ c:\HCserver\
```

**it is supposed your CDROM driver is on d:*

Now you can configure your HCS…

3.3 Configuration of the HCS

The HCS folder contains these files:

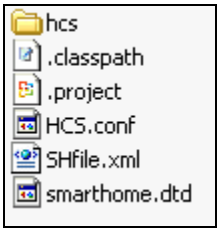
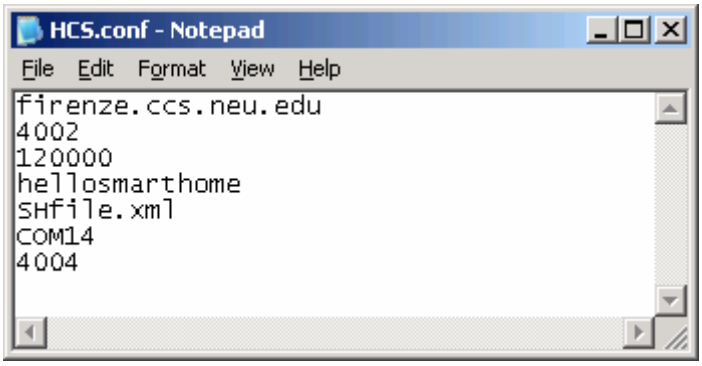


Figure 3 : HCS folder contains the class used by HCS

The parameters of your HCS are stored in the HCS.conf file. To change the parameters, open HCS.conf in the notepad (right-click, Edit).



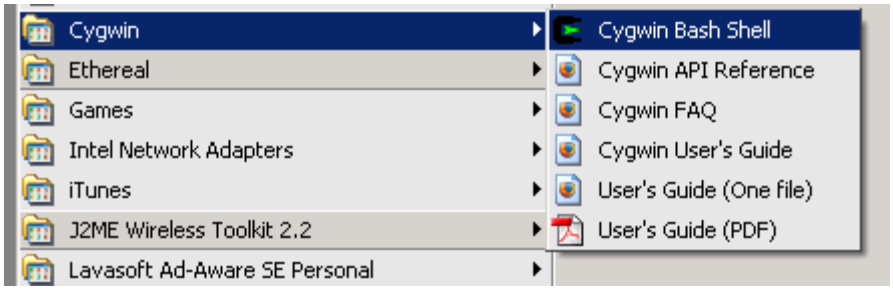
Set the configuration of your HCS in the HCS.conf file. Each line is a parameter for the HCS:

- Line 1 = address of GPRS Server (for example firenze.ccs.neu.edu)
- Line 2 = port number of GPRS Server
- Line 3 = time to re-register to GPRS Server in ms (2min by default)

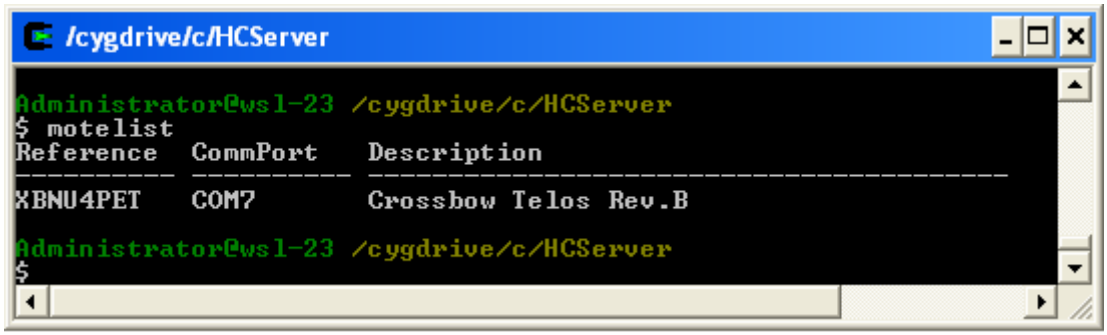
- Line 4 = pass phrase to authenticate message. (Must be the same as the client pass phrase set in Constants.class of the client MIDlet.)
- Line 5 = name of XML file (by default SHfile.xml)
- Line 6 = COM port where is connected the bridge Mote *
- Line 7 = port number used by the HCS (for the local BTGateway)

To know which COM port the HCS Mote uses:

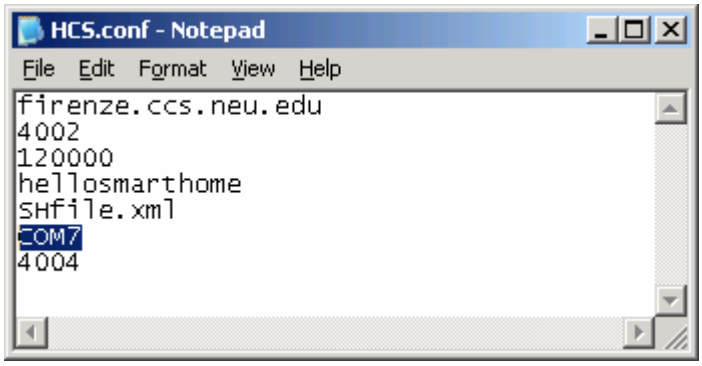
- Plug the HCS Mote on a free USB port.
- Open a new Cygwin window (Cygwin is installed when you install Telos Mote environment)



- Type the command motelist.



- Then you can change the COM port line in the HCS.conf file.



Write the configuration of your sensor network in the XML file

- Open the SHFile.xml with Wordpad or another XML file editor.
- You can configure your XML file using the same form as the example below.
  - Between the <smarthome> tags, you can place the tags for the rooms
  - Between the <room name=…> tags, you can place the tags for the motes
  - Between the <mote address=…> tags, you can place the list of sensor available on the mote.
  - Between the < sensorid number=…> tags, you can place the list of functions accepted by the sensor
  - Between the <function type=…> tags, you can place the value 00000000000000000000.

Example of valid XML file:

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<smarthome>
  <room name="kitchen">
    <mote address="2420000a">
      <sensorid number="14">
        <function type="46">30311234567890123456</function>
        <function type="47">3938ab13243546576879</function>
      </sensorid>
      <sensorid number="12">
        <function type="41">00000000000000000000</function>
      </sensorid>
    </mote>
    <mote address="2420000b">
      <sensorid number="17">
        <function type="41">30310000000000313031</function>
        <function type="42">fbfbfbfbfbfbfbfbfbfb</function>
      </sensorid>
    </mote>
  </room>
  <room name="bedroom">
    <mote address="2420000c">
      <sensorid number="11">
        <function type="41">00000000000000000000</function>
      </sensorid>
    </mote>
  </room>
</smarthome>
```

Name of the room

Address of the Mote

Sensor ID code

Sensor CMD code

List of room names supported by the SmartHome MIDlet:

The SmartHome MIDlet support all name of rooms, but can display a logo only for these room names:

Room name in the XML file	Logo displayed on the MIDlet
babyroom	
bathroom	
bedroom	
kitchen	

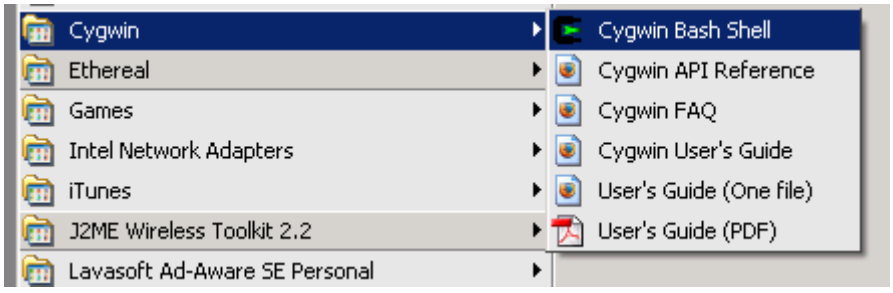
Table of the sensor ID's supported by the SmartHome MIDlet and their functions.

Sensor ID description	Sensor ID number	Command (function) supported by the sensor	function number
Temperature	11	READ	41
Infrared	12	WRITE	42
		STATUS	43
Switch n°1	14	ON	46
		OFF	47
Switch n°2	15	ON	46
		OFF	47
Dimmer	16	ON	46
		OFF	47
Motor	17	WRITE	42
Monitoring	18	PACKET	48
		BATTERY	49

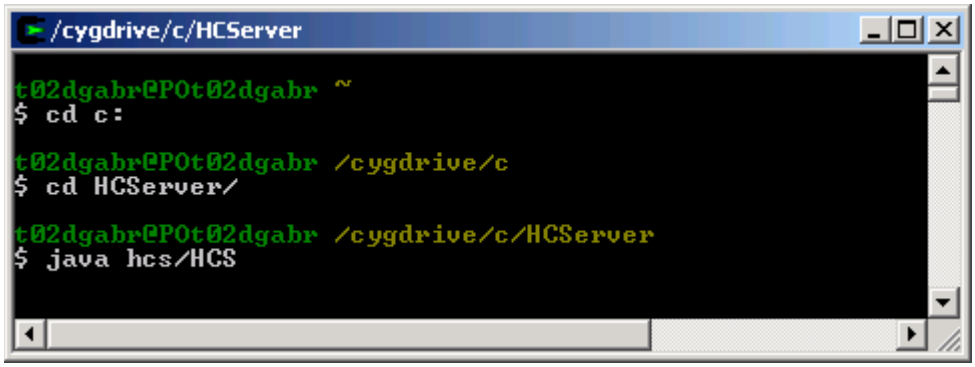
3.4 Running the HCS

To run the HCS follow these steps:

- Before starting the HCS, be sure your GPRS Server is already running.
- Open a Cygwin window:

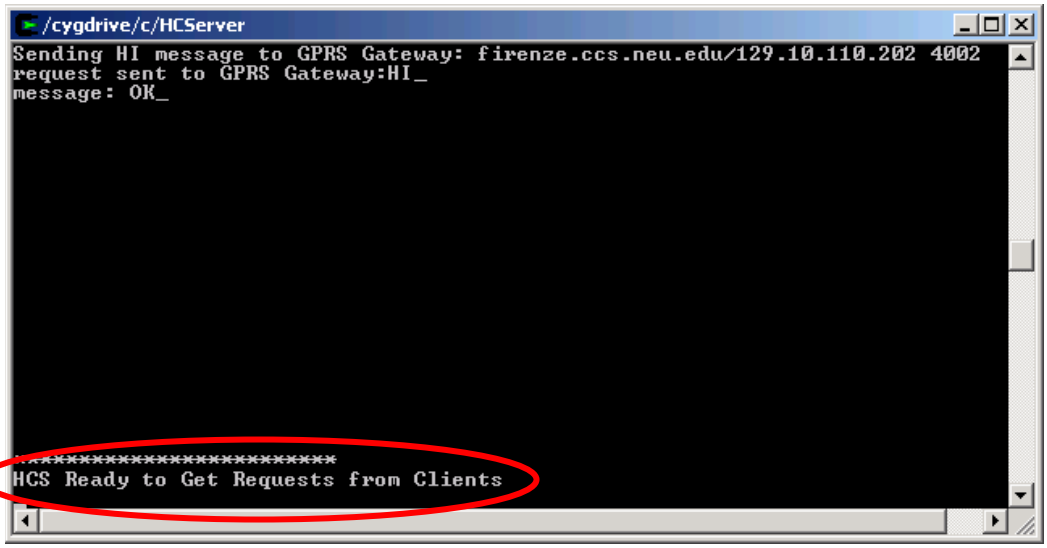


- Type in the Cygwin window:

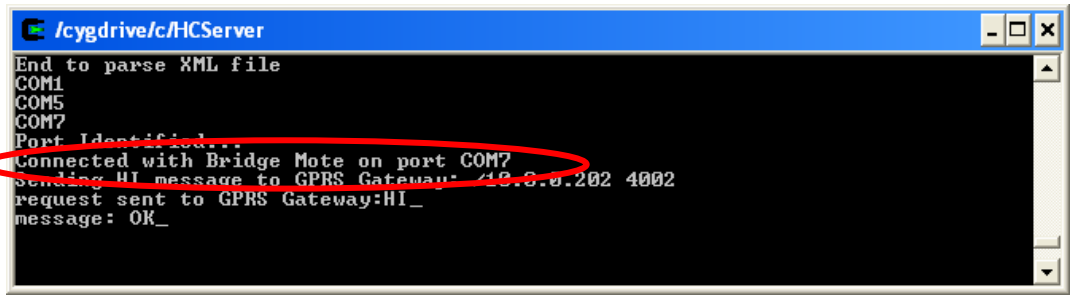


- Now your HCS is running!

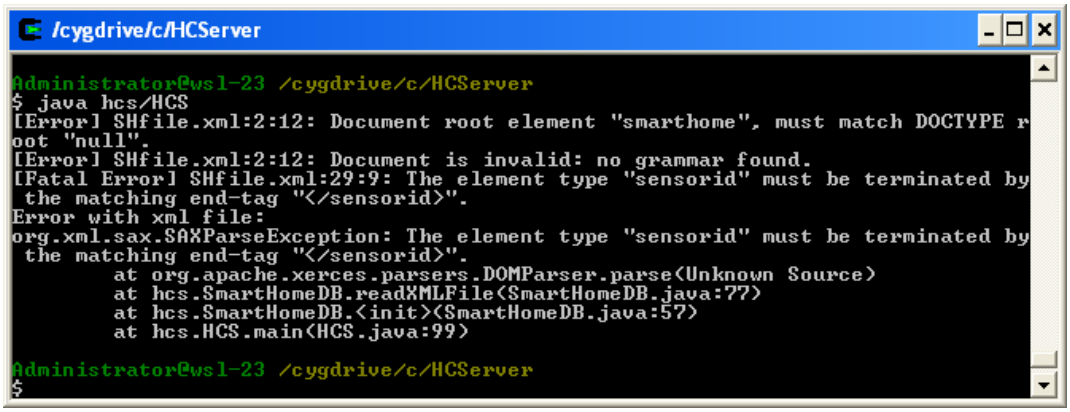
- Control that your HCS is ready to receive request from client:



- You also have to control that the HCS has found the HCS Mote on the configured COM port.



- If your XML is not accepted by the parser, you will see an error when you start the HCS:



4 Client MIDlet installation and running manual

4.1 Introduction

This manual contains all the information needed to install and use correctly the client MIDlet to manage your SmartHome.

With the client MIDlet, you can have a hierarchic view of your SmartHome and interact directly on the Mote network.

The client MIDlet for SmartHome has been programmed with Java J2ME and has been fully tested on Nokia 6620.

4.2 Installation of the MIDlet on a Nokia 6620

4.2.1 Pre-requisite to run the client MIDlet for SmartHome

- The client MIDlet should run on all MIDP2.0 CLDC1.0 phone having JSR82. But the application has only been tested on a Nokia.

  It is only guaranteed that the client MIDlet run correctly on the Nokia 6620! Some tests have demonstrated potential problem with Bluetooth connection on a Sony Ericsson P910 cell phone.

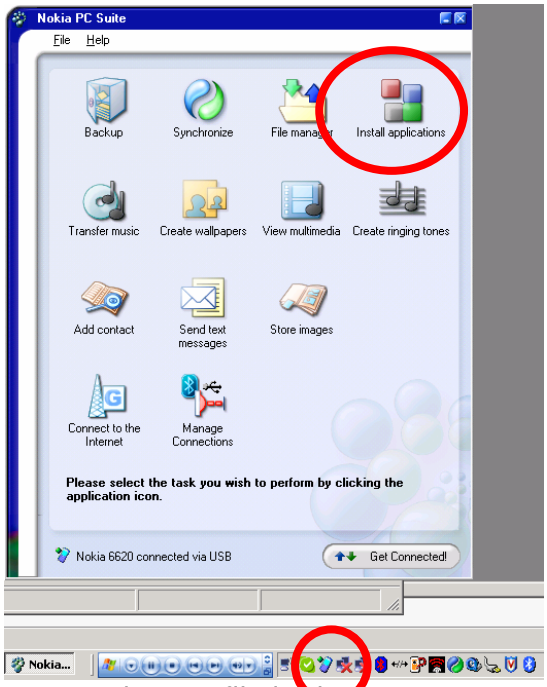
- The PC Suite for Nokia must be installed on your PC. The installation CD should be send with Nokia. If not, you can download the PC Suite on the Nokia website on :
  (http://www.nokia.ch/french/support/pc_suite/download.html) (Nov 2005)

- Before starting your client MIDlet for your SmartHome, be sure that the HCS, the Bluetooth Gateway, the GPRS server are already running!

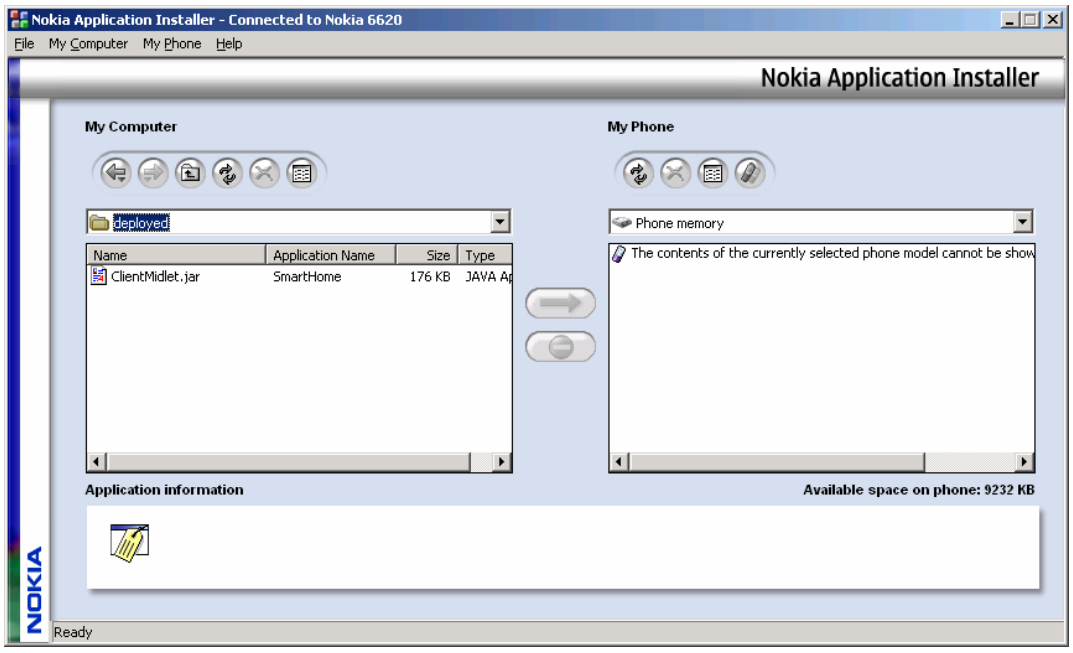
4.2.2 Installing the client MIDlet on the Nokia 6620

- Connect your phone to your PC, with a cable, Bluetooth or IR.
  Note: if you download your application with Bluetooth, reboot your phone before using the client SmartHome MIDlet.

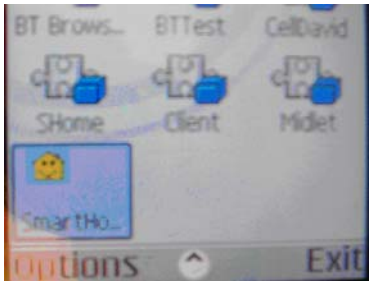
- Open your PC Suite with the small icon at the right bottom of your screen and choose Install Application.



- Browse the JAR file in the SmartHome CD:
  d:\java\ClientMidlet\deployed\ClientMidlet.jar (if d:\ is your CDROM driver)



- Click on the spear and finish the installation on the MIDlet.
- If the MIDlet has been successfully installed you should see the SmartHome icon in the list of your applications.

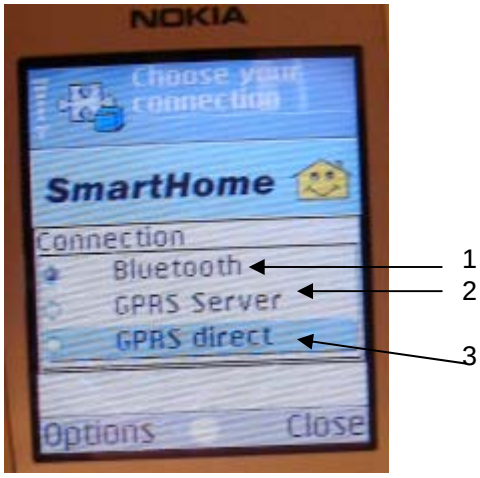


- Now you can run the SmarHome application!

4.3 Utilization guide of client MIDlet for SmartHome

Now you are ready to use the client MIDlet for SmartHome.

- Start the SmartHome MIDlet
- You will see a menu to choose which connection you want to use. You have the choice between three options:
  1. Bluetooth
  2. GPRS direct (entering manually the address of GPRS Server)
  3. GPRS Server (the MIDlet will send a request to GPRS Server to ask the address of HCS)

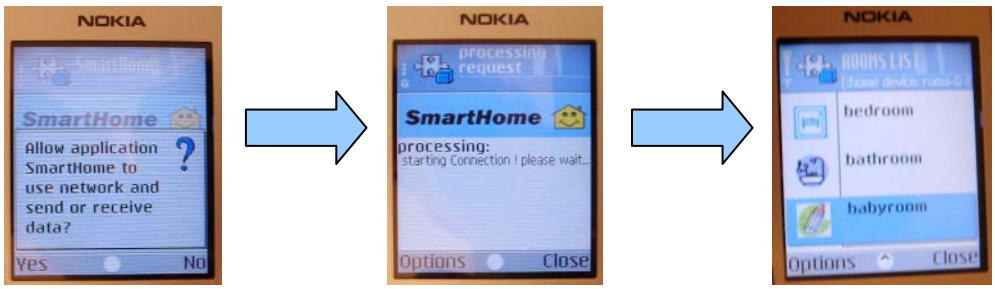


If you choose Bluetooth, you can change the friendly name of the Bluetooth device you want to search in the menu Options→options. Choose back in the Options menu and continue.

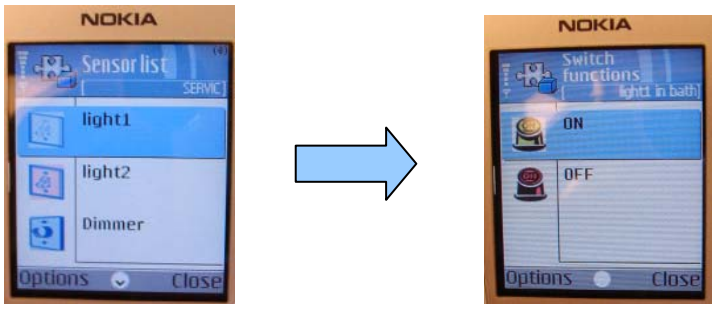
If you choose GPRS Direct, you will have to give the address and port number used by your HCS. Then choose connection in the menu Options to continue.

If you choose GPRS Server, the MIDlet will automatically ask the address of HCS to the GPRS Server.

- Once the MIDlet is connected, a request will be sent automatically to the HCS to know the list of rooms



- You can then browse the SmartHome to know which sensors are available for all the rooms. And for each sensor, you can enter in the menu to send command or make a measure (depending of the sensor you have chosen).



- Now you are ready to try the client MIDlet for SmartHome, enjoy!

5 Monitoring tool installation and running manual

5.1 Introduction

This manual contains all the information needed to install and use correctly the monitoring tool.

The monitoring tool is a Java application that sends requests to HCS (and then to the Motes) to obtain information about each Mote of the network.

The information that can obtain the monitoring tool is the number of packets received and sent and the level of each Motes.

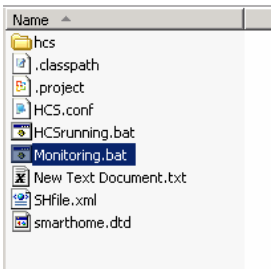
5.2 Installation of the monitoring tool

The application tool does not use special libraries and do not need to have special requirement and is installed in same time as the HCS.

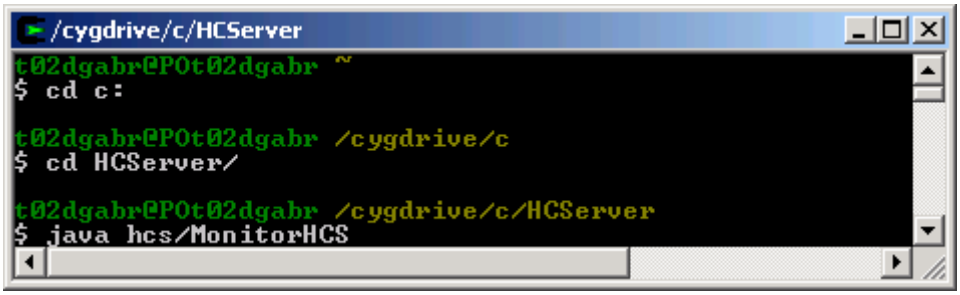
5.3 Utilization of the monitoring tool

- Be sure that the Mote sensor network is working
- Be sure that the HCS is running and the HCS Mote is correctly connected to the HCS.
- You have two possibilities to run the HCS monitoring tool:

    1. You can click on the file : Monitoring.bat situated in the folder of your HCS:

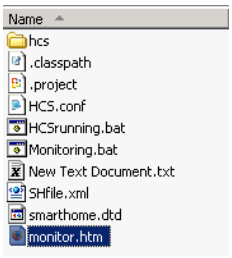


2. Or open a Cygwin window and type :



- The Monitoring tool will send requests to know first the list of Motes and then to have information for each Mote about the number of packets sent and received and the level of the battery of each Motes.

- When the monitoring is finished (after ~10sec depending of the number of Motes in the network) the result is written in the **monitoring.html** situated in the folder of the HCS. The file can be displayed with a web browser.



- You can see below the result of a monitoring on a web browser