Hybrid Box Application

Functional Requirement
For
Healthcare Service

Version 1

May 18th, 2012
Japan Cable Laboratories

Revision History

Version	Date	Remarks
1	2012.5.18	Issuance of Version 1

Contents

1. Purpose

This document describes a home healthcare service by cable operator using healthcare devices such as weighting scale, thermometer, blood pressure, pedometer, etc. and cable network for their healthcare data transmission. This service contains health consultancy service by healthcare consultant, registered dietitian based on obtained data. Associated service such as data comparison with past data, exercise recommendation and provision of healthcare devices.

2. General

This document assumes that cable operator provides a home healthcare service of patient compliance instruction, health consultancy, distributing regional medical information to cable customers. This document describes a functional requirement for the healthcare service for cable operator.

A simplified aspect of the healthcare service is shown in Figurer 1. The service contains that obtaining healthcare data from weighting scale, thermometer and blood pressure devices, etc, storing these data on data cloud through the hybrid box, displaying stored data on customer's request, informing data analysis result, reception of consultancy from healthcare specialists. This contains deployment of municipal information on healthcare promotion. A comparison with past data, recommendation of exercise and provisioning of appropriate healthcare devices are also in the scope.

Consultancy service between customer (single elder person, specifically) and official health consultant (public health nurse, registered dietitian, etc.) over TV telephone (a function of the hybrid box) is assumed as an optional service.

Similar service is already provided by mobile telephone operator using cell phone and data cloud. This document proposes a family healthcare service using the hybrid box which is a common gateway device for the service. The big display of TV and interactive nature on the hybrid box are advantage of this service.

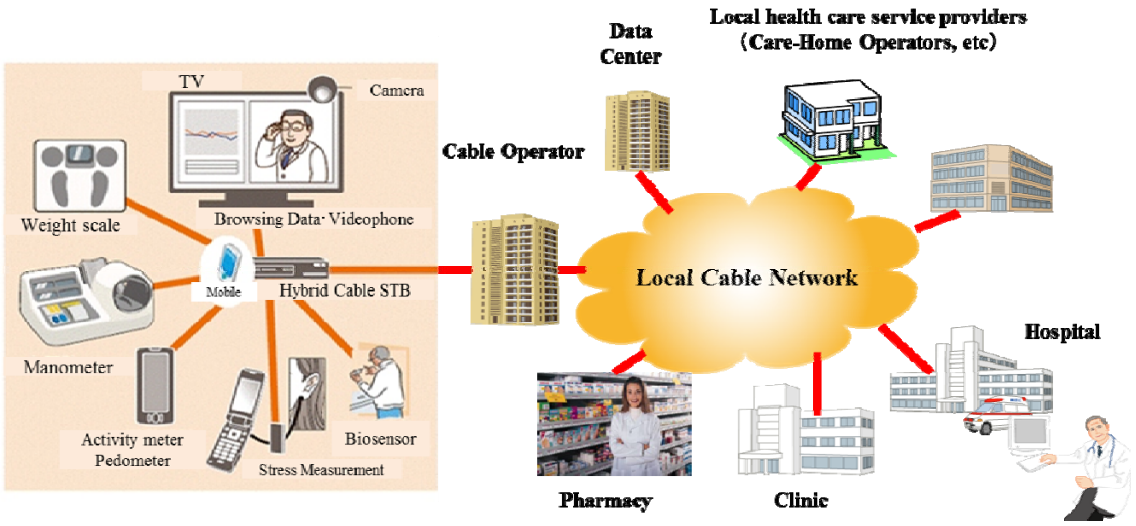


Figure1: A simplified aspect of the healthcare service

3. Conventions

This portion is normative.

In this Document:

The keywords "**is required to"** indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed. The keywords "**is recommended"** indicate a requirement which is recommended but which is not absolutely required. Thus this requirement need not be present to claim conformance. The keywords "**is prohibited from"** indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed. The keywords "**can optionally"** indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

In the body of this document, the words *shall*, *shall not*, *should*, and *may* sometimes appear, in which case they are to be interpreted, respectively, as *is required to*, *is prohibited from*, *is recommended*, and *can optionally*. The appearance of such phrases or keywords in an appendix or in material explicitly marked as *informative* are to be interpreted as having no normative intent.

4. Functional Element

This portion is normative.

The first step of this service is limited to a data usage from healthcare devices as shown in Figure 2. The data are gathered to cable operator's data server and processed by an application in the cloud through the internet. The right portion of Figure 1 (construction of regional healthcare network and service deployment) is the second step of this service.

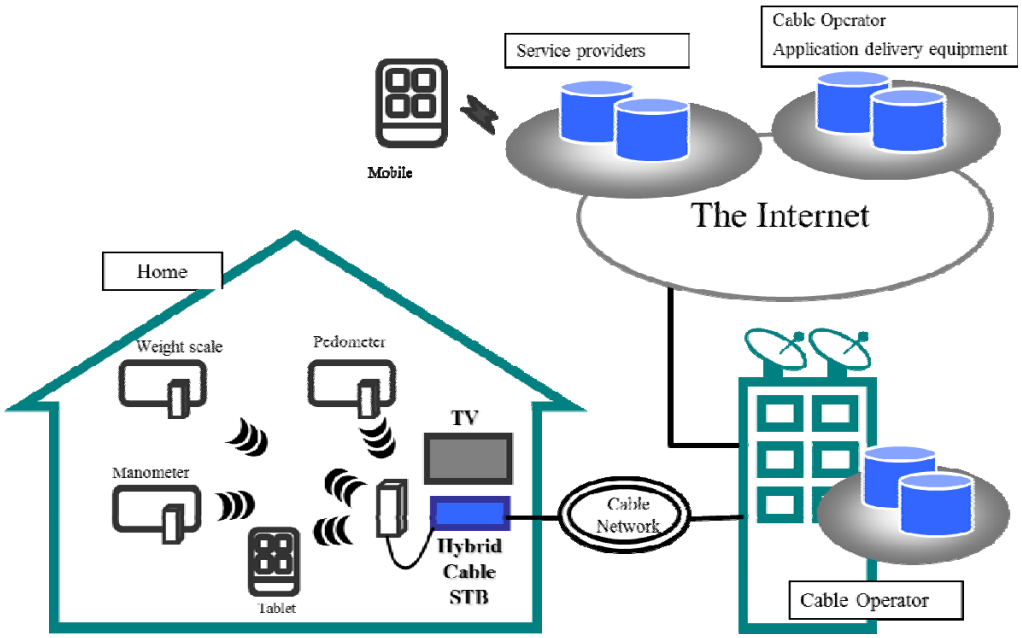


Figure 2: First step of healthcare service

4.1 Definition of Functional Element

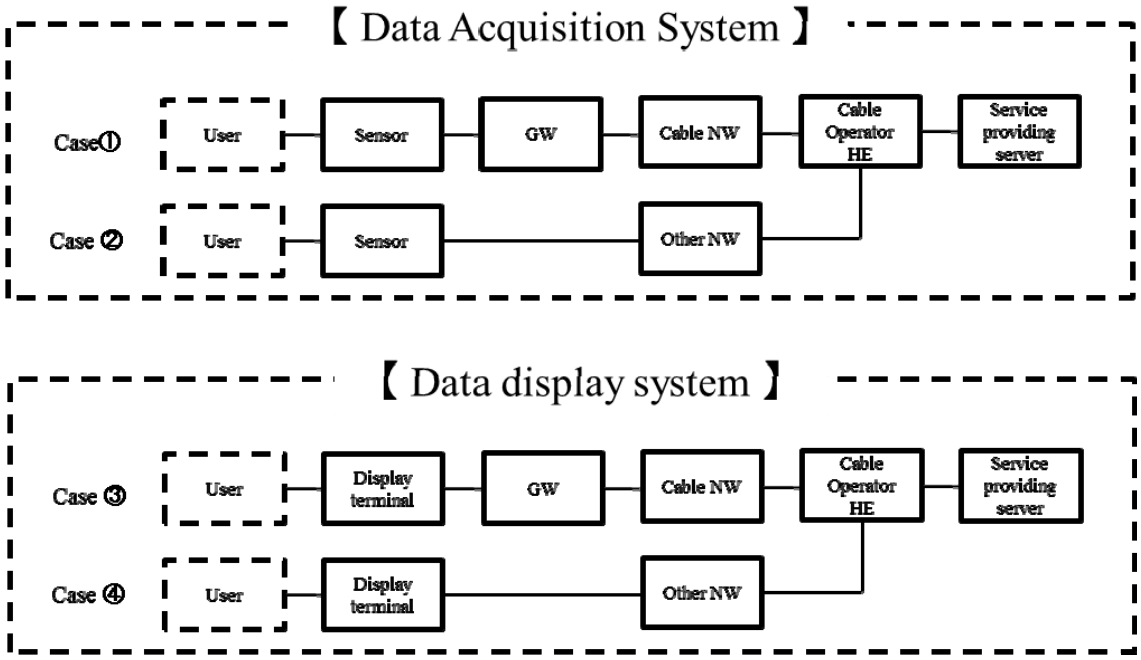


Figure 3: Functional element for healthcare service

Figure 3 shows the functional element for healthcare service. Each element is described below. Each element is a logical unit and hence, there is no restriction to physical implementation. For example, terminal function and gateway function can be installed in the hybrid box.

(1) **User:** It is an element using the healthcare service defined in this document and one of family who is a customer of cable service. User can receive his/her own healthcare service data via the sensor or devices.

(2) **Sensor:** It is an element for collection of healthcare data, blood pressure, weighting scale are in this category. A scanning device of a diagnostic test will be a kind of sensor.

(3) **Display Terminal:** It is an element for provisioning application and user interface for the healthcare service. User can access via gateway through cable network or non-cable network as shown in Figure 3. As the former case, Case (1) of Figure 3 shows the case of the hybrid box usage and Case (2) means smart phone usage via LAN in home. For example, a home usage. The latter means an outdoor usage via internet.

(4) **GW:** It is an element for termination of cable network and protocol conversion between sensor/terminal and cable network.

(5) **Cable NW:** It is an element of network function provided by cable operator.

(6) **Other NW:** All transmission network except for Cable NW. Mobile, fixed internet, public WiFi, etc. are in this category.

(7) **Cable operator HE:** It is an element of cable operator headend capable for authentication of and charging to customers.

(8) **Service provisioning server:** It is a collection of functions for healthcare service except for supporting functions by cable operator headend. For example, provision of application, storing healthcare data, charting data, etc. are in this category.

5. Healthcare Service

This portion is informative. Appendix A describes healthcare services required by this document.

6. Functional Requirement

This portion is normative. The functional requirement are described below.

6.1 Sensor Function

(1) Transmission means (Interface)

The sensor function is required to transmit the healthcare data collected from the user to the GW by at least one of following means.

- Continua Health Alliance (ZigBee, Bluetooth, Z-wave, WiFi)
- WiFi
- NFC（Type-A, Type-B, All Felica interface）
- Wired（Ethernet, USB）, Wireless (Infrared)

Following international standards (Table 1) can be used optionally for the healthcare service.

Table 1: International standard for healthcare device interface

ISO/IEEE 11073-10404	Pulse Oximeter
ISO/IEEE 11073-10407	Blood Pressure
ISO/IEEE 11073-10408	Thermometer
ISO/IEEE 11073-10415	Weighting Scale

ISO/IEEE 11073-10417	Glucose
ISO/IEEE 11073-10441	Cardiovascular Fitness Monitor
ISO/IEEE 11073-10442	Strength Fitness Equipment
ISO/IEEE 11073-10471	Independent Living Activity

(2) Sensor and User Identification

Upon access by user, sensor is required to inform GW its identification number. If user identification is available, the sensor must report GW the identification number. (In case that even if user ID input is not allowed, changing user from user 1 to user 2 is available.)

(3) Data Transmission and Timing

Sensor is required to send collected healthcare data with own identification number to service provider server. The activation trigger (by automatic or manual) must be set by cable operator. The data transmission timing shall be referred to the specification of Continual Health Alliance.

6.2 Terminal Function

(1) Terminal device is required to identify user.

(2) Terminal device must have user changing function (ex. Selection icons, ID and Password) in such a case where several users can access the hybrid box.

(3) In case (3) of Figure 3, terminal device must authenticate identified user, and authorize whether the service can be used or not, then provide service for user.

(4) Terminal must confirm by server identification that the cable headend is the right one to be used in the event of user authentication.

(5) Terminal device must be used with the hybrid box as well as smart phone, tablet and PC which are devices connected with non-cable network.

(6) Terminal device must obtain past healthcare data from user in one action (for data back-up), restore them via server.

(7) Terminal device must use IP as transmission protocol.

(8) Terminal device must have self version up function.

6.3 Gateway Function

(1) GW function must work with transmission means described in Clause 6.1, however, it is not required to work with all the means at the same time. It is recommended to use transmission adapter such as USB dongle where required.

(2) GW function must collect healthcare data from the sensor and store them temporarily until the data is transmitted.

(3) GW function must be able to set the activation trigger (by automatic or manual) by cable operator.

(4) GW function must have means (ID, PW, etc.) to identify user

(5) GW function must tie identification numbers from sensor and ones from service.

(6) GW must have user change function in case that no mapping function (see (5) above) is available and the functions for family use are incorporated in the hybrid box.

(7) In case (3) of Figure 3, GW function must authenticate identified user, and authorize whether the service can be used or not, then provide service for user.

(8) GW function must confirm by server identification that the cable headend is the right one to be used in the event of user authentication.

(9) GW function must encrypt the data with AES 128 bit or much stronger encryption after confirmation of send address.

(10) GW function must have self version up function.

6.4 Cable NW Function

The required cable NW is the same as current cable operator network and no specific function is required.

6.5 Other NW Function

The required other NW in this document is all the bi-lateral communication network except for the cable network and no specific function is required.

6.6 Cable Headend Function

(1) Cable Headend Function must authenticate user and authorize the status in where service is available.

(2) Cable Headend Function must be capable to access cable network function as well as non-cable network function.

(3) Cable Headend Function must have server certification signed by third party.

(4) Cable Headend Function must convert the healthcare data to un-identifiable and un-traceable data when the user start communication with outside of cable network.

(5) Cable Headend Function must provide means for user to continue his/her healthcare service by using back-up list (see Clause 6.2), when user changes his/her cable operator due to house-moving or some other reason.

(6) Cable Headend Function must be capable to charge service fee with other cable TV services with cooperation of service provider server.

6.7 Service Provider Server Function

(1) Service Provider Server Function must store the healthcare data in database in accordance with user identification information.

(2) Considering common operation by multiple operators, the accessible data must have unique structure available only in cable network.

(3) Service Provider Server Function must provide exclusive applications and to be capable access from terminal or GW functions.

(4) Service Provider Server Function can be optionally accessible from browser implemented in terminals.

(5) Service Provider Server must have anti-tampering function against illegal access. Even if the data is stolen, the healthcare data must be encrypted and stored safely for not to be de-encrypted.

7. Other System Requirement

7.1 Application

Application for this healthcare service assumes WEB application which is in service provider server and Android application on terminal device or GW, both applications are accessible from terminal device or GW. At least either one application must be implemented. Application must have self version up function. Appendix A shall be referred for application example.

7.2 Protection of Personal Information and Reset

All personal information including collected data from user must be protected. The transaction must be encrypted. All the information collected from user must be cleared easily by user.

7.3 Authentication and Charging

As described in Clause 6.2, Cable Headend Function must authenticate user and authorize the status whether service is available or not. And it must be capable to charge service fee with other cable TV services with cooperation of service provider server, considering common usage by a family.

Appendix A Service Example

This portion is informative.

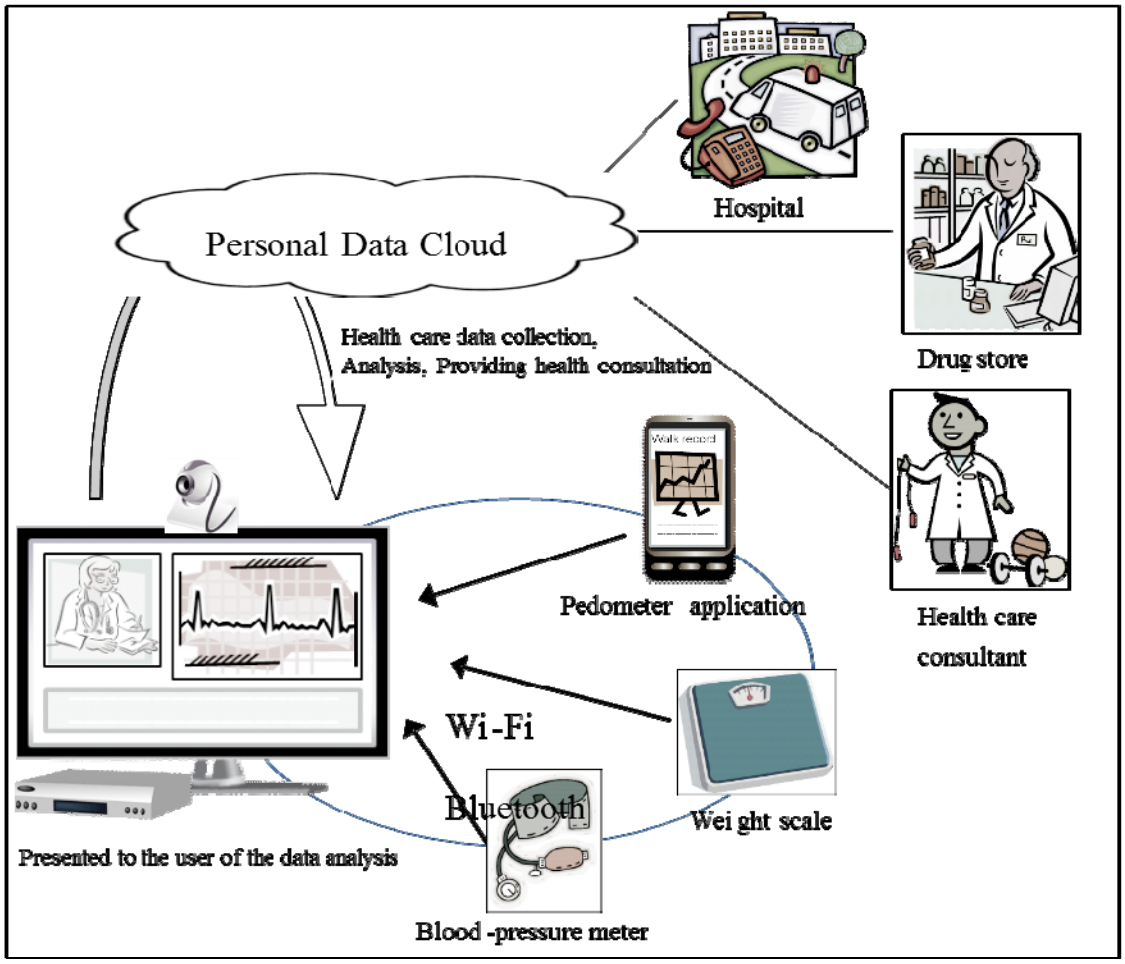


Figure A-1: Simplified Healthcare Image

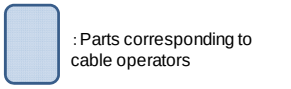
A-1. Service Objective and Relationship with Other Organization

Provisioning simple handling and never weary of healthcare service for cable customer are the objectives of this service. It is required to establish relationship with healthcare device vender and medical consultant to enhance this service.

A-2. Service Operation Pattern

In this service, following three patterns are assumed. In case of cooperation with

healthcare operators, provision of healthcare devices, data collection and control, site development and operation, settlement are negotiable matters. Adding terminal site application to this WEB application will also enhance service area.



	Feature	Site		Data Management	Settlement	Remarks
		Development	Management			
Pattern A	・Healthcare businesses diverted nearly the site	The Health Care Business	The Health Care Business	The Health Care Business	The Health Care Business	・Yes / no Terminal application
Pattern B	・Site is a mix of both cable operators and health care businesses.	Basic cable operators (Partially take advantage of their health care business content)	Cable Operator	Cable Operator	Cable Operator	・Yes Terminal application
Pattern C	・Site to make all cable operators ・Receive only the image of OEM devices from the health care business	Cable Operator	Cable Operator	Cable Operator	Cable Operator	・Yes Terminal application

Figure A-2: Operation Pattern of Healthcare Service

(1) Pattern A

In this pattern, almost service function is provided by healthcare service operator, not by cable operator. Very limited customization will be done by cable operator such as instruction of service, offering of healthcare devices, etc. All the collected healthcare data from user is stored in healthcare service operator server and controlled by them. This pattern fits small start service by cable operator.

(2) Pattern B

This pattern shows an equal partner service between cable operator and healthcare service operator. Based on WEB service by healthcare service operator, cable operator can add his original service with it. The obtained data will be stored in cable operator server.

(3) Pattern C

Borrowing data collection mechanism from healthcare service operator, cable operator deploys his own healthcare service. Cable operator can process all the healthcare data with his own application.

A-3. Healthcare Data

A-3-1. Collection of Data

Two ways of collection are assumed.

(1) Automatic storing in server from sensor

The data is stored in WEB server automatically via sensor, transmission line (wireless) and the hybrid box. It is also assumed a direct data transaction to server from sensor.

(2) Manual storing in server

The user stores his/her healthcare date in assigned server manually.

A-3-2. Collected Data

Collected data are assumed fundamental data, obtained calorie data, consumed calorie data.

(1) Fundamental data

- Age, Gender, Height, Walking step
- Blood test result, Weight, Blood pressure, Body fat, Glucose, etc.

(2) Obtained calorie data

- Obtained food calorie data

(3) Consumed calorie data

- Total walking steps per day
- Consumed calorie by other exercise

A-4. Application Example

Keeping motivations is quite important for the healthcare service. To do so, following applications are recommended.

(1) Collection and analysis application

Graphical display is effective after collection and accumulation of healthcare data. The presentation timing shall be based on user’s access and periodical presentation. Both presentation on WEB page and terminal application shall be available.

Graphical Example

- Weight graph per hour
- Calorie graph
- Food calorie balance
- Target Graph

- Ranking of healthcare competition

Graphical samples for weight and calories measurement are shown in Figure A-3 and A-4, respectively.

Figure A-3: Weight graph

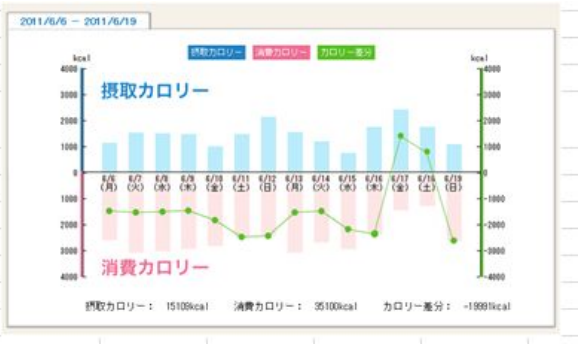


Figure A-4: Calorie graph

(2) Terminal application

Utilizing big display of TV and interactive nature of the hybrid box, following applications (Portal and pop-up message) are recommended. It seems useful that pop-up message of healthcare at power-on stage, at given time or in specific day. Graphical samples for portal menu and pop-up message are shown in Figure A-5 and A-6, respectively.

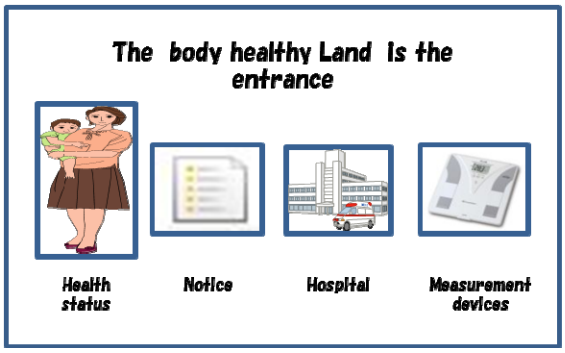


Figure A-5: Portal Menu Example

Figure A-6: Pop-up Message Example

A-5. Other Possible Services

A-5-1. Healthcare channel and exercise for elder person

Commercial channel of cable operator must be used effectively. The local healthcare

event is also broadcasted.

A-5-2. Promotion of healthcare device and installation aid

Promotion of healthcare device is also available by cable operator. Cable operator can insert banner so that user can navigate. When installing the system, additional installation aid program is also one of possible services.

A-5-3. Co-work with municipal office

In order to expand this home healthcare service to local community healthcare service, co-working with municipal office is important. As a part of local medical network, cable operator will be able to form a healthcare network involved medical office, hospital, pharmacy and health consultant. A local healthcare program can be provided for the purpose.

A-5-4. Face to face healthcare and Security

TV telephone function of the hybrid box can be used for this service. Customer can communicate with health consultant or nurse via TV telephone and can receive appropriate healthcare advice. This service can be extended home security services when appropriate sensor devices are introduced.