

Designing Bluetooth Medical Devices

Communication between Medical Devices, to date, have been based on ad-hoc, proprietary communication schemes with limited to no interoperability between devices from different manufacturers. With the release of the **Bluetooth Health Device Profile (HDP)** and the **IEEE-11073 Personal Health Data (PHD)** specification, the market for Bluetooth enabled Health Devices is poised for mainstream adoption.

There are several design approaches and strategies manufacturers may wish to consider when designing Bluetooth functionality into their devices. This article briefly describes these considerations.

The Bluetooth Health Device Profile

The new Bluetooth **Health Device Profile** in combination with the **IEEE 11073** Specifications provide a robust, standards based framework to allow interoperability between Bluetooth Health Devices. The building blocks are shown in Fig 1.

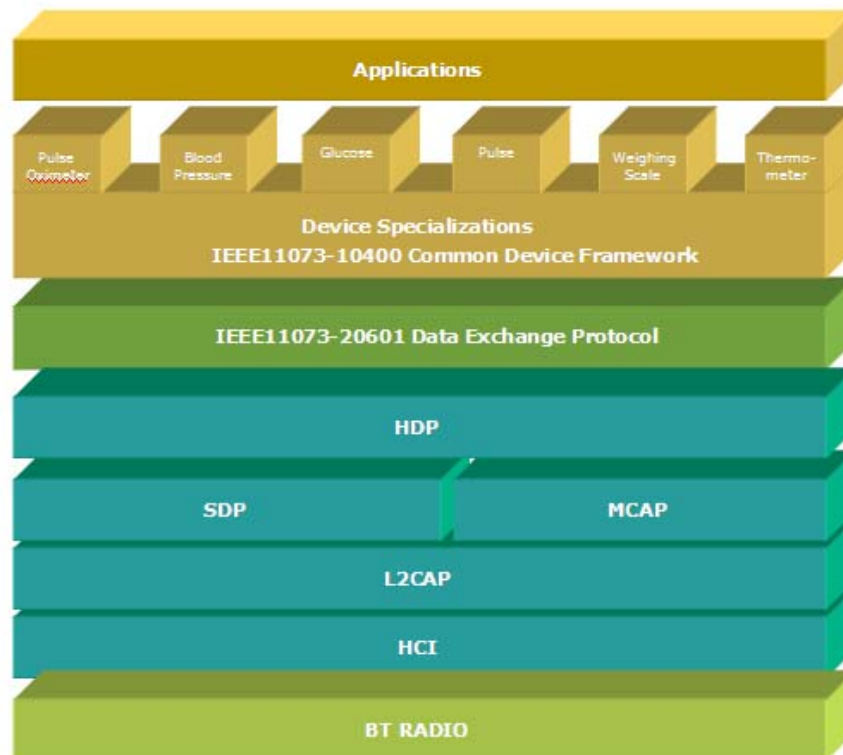


Fig. 1. Bluetooth Health Device – Building Blocks

Bluetooth Radio chipsets are utilized in millions of phones world wide, resulting in constant downward pressure for ROM-based HCI Bluetooth Radios. However, in order to use a HCI BT Radio, a separate host microcontroller is needed. This host controller would run the Bluetooth Host Stack, the IEEE 11073 code, as well as the specific device application. As long as the proper Bluetooth Host Stack is used, this **“hosted approach”** is radio independent, and allows the manufacturer to replace radios as the specification evolves and prices drop, without having to re-engineer the software/platform and framework.

The other model is to utilize a Bluetooth radio which supports the complete Bluetooth Host Stack, IEEE 11073 specification and an Application Framework running on the Bluetooth Radio's baseband, in Flash. These Radios tend to be more expensive than their HCI (ROM-based) brethren, but may be appropriate if the application/device is relatively simple. While this **“embedded approach”** does sometimes result in a lower up front cost, maintaining this framework can be complex and the design is tied to a specific radio implementation.

The **Bluetooth Host Stack** includes the Multichannel Adaptation Protocol (**MCAP**) and the Bluetooth Health Device Protocol (**HDP**). MCAP and HDP are specifications that are specific to Bluetooth health/medical devices. MCAP allows for a robust connection, including support for streaming data. The Health Device Profile (**HDP**) is the Bluetooth application profile that allows for **source** devices, such as blood pressure monitors, weight scales, glucose meters to exchange data with **sink** devices such as mobile phones, laptops and health appliances.

Bluetooth – A core part of your product strategy?

If Bluetooth is a core part of your product strategy, selecting a robust and radio/platform/OS independent Bluetooth Host Stack is key. The selected Host Stack should support the latest Bluetooth specifications, and the vendor should have a team that is actively involved in the Bluetooth SIG. The reason is that the Bluetooth Specifications are constantly evolving with new profiles and features, such as Ultra Low Power (ULP). The chosen stack should allow a fair degree of abstraction from the Operating System and Radio/Hardware dependencies, allowing your team to seamlessly migrate from one platform to another, leveraging your investment. You should look for a supplier that has access also to the Application Framework source code, and is in a position to assist you in designing your final device/application.

There are considerable costs involved in setting up a production line of a Bluetooth product, from RF testers, Test Jigs and RF qualifying a module. An often more cost effective approach is to use **pre-qualified Bluetooth modules**. Generally, look for suppliers that have access to both the chip and the Bluetooth Host stack and Application framework source code. The module you choose would ideally have the host CPU you are comfortable with, as well as the Bluetooth Host Stack,

BT Radio, and Application Framework pre-integrated, and available to you in source or object code.

This article is co-authored by Kristian Palm of Cybercom Group, and Ivan Soh of iFoundry Systems.

About Cybercom Group – The Cybercom Group, a public company quoted on the OMX Nordic Exchange, is a high-tech consultancy and design house. Cybercom has 2000 employees at 27 offices in 11 countries. www.cybercomgroup.com.

About iFoundry Systems – iFoundry Systems is a design house specializing in Bluetooth module designs and Bluetooth hardware and platform integration design services. For more information, please visit www.ifoundrysys.com.

Cybercom and iFoundry Systems in partnership offer Bluetooth consultancy, pre-qualified Bluetooth modules, and ODM services for Health Devices. Cybercom's Bluetooth SDK for Health Devices is fully aligned with the new Health Device specification. Health Device products based on Cybercom's software will be released by its customers already this autumn.