

Bluetooth

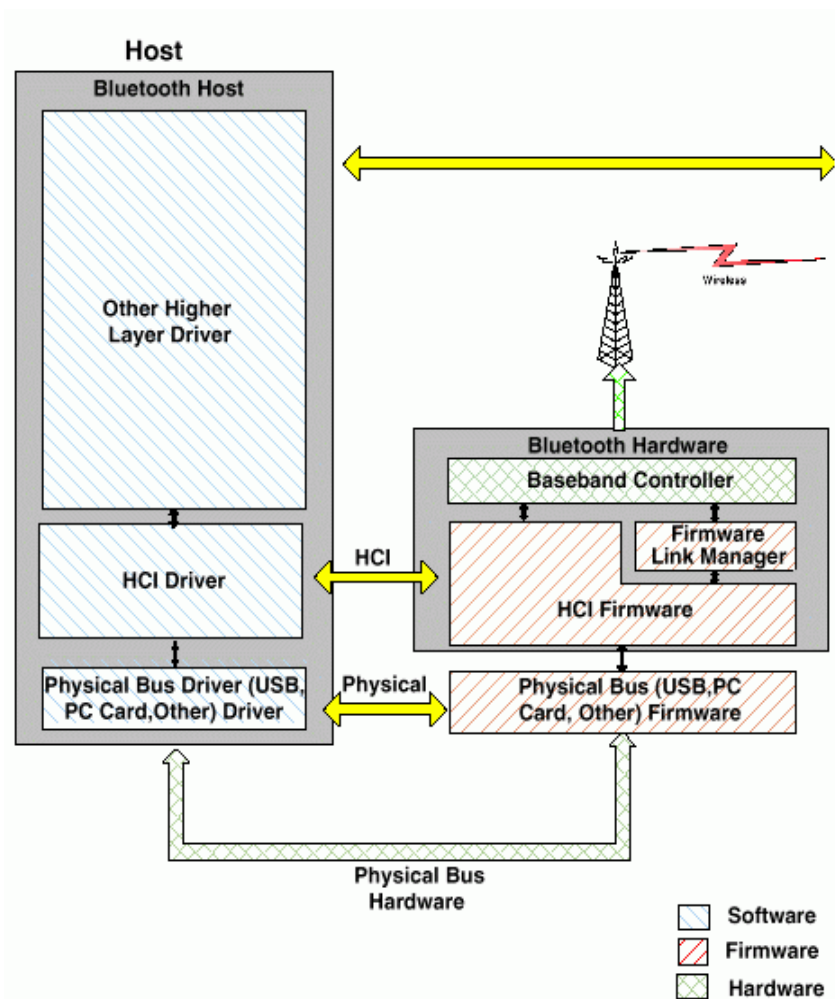
Main goal of our work was to learn things around bluetooth and to learn to work with Bluetooth application kit, produced by Ericsson. On this kit there is mounted ROK 101 008 module (short description in Appendix A), which is main part of this kit. Otherwise there are also supporting circuits for connections to USB and COM port. UART is a native interface.

Brief description of steps we went through are below.

0.1 Learning bluetooth

Short overview what bluetooth is: (deep insight you can get by reading latest specification - you can find them on <http://www.bluetooth.com/> - SIG, at this moment ver.1.1)

Bluetooth is a short range radio communication system desinged for communication of devices like mobile phones, PDAs, notebooks, PCs, printers, headsets etc. It should be cheap and low power consumption for easy implantation into mobile devices. First it should mainly replace cables, now this is forming complex system for communication which is able to create piconetworks ('radio LAN') not only based on packet data transfer (ACL) but also for voice services (SCO). Layer structure of Bluetooth according OSI model is on next picture:



There are depict basic parts of stucture where right half of picture is directly on the module, left part is software implementacion on host system.

More detailed picture you can get in chapter [0.3](#) about communication software.

0.2 Get it work!

Second step of our work was to learn how to get kit to work using windows environment drivers shipped with the kit. From this part of work there is “Bluetooth kuchařka” (see Appendix B), which is written in czech and should be used as simple howto for next people working with bluetooth kit, so they do not need to spend much time finding how to get it work.

0.3 Software communication

Next step is to learn to communicate with ROK module. There are, in this kit, some sources, mainly for MS Visual C++, which should serve as an example. Also there are c++ libraries for basic communication functions.

Knowing basic structure

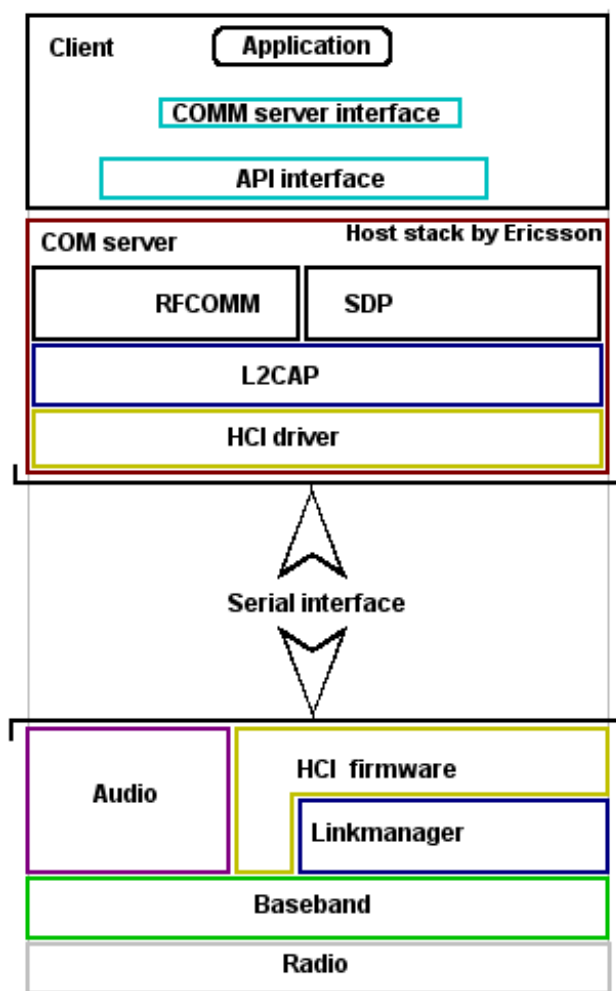
The structure of routines is almost the same as bluetooth layer structure as you can see it also on picture in chap.0.1. Here is more detailed picture:

As you can see on picture software is divided to three main parts. Client, COM server and Bluetooth module software. Client and COM server are provided as software for windows.

For demonstration there are in kit two applications - BT Test sample and BT Chat. Both aim to category of client applications and also sources are included. BT_COMserver which is COM server from picture is in application kit only in compiled form, but it serves as with all basic features needed. All these components are together called Bluetooth PC reference stack.

Main parts of COM server are **RFCOMM** which emulates COM port (RS-232, UART) for communication with bluetooth device. **SDP** is Service Discovery Protocol and is basic stone of technology. The SDP provides a means for applications to discover which services are available and to determine the characteristics of those available services using an existing L2CAP connection. **L2CAP** is Logical Link Control and Adaptation Protocol for multiplexing capability, segmentation and reassemble operation. **HCI** is Host Control Interface.

More accurate description is in BT pc ref. usersmanual included on CD and is beyond aim of this report.



Appendix A

ROK 101 008

Bluetooth PtP Module

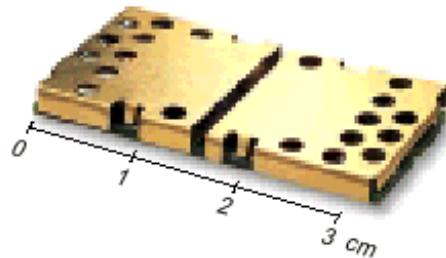
Description

ROK 101 008 is a short-range module for implementing Bluetooth functionality into various electronic devices. The module consists of three major parts; a baseband controller, a flash memory, and a radio that operates in the globally available 2.4 –2.5 GHz free ISM band. Both data and voice transmission is supported by the module. Communication between the module and the host controller is carried out via UART and PCM interface.

ROK 101 008, which is compliant with Bluetooth version 1.1, is a Class 2 Bluetooth Module (0 dBm) and is type-approved.

Key Features

- Qualified to Bluetooth 1.1
- RF output power class 2
- FCC and ETSI approved
- 460 kb/s max data rate over UART
- UART and PCM interface
- I²C interface
- Internal crystal oscillator
- HCI firmware included
- Point to Point (PtP) connection
- Built-in shielding



NOTE: This module is from Ericsson, but there are also other firms producing Bluetooth modules, e.g. Xilinx - on its pages you can also find a lot of information.

Appendix B:

Kuchařka Bluetooth

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Verze: 0.1

Použitý systém WinME.

Připojení realizováno přes USB. (Pro připojení přes seriový port je potřeba externí napájení 5V na pin 1 'jumper pole'.)

Nejdříve nainstalovat PC Reference Stack (Click na Setup v :\Bluetooth PC Reference Stack na přiloženém CD). NEinstalovat "COM server for Windows NT". Instalace by měla skončit hláškou, že bt_comserver byl úspěšně zaregistrován.

Nyní nastává hlavní komplikace a to instalace USB driveru, která je v Getting Started popsána zcela zcestně.

První část je správně:

"Connect the Tool Kit to the USB port of the computer. The operating system will detect the new hardware and search for files needed. A dialog box will appear asking for files needed."

Pokud se vám zařízení napoprvé neohlásí zkuste "systém vystoupit nastoupit" - tedy vytáhněte konektor z Bluetooth device a opět zasuňte.

Špatně je ovšem následující část:

"In this dialog browse to the ebtusb.sys file, located at C:/WINNT/System32/drivers on Win 2000 or C:/WINDOWS/System/drivers on Win 98. Press the OK button and the driver will be installed."

V tomto adresáři byste pod WinME/98 hledali soubor ebtusb.sys marně - není tam ani adresář ani soubor. Instalace ho nakopíruje do jiného adresáře C:/WINDOWS/System32/. Hledat soubor ebtusb.sys je taktéž nesmysl. Musíte hledat soubor ebtusb.inf.

Dále to vypadá, že driver není určen primárně pro WinME/98, ale pro W2k nebo WinNT (alespoň tak soudím podle obsahu), takže musíte WinME/98 přesvědčit, že driver chcete skutečně nainstalovat.

Po otázce na vyhledání vhodného driveru systémem odpovězte, že raději zvolíte driver sami (pro odborníky - co jiného taky jsme že?). Jako zařízení pro které má být driver instalován vyberte Řadiče sběrnice USB, pak nalistujte do adresáře C:/WINDOWS/System32/ na soubor ebtusb.inf a po odkliknutí přesvědčte Windows, že driver chcete skutečně nainstalovat i když nebyl napsán pro toto zařízení.

Tím by mělo být Bluetooth device úspěšně nainstalováno.

Pro zprovoznění testu spojení postupujte podle příkladu na straně 236 souboru "bt pc ref usersmanual.pdf", který je dostupný až po instalaci PC Ref. Stacku v podadresáři 'doc' v adresáři kam jste nainstalovali Stack.

Citují:

In order to test the executables on two PC's proceed as follows:

- Register the 'bt_comserver.exe' on two PC's see installation chapter. (Ten je již registrován po instalaci = nemusíte nic dělat)
- Connect a bluetooth device to COM1 on both PC's. The 'TestSample' application uses COM1. Or USB port if used. (Použijte USB jinak musíte mít externí napájení.)
- Start 'BT_TestSampleSecurity.exe' and 'BT_TestSampleServer.exe' on one PC (Zatím nic nevyplňujte a nepouštějte nic jiného z kitu - bt_comserver se pustí sám.)
- Start 'BT_TestSampleClient.exe' on the other PC. (Totéž jako předchozí.)
- Choose which interface that is preferred (Serial or USB) on both 'BT_TestSampleServer.exe' and 'BT_TestSampleClient.exe. (U obojího vyberte USB => Device connected.)
- Now you can fill the BD_Address of the server in the 'client' window.
- After doing that, the 'testsample' should run its test-sessions.

Další poznámky ke Kitu.

* Dodávaný Application Kit neumí PCM Voice

* rok101008.pdf obsahuje dokumentaci k připojení přes UART (COM) - protože jdeme přes transparentní vrstvu bt_comserveru je vše stejné i pro USB

* k dispozici jsou dva druhy kitů - BT Application Tool Kit a BT Application & Training Toolkit. První je novější, ale chudší, druhý obsahuje navíc licenci na weblearn, prezentaci bluetooth a některé další specifikace

Doporučená "literatura": název; umístění; obsah

- rok101008.pdf; instalační CD; popis Bluetooth PtP modulu (to je to pod zlatavým plíškem na kitu)

- bt pc ref usersmanual.pdf; adresář nainstalovaného Stacku/doc; manuál ke Kitu

- weblearn; http://learning.ericsson.net/len_course_material/wbl/bluetooth_an_introduction.shtml - Vstupní údaje (jméno a heslo) jsou na zadní straně Getting Started Appl & Train. Tool Kitu.; Obrázkový průvodce základy Bluetooth.