



# Getting Started

**Bluetooth Application and Training Tool Kit  
LZT 108 4123 R1A**



## History

Date	Issue	Comments
Wednesday, 21st June, 2000	1.0	Creation of this document

THE INFORMATION OF THIS "**Getting Started - Bluetooth Application and Training Tool Kit**" IS PROVIDED AS IS AND ERICSSON MAKES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, WHETHER EXPRESS OR IMPLIED, FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREIN. IN NO EVENT SHALL ERICSSON BE LIABLE FOR ANY CONSEQUENCES ARISING FROM THE USE OF THIS INFORMATION NOR FOR ANY INFRINGEMENT OF PATENTS OR OTHER INTELLECTUAL PROPERTY RIGHTS OF THIRD PARTIES WHICH MAY RESULT FROM THE USE. NO LICENSE IS GRANTED BY IMPLICATION OR OTHERWISE UNDER ANY INTELLECTUAL PROPERTY RIGHTS OF ERICSSON.

ALL RIGHTS RESERVED. NO PART OF THIS DOCUMENT MAY BE REPRODUCED IN ANY FORM WITHOUT THE WRITTEN PERMISSION OF THE COPYRIGHT HOLDER. THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.

LZT 108 4123 R1A

© Ericsson Mobile Communications AB, 2000

## CONTENTS

<b>1. LICENSE FOR THE BLUETOOTH APPLICATION AND TRAINING TOOL KIT FROM ERICSSON .....</b>	<b>1</b>
1.1 LICENSE AGREEMENT FOR THE SOFTWARE AND THE DOCUMENTATION .....	1
<b>2. GENERAL .....</b>	<b>2</b>
2.1 INTRODUCTION .....	2
2.2 HOST PLATFORMS.....	2
2.3 SUPPORT .....	2
<b>3. PACKAGE CONTENTS .....</b>	<b>3</b>
3.1 MAIN COMPONENTS.....	3
3.2 OVERHEAD PRESENTATIONS .....	3
3.3 BLUETOOTH WEBLEARN PROGRAM .....	4
<b>4. CIRCUIT BOARD DESCRIPTION .....</b>	<b>5</b>
<b>5. BLUETOOTH PC REFERENCE STACK .....</b>	<b>6</b>
<b>6. BLUETOOTH PC REFERENCE STACK APPLICATIONS .....</b>	<b>7</b>
6.1 SOFTWARE CONTENTS .....	7
<b>7. TO RUN THE BLUETOOTH PC REFERENCE STACK.....</b>	<b>8</b>
7.1 USB DRIVER INSTALLATION.....	8
7.2 COM SERVER .....	10
7.3 SAMPLE APPLICATIONS .....	10
7.4 THE SOURCE CODE OF THE SAMPLE APPLICATIONS .....	16



# 1. License for the Bluetooth Application and Training Tool Kit from Ericsson

**Warning:** Ericsson Mobile Communications is willing to license the enclosed software and documentation to you only upon the condition that you accept all of the terms contained in the license agreement described below. Opening the package with the CD-ROM will indicate your assent to the terms. If you don't agree to these terms, then Ericsson Mobile Communications is unwilling to license the software and documentation to you, in which event you should return this complete package with all original materials and the package with the CD-ROM.

## 1.1 License agreement for the Software and the Documentation

Both the Software and the Documentation are protected under applicable copyright laws, international treaty provisions, and trade secret statutes of the various states. This Agreement grants you a limited, nonexclusive, non-transferable license to use the Software and the Documentation. This is not an agreement for the sale of the software or the documentation or any copies or part thereof. Your right to use the Software and the Documentation is limited to the terms and conditions described herein.

A single license to use the Software and the Documentation is included in every Tool Kit.

You may use the Software and the Documentation solely for your own personal or internal purposes, for no remunerated demonstrations (but not for delivery or sale) in connection with your personal or internal purpose, and you may make copies of the Software solely for archival purposes, provided you reproduce and include the copyright notice on any backup copy.

Ericsson Mobile Communications reserves all rights not expressly granted to you by this License Agreement. The license granted herein is limited solely to the uses specified above and, without limiting the generality of the foregoing, you are NOT licensed to use or to copy all or any part of the Software or the Documentation in connection with the sale, resale, license, or other for-profit personal or commercial reproduction or commercial distribution or computer programs or other materials without the prior written consent of Ericsson Mobile Communications.

Ericsson Mobile Communications' licensors do not warrant the Software, do not assume any liability regarding the Software or the Documentation.

Without prejudice to any other rights, Ericsson Mobile Communications may terminate this license if you fail to comply with the terms and conditions of this Agreement. If this license is terminated, you agree to destroy all copies of the Software and Documentation in your possession.

This License agreement shall be governed by Swedish law, and shall insure to the benefit of Ericsson Mobile Communications, its successors, representatives, and assigns. If any provisions of this Agreement shall be held to be invalid, illegal or unenforceable, the validity, legality, and enforceability of the remaining provisions shall in no way be effected or impaired thereby.



## **2. General**

### **2.1 Introduction**

The Tool Kit is a product for development and/or demonstration purpose only and it has not been qualified to the Bluetooth specification. Qualification for the Tool Kit is based upon a declaration of compliance with the Bluetooth Specification 1.0B and Brand Book.

The Bluetooth device on the Tool Kit is an engineering sample with no guaranteed specifications.

On this version of the PC Host Reference Stack, only USB communication is implemented as the HCI transport layer. The supply current for the Bluetooth Module is through the USB cable.

However, also the UART transport layer is supported by the Bluetooth Module, which means that you can send HCI commands between the host PC and the Tool Kit (with another host software) through two UARTS. In this case the communication is assumed to be free from line errors. RTS/CTS flow control has to be used. The first decoded HCI command received by the Bluetooth module through either of the USB or UART ports determines which port to be selected. The other one is switched off, until next hardware reset.

Source code supplied with the Tool Kit should be seen as an example with no warranties regarding fitness for any particular purpose.

### **2.2 Host platforms**

The PC Host Reference Stack requires Win 98 (ed. 2) or 2000 environment because of the USB support.

This version of the Bluetooth Module requires a PC hardware with the Intel USB Universal Host Controller. To check how the PC is equipped, right-click My Computer and find the System Properties window under properties (Win 98). Select Device Manager and look under Universal Serial Bus Controllers.

### **2.3 Support**

Sigma ComTec AB  
Stortorget 9  
SE-211 22 Malmö

E-mail: [info@comtec.sigma.se](mailto:info@comtec.sigma.se)  
Internet: <http://www.comtec.sigma.se>



### 3. Package Contents

#### 3.1 Main components

- Tool Kit board with connectors for USB and RS232
- Complete with Bluetooth Module and on board inverted-F antenna.
- Type A to Type B USB Cable
- 9 way female to female RS232 cable
- RS232 cable adapter
- CD\_ROM including:
  - A PC ported executable of the Bluetooth Reference Host Stack with a few demo applications. This software contains selected higher layers of the Bluetooth protocol stack (HCI-Driver, L2CAP, SDP and RFCOMM), together with a uniform interface and some sample applications. It allows the user to focus on the application level and system aspects of his Bluetooth solution.
  - Bluetooth USB driver
  - Documentation of the application software interface.
  - Datasheet of the Bluetooth Module
  - Overhead presentations
  - Bluetooth Specification
  - Bluetooth Web-learn program information

#### 3.2 Overhead presentations

A general Bluetooth presentation suite is available on the CD. All files are in PDF format except the “agenda” which is in PowerPoint format. The agenda has links to all the provided PDF files.

All presentation files are stored on the CD in the directory “Bluetooth Presentations”

The following files/presentations are provided:

- Agenda (PowerPoint)
- Introduction (PDF)
- Architecture overview (PDF)
- Profiles (PDF)
- Qualification (PDF)
- Radio and baseband (PDF)



- Security (PDF)
- Software (PDF)
- Bluetooth building blocks (PDF)

For additional Bluetooth information, please visit <http://bluetooth.ericsson.se>

### **3.3 Bluetooth Weblearn Program**

#### ***Bluetooth, a Technical Introduction***

The Bluetooth Application and Training Tool Kit allows you to access the Bluetooth weblearn program.

This course provides a technical overview and a comprehensive introduction to Bluetooth - the universal radio interface in the 2.4 GHz frequency band that enables portable electronic devices to connect and communicate wirelessly via short-range, ad hoc networks.

#### *Contents:*

- Course Introduction
- Technical Features & Architecture
- Topology
- Physical Channels and Links
- Packet Formats and Packet Types
- Logical Channels
- Timing & Synchronisation
- Access Procedures
- System Operation
- Security
- Course Summary
- Course Quiz

Note: You need the Macromedia Flash 3 plugin to take this course. You can download it at: <http://www.macromedia.com/shockwave/download>

Please use the username and password at the back of this document to get access to the course.

## 4. Circuit board description

The hardware consists of a two-layer printed circuit board equipped with a UART buffer, a voltage regulator, a few passive components and the Bluetooth Module of Ericsson. This Bluetooth Module includes the Ericsson Baseband device, a Flash Memory and the Ericsson Radio Module device.

For technical details of the Bluetooth Module please look in the datasheet rok101007.pdf included on the Tool Kit CD.

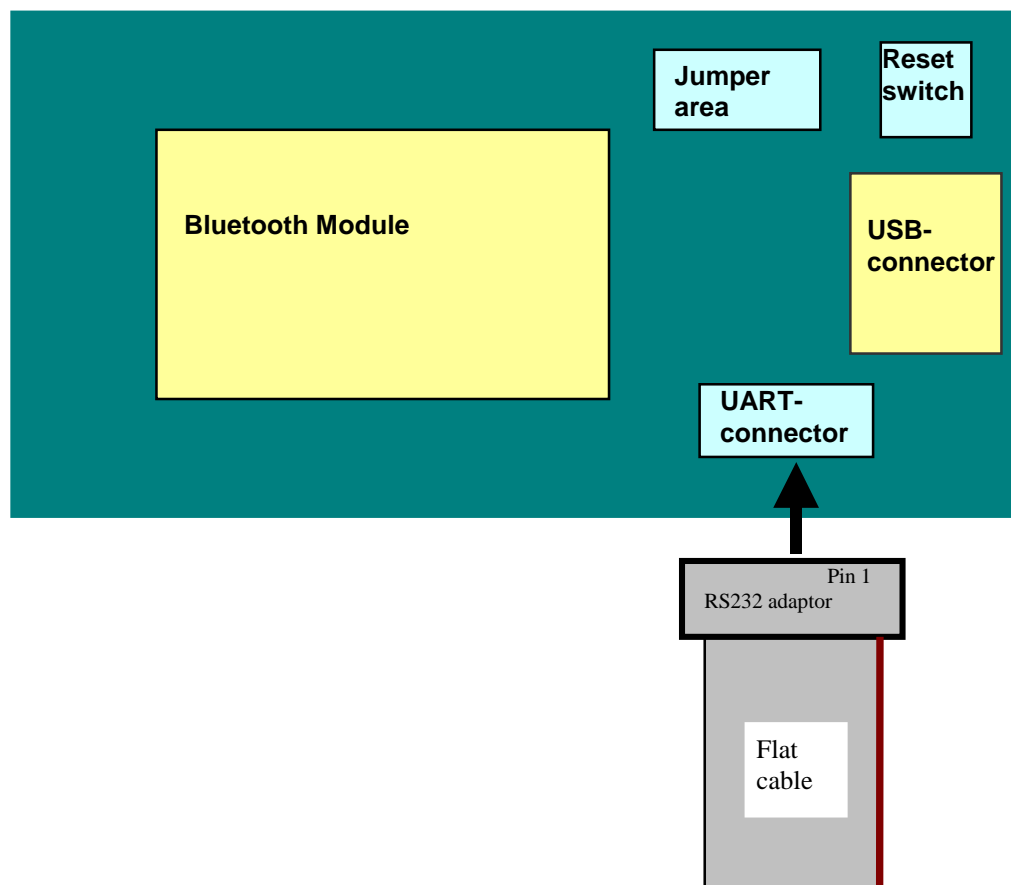


Figure 2: The Tool Kit circuit board

To make easy access possible to certain signals, a jumper area is included on the Tool Kit. The jumper area is listed in the table below. Note that pin 1 is at the edge of the board next to the reset switch.

2 PCM_CLK	4 PCM_SYNK	6 VCC 3.3V	8 DETACH	10 GROUND
1 Vin 5V nom	3 WAKE_UP	5 PCM_OUT	7 PCM_IN	9 RESET



## 5. Bluetooth PC Reference Stack

The Bluetooth PC Reference Stack is a PC ported version of the Bluetooth Host Stack, which is a software component developed by Ericsson to enable local wireless connections between devices such as mobile computers, handheld units, mobile phones, LAN access points, digital cameras headsets etc. This Bluetooth Host Stack is independent of operating system and hardware.

The Bluetooth PC Reference Stack communicates with the Bluetooth Module from Ericsson via the HCI interface, which is standardized by the Bluetooth Special Interest Group.

The Bluetooth Host Stack complies with the Bluetooth Specification and will be used in many Ericsson products.

Documentation of the interface and the functionality provided by the Bluetooth PC Reference Stack and the set-up procedure is included in the separate document "BT PC Ref UsersManual.pdf".



## **6. Bluetooth PC Reference Stack Applications**

There are two sample applications with source code on the Tool Kit CD. The source code is designed to work with Microsoft Visual C++. It has only been tested with version 6.0. If you are using a different compiler like an older version of MS Visual C++ or another compiler you have to notice that some parameters have to be changed to compile correctly.

How to use the Bluetooth PC Reference Stack applications is explained in the next chapter. The progress through the chapter will be explanations in a 'step by step' manner on how to set-up, configure a pair of devices and run the sample applications.

### **6.1 Software contents**

- A sample application that demonstrates connect/disconnect of a headset profile.
- The source code of the connect/disconnect sample application.
- A sample application that demonstrates a chat application.
- The source code of the chat sample application.
- COM server that includes the Bluetooth PC Reference Stack

## 7. To run the Bluetooth PC Reference Stack

### 7.1 USB driver installation

After installing the Tool Kit software in a suitable directory, the USB driver has to be installed.

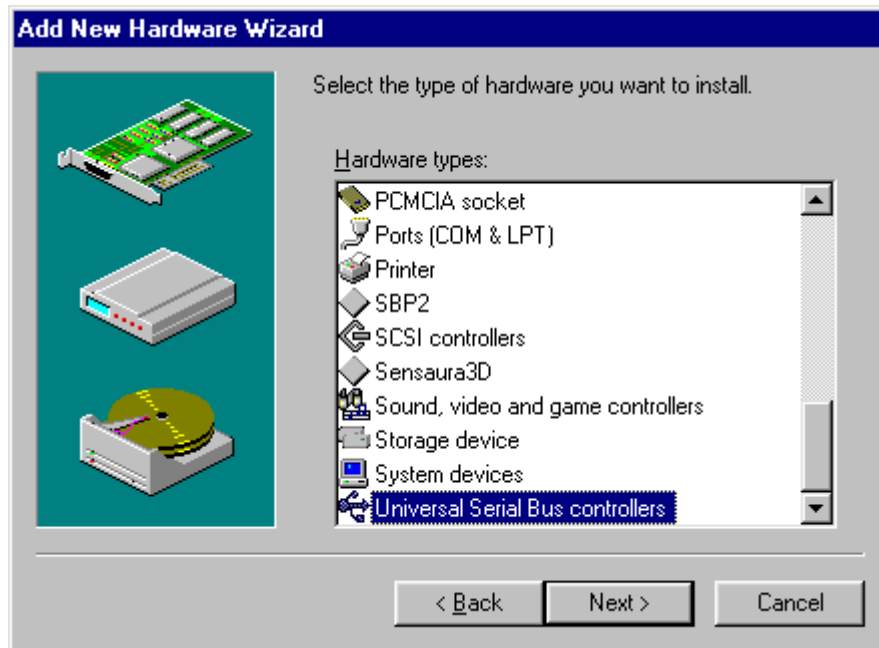
There are basically two ways to install the USB driver:

- Connect the Tool Kit to the USB port of the computer. The operating system will start the Add New Hardware Wizard (The factory installed jumper between pin 8 and 10 on the board JP2 is necessary).
- Go to the Control Panel and select Add New Hardware.

Follow the instructions of the wizard. Select “No, I want to select the hardware from a list”.



Select Universal Serial Bus Controllers:



Select Have Disk:



Enter the path to the driver files ebtusb.sys and ebtusb.inf in your Bluetooth Toolkit directory. Press OK.....

....and the new driver will appear:

Press Next and Finish and the driver should be installed.



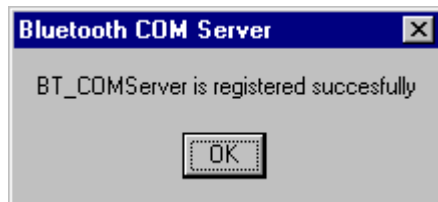
The driver should be loaded by the operating system when the Tool Kit is connected to the computer's USB port. The driver should be found under Universal Serial Bus Controllers in the Device manager (Win 98).

### 7.1.1 USB driver warning

The USB cable should not be unplugged and the reset button for the Bluetooth Module should not be pressed when a program is using the USB port, otherwise you may have to reboot your PC.

## 7.2 COM Server

This program is automatically installed. You will see the dialog box below when you run "<bt-executables path>**Bt\_comserver.exe /RegServer**".



When you type "<bt-executables path>**Bt\_comserver.exe /UnRegServer**", the following dialog will appear



NOTE! If the BT\_COMServer.exe crashes, you have to reset your Bluetooth device by pushing the reset button on the device before a new attempt to connect. You should also restart the applications to be sure that they run properly. In BT\_Chat, BT\_ChatServer.exe is hidden during the connection procedure so you'll have to use Task Manager.

## 7.3 Sample applications

There are two sample applications provided with the CD-ROM. One is BT\_TestSample and the other is BT\_Chat. These applications are clients to COM Server application (BT\_COMServer.exe). Please refer to the COM technology for extensive explanations of COM environment. Both applications utilize client/server solution when they demonstrate a Bluetooth communication connection. Before running any application you have to be sure you have already set-up the environment properly and that you use two computers, each connected to it's own Bluetooth device.



NOTE! You can't use a shared folder to run both client and server applications on the same COMServer.exe. They have to run on different computers, because the COM Server does not support multipoint connections.

## The Test Sample

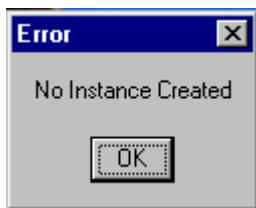
The Test Sample application demonstrates a connection between a Bluetooth master device and a slave Bluetooth device. The connection makes use of a headset profile. The application connects and disconnects repeatedly with a few seconds cycle time. The BT\_TestSample has three parts, the BT\_TestSampleSecurity, the BT\_TestSampleServer and the BT\_TestSampleClient.

### 7.3.1.1 How to run BT\_TestSample

Follow these steps:

Make sure that the Com Server and the Bluetooth device is set-up correctly. Simply start BT\_TestSampleSecurity.exe on both computers.

If a dialog looking like the one below appears then the COMServer.exe isn't registered.



To take care of this problem you have to:

Check in the task manager for a process called BT\_COM~1.exe or BT\_COMServer.exe and end the process.

Hardware reset the Bluetooth device

Run "<bt-executables path>**Bt\_comserver.exe /RegServer**"

If you see the dialog below,



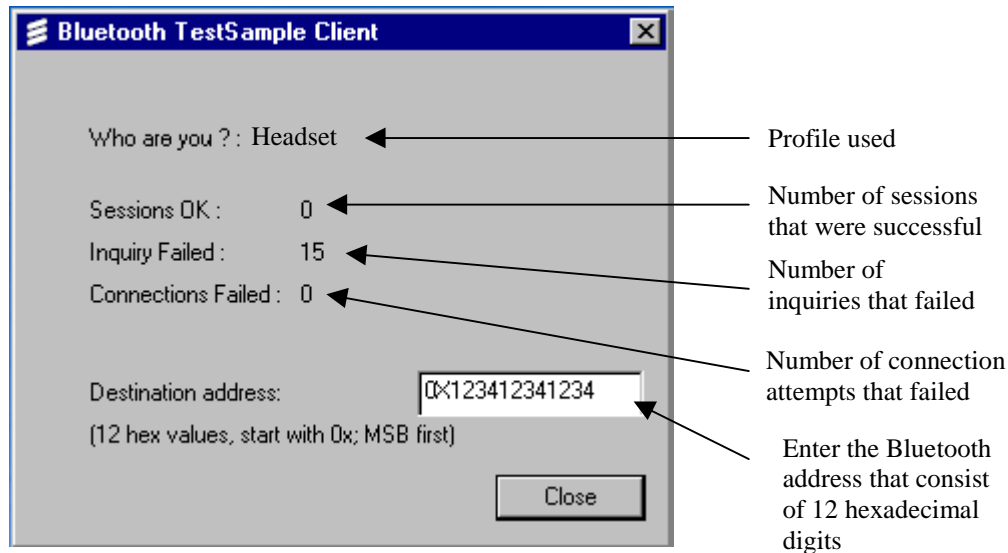
you have to restart BT\_TestSampleSecurity.exe on both computers.

Finally you start BT\_TestSampleServer.exe on one of the computers and on the other you start BT\_TestSampleClient.exe.

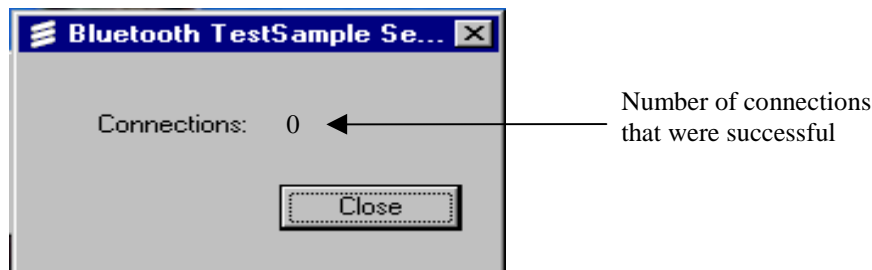
### 7.3.1.2 What does BT\_TestSample demonstrate?

BT\_TestSample demonstrates a connection between two Bluetooth devices communicating on a radio channel that is configured with a headset profile. It opens and closes the channel repeatedly.

The graphical user interfaces (GUI) is kept simple and shows only the necessary parameters to view the connection attempts that is made between the both devices.



Below you can see the GUI of both BT\_TestSampleClient and BT\_TestSampleServer.



When the channel opens the following happens:

1. BT\_TestSampleClient sends an inquiry with the destination device address typed in the edit box.
2. If it discovers the device that was inquired, it asks the server what kind of profiles are offered. In this case there is only the headset profile available.
3. After that the client acquires the profile through SDP-stack services.
4. The information that was fetched is used to configure a common communication channel using RFCOMM-stack
5. Then some packets of voice data are exchanged. Finally it disconnects.

The steps 1 to 5 are repeated over and over again.

## 7.3.2 Chat

The Chat application demonstrates a connection between a Bluetooth master device and a Bluetooth slave device. The connection makes use of a chat profile. The application's task is to set-up a chat channel between the two devices. BT\_Chat is made of three parts, the BT\_ChatSecurity, the BT\_ChatServer and the BT\_ChatClient.

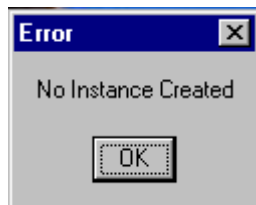
### 7.3.2.1 How to run BT\_Chat

Follow these steps:

Make sure that the environment is set-up correctly according to previous description.

Simply start BT\_ChatSecurity.exe on both computers.

If a dialog looking like the one below appears, then the COMServer.exe isn't registered.



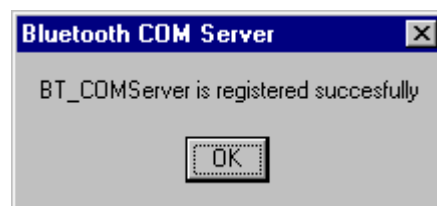
To take care of this problem you have to:

Check in the task manager for a process called BT\_COM~1.exe or BT\_COMServer.exe and end the process.

Hardware reset the Bluetooth device.

Run "`<bt-executables path>Bt_comserver.exe /RegServer`".

When you see the dialog below,



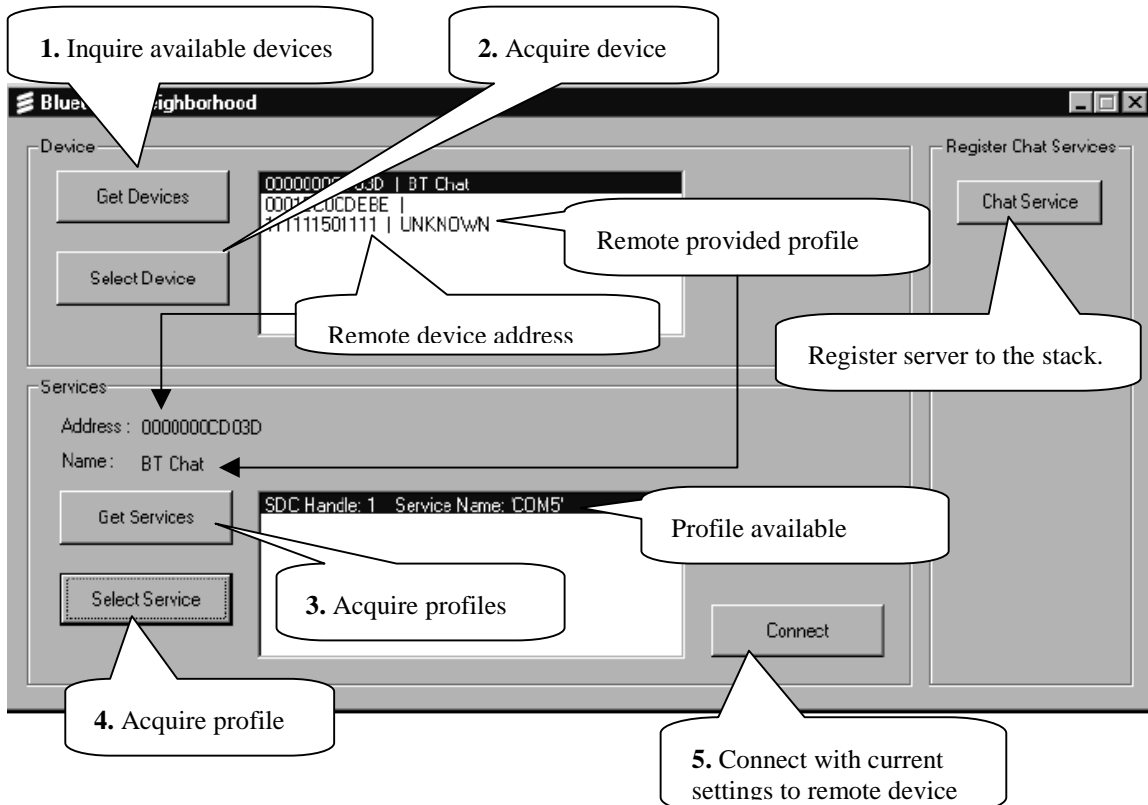
you have to restart BT\_TestSampleSecurity.exe on both computers.

Finally you start BT\_ChatServer.exe on one of the computers, and on the other you start the BT\_ChatClient.exe.

### 7.3.2.2 What does BT\_Chat demonstrate?

BT\_Chat demonstrates a connection between two Bluetooth devices communicating on a radio channel that is configured with a chat profile. Before it sets up a channel for chatting purposes, it also shows various preparations. It makes for instance inquiry of devices and asks for profiles (services) provided by the server side (SCM and SDP do this). To end the chat application just push “End Chat”.

The GUI is not more complex than the one for the BT\_TestSample. Below you can see the GUI of BT\_ChatSecurity, BT\_ChatClient and BT\_ChatServer.



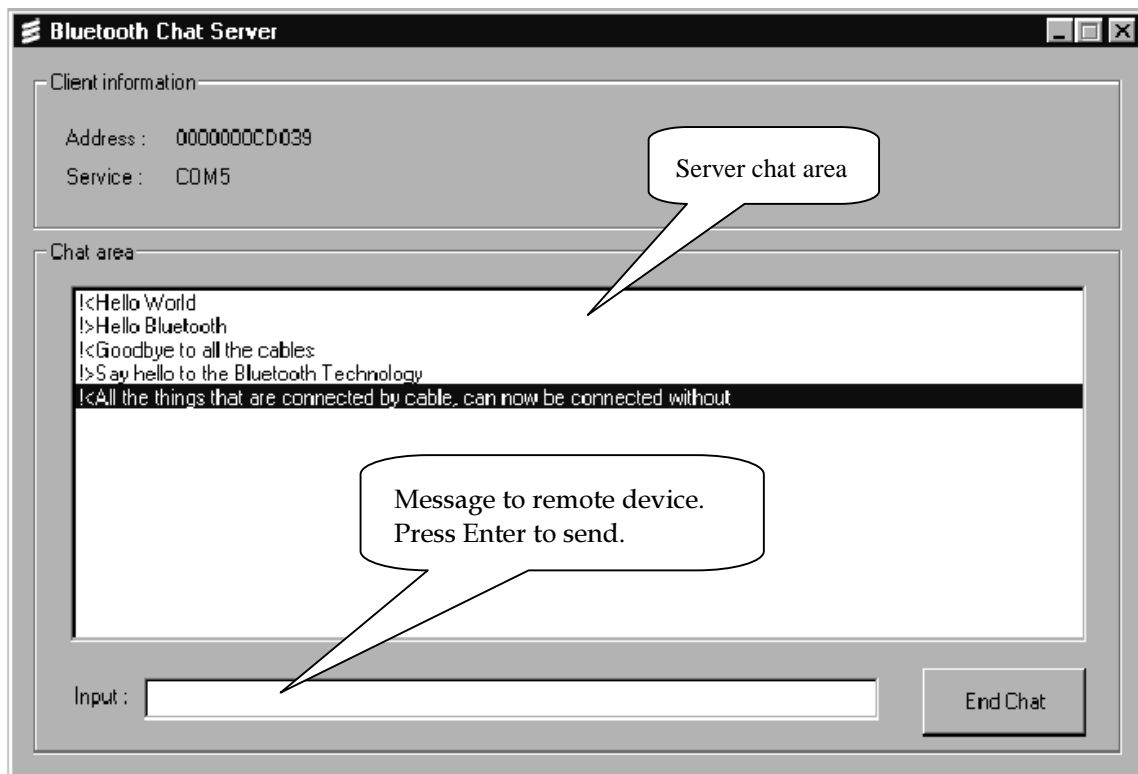
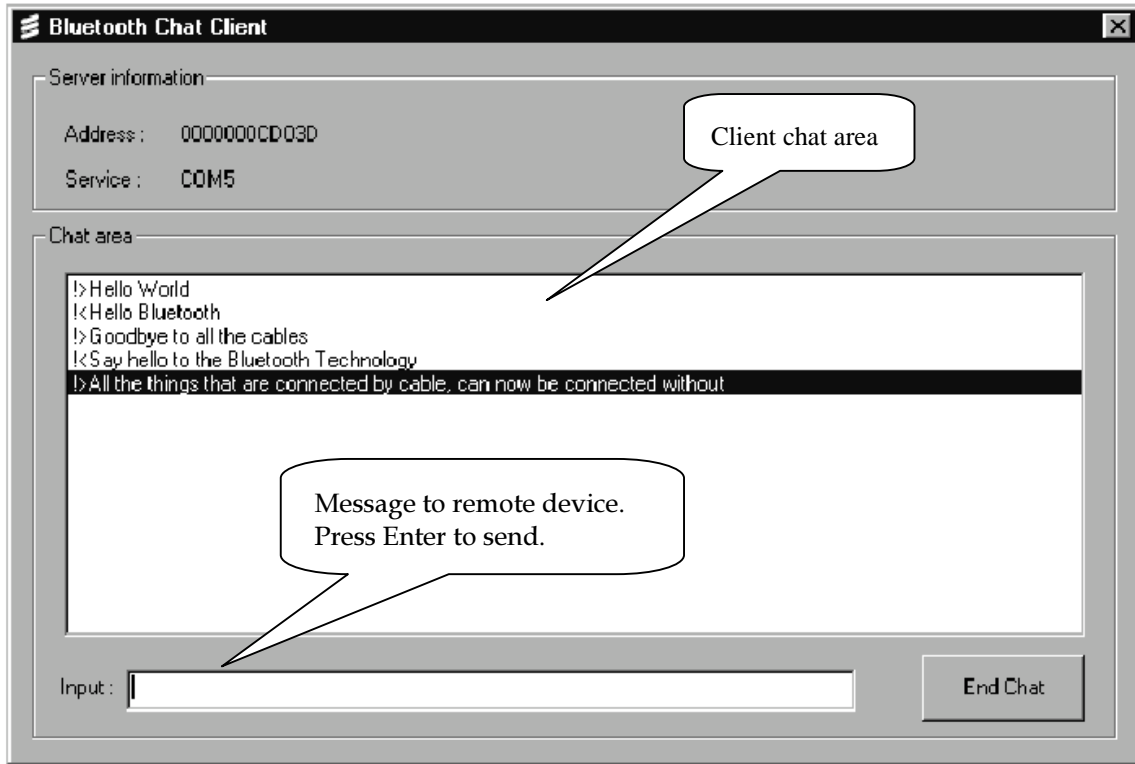
To start-up a chat session you have to do the following steps

1. Start-up BT\_ChatSecurity (Bluetooth neighbourhood) on both computers.
2. Choose one of the computers to act as server. Start BT\_ChatServer on the server.
3. Push “Get Devices”-button (se pic. # 1. above) on the client computer.
4. Wait until “Select Devices”-button (se pic. # 2. above) becomes available (may take 10 seconds) and then select the desired device in the list box, if there is any, on the right next to the button. Then press the button.
5. In the “Services”-frame on the dialog address and name will be set.
6. Get profiles from the remote device by pressing “Get-Services”-button (se pic. # 3. above). They will be listed in the list box next to the button.
7. Select the profile in the list box and push “Select Services”-button (se pic. # 4. above) to initialise the client stack with the acquired profile



- Now you are ready to start the BT\_ChatClient on the client computer by pressing the "Connect"-button (se pic. # 5. above).

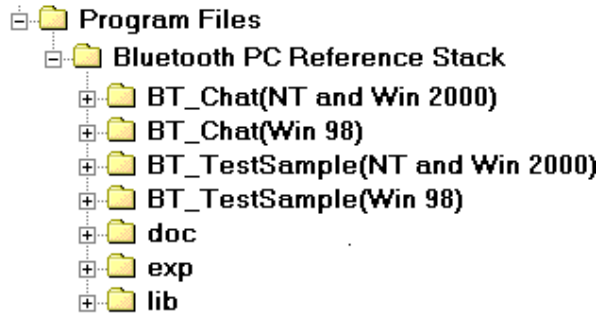
And below you can see an example of a chat session in action



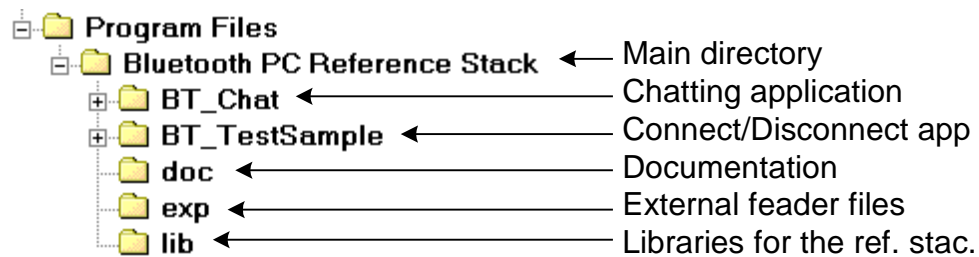


## 7.4 The source code of the sample applications

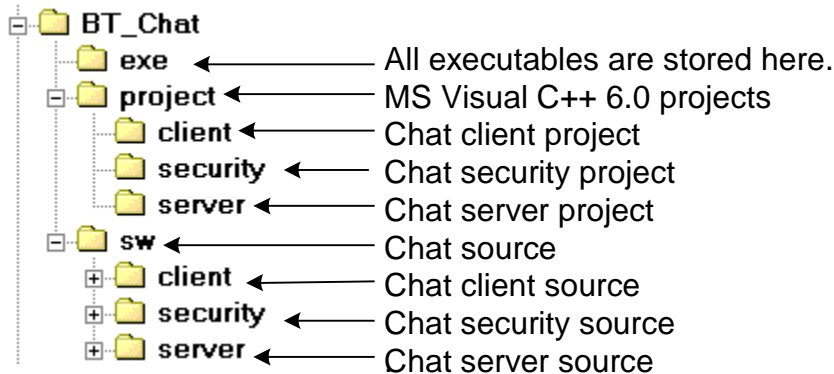
The source code is located in the following directory structure



~~~~~



~~~~~



~~~~~