A Study on Smart Gateway Based on Android 4.x Bluetooth HDP(Health Device Profile)

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Abstract. We studied the connection of standard medical devices, i.e, continua health alliance under the Android 4.x Bluetooth HDP(Health Device Profile) environments. We also tried to implement smart gateway which can support diagnosis for healthcare provider and user based on HL7n standard.

Keywords: Smart Gateway, HDP, HL7

1 Introduction

The object of smart healthcare service is focused on preventive healthcare and wellness. It also aims for the user oriented active service. This smart healthcare service is provided by smart phone application program. The total number of healthcare application program already exceeds 15,000 in May 2011. Currently, smart healthcare service can support various services like basal physical fitness, caloric intake, checking heartbeat and so on. Among those services, especially DSSH system which can be provided remote medical treatment by doctor using smart phone is emerging now a days.

For the interface with home healthcare diagnosis system, it should support communication function of the health, feedback information which is also provided by home healthcare server/gateway. We tried to implement smart gateway which can support the interface of medical devices and the contents thru information transformation module based on HL7, Android 4.x Bluetooth HDP standard.

2 Related work

Current existing home and mobile healthcare system is shown in Fig. 1.

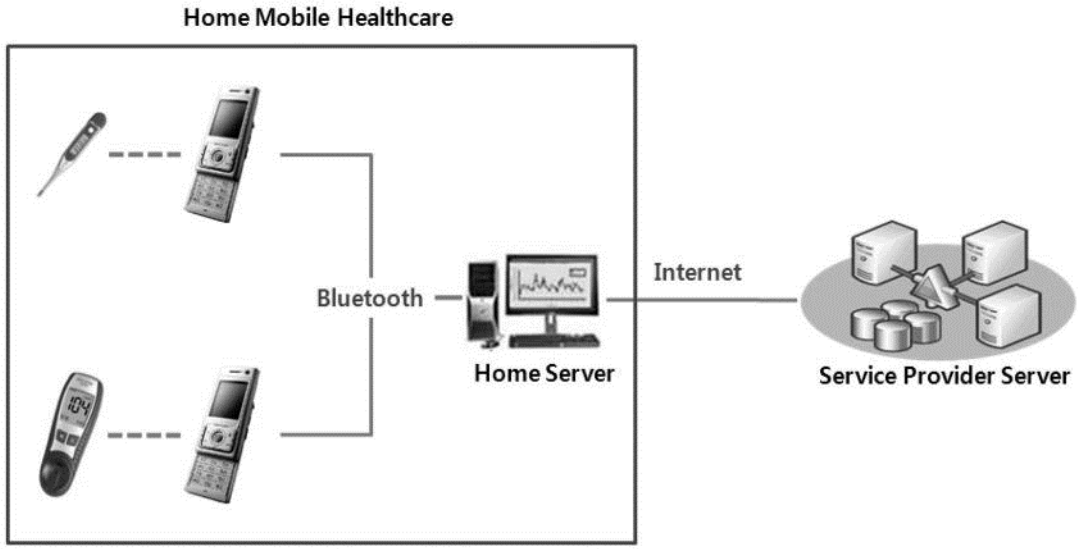

Fig. 1. Configuration of existing home and mobile healthcare system

Via home server it monitors data which come from smart phone linked with special medical devices. This home & healthcare system is dependent to the medical devices linked with smart phone. Thus, the interconnection among medical devices and healthcare service is so limited.

Recently, home healthcare system support ISO/IEEE11073 PHD,HL7 standard. It also support medical information exchange by unlimited connection for the standard healthcare devices under HL7 environment. This concept is shown in Fig. 2.

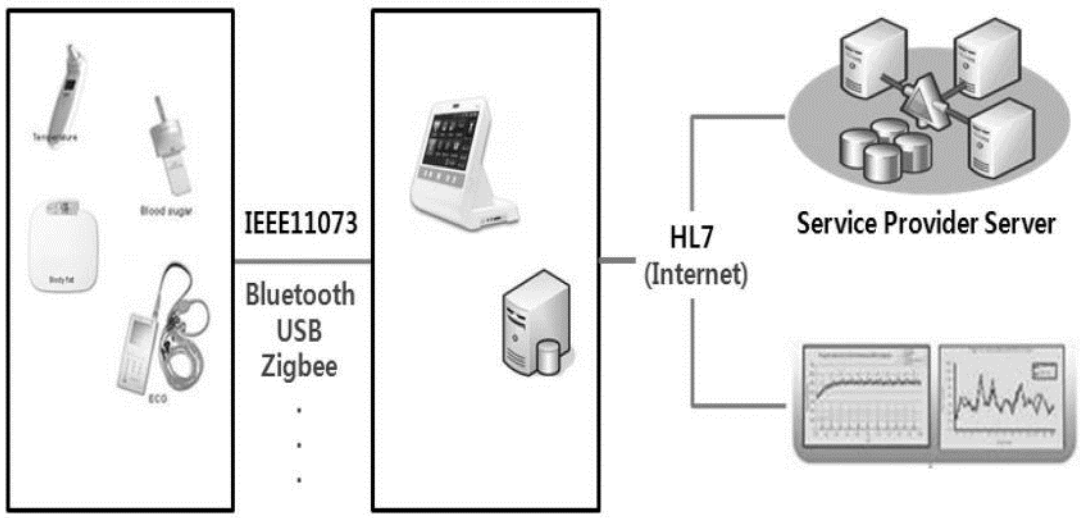

Fig. 2. Standard home healthcare system suggested by Korean Food and Drug Administration

However this kind of home healthcare system can't blend with smart application like health, medical related services. It can't solve location dependent problem of gateway although it support the monitoring interface of smart phone. Without gateway it can't connect to the smart phone.

3 Implementation

The smart gateway we try to implement is the same way as the suggestion of Food and Drug Administration. It relays information exchange thru smart phone application module instead of gateway and server as the home gateway platform. The suggested system configuration is shown in Fig. 3.

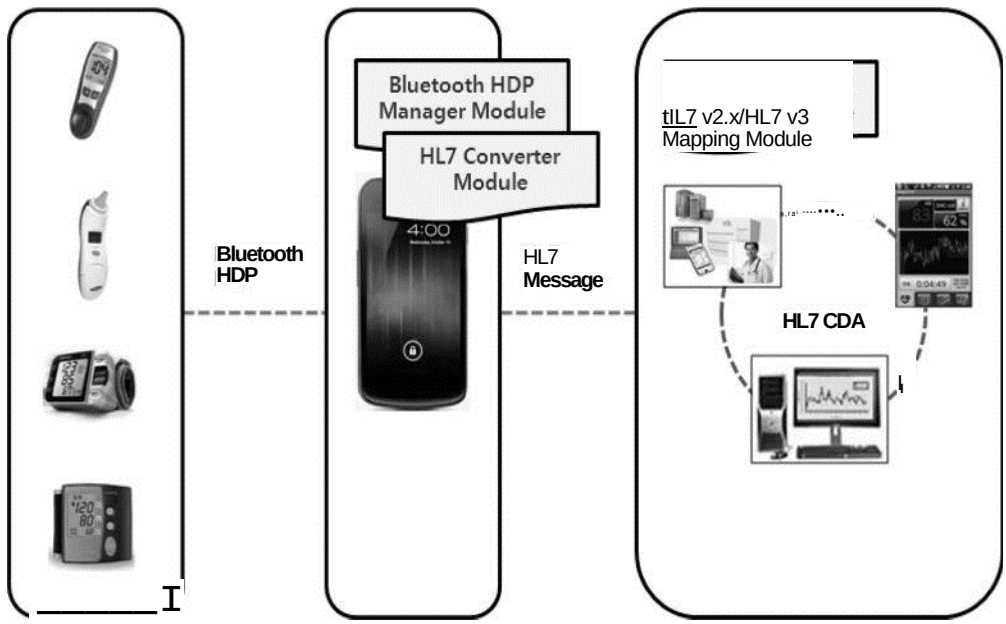

Fig. 3. Smart healthcare configuration based on smart gateway

We construct the smart gateway step by step and it could be summarized as follows.

First, developing the Bluetooth HDP Manager Module that support smart phone communication and standard home healthcare devices, i.e., continua health alliance. This module is running under the Android 4.x Bluetooth HDP(Health Device Profile) environments.

Secondly, implements HL7 Converter Module. This process transforms acquired data from wireless communication into HL7 standard medical information.

Third, implements HL7 converter module and HL7 v2.x/HL7 v3 mapping module. Converter module transforms medical data into HL7 messages as message sending method. Mapping module does the function of linking with diagnosis support system as the way of document exchange.

These HDP Manager modules would be implemented as the smart phone application and it is shown in Fig. 4.

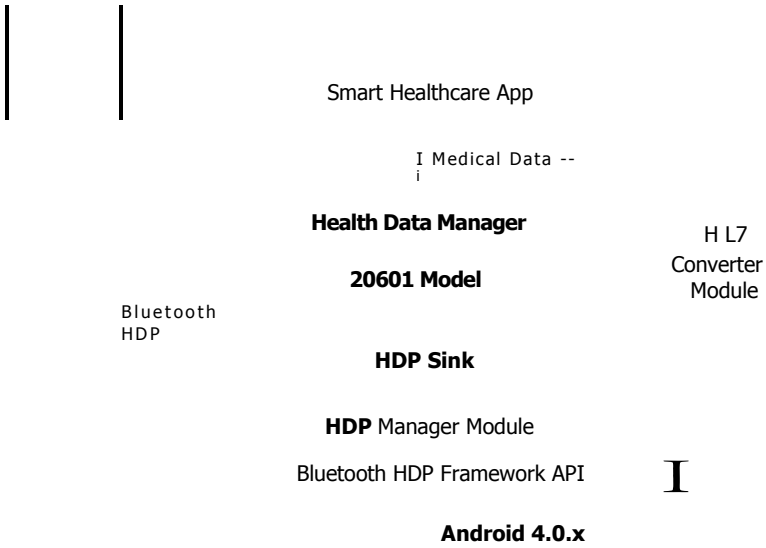

Fig. 4. HDP Manager Module configuration

Bluetooth HDP shown in Fig. 4 is operated as NON IEEE PHD protocol, and it can use 11073- 104xx Device Specializations under 11073-20601 personal Data Exchange Protocol. Thus, Health Data Manager can find out health information by the acquired data from medical devices after sending the data to HL7 related modules under 11073-20601 protocol environments.

4 Conclusions

The expectation from this study is as follows.

- Having high technical skills for the utilization of healthcare medical devices based on Bluetooth HDP, HL7 standard.
- Industrializing of data monitoring skill on HDP healthcare medical devices using Android 4.x smart phone.
- Industrializing of ADT(Android Developer Tools) 16.0.1 solution that support Android 4.x smart phone application.
- Having intellectual property for the new solution of smart healthcare system construction.

- Extended study for the new smart healthcare fields.

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