

M2M Pre-p

Pre-paid Health Management (Pets)

• Technology Reports •

Pet Fit: Keeping Dog Lovers in touch with their Pets

The market in pet-related goods and services exceeded 1.4 trillion yen in 2012 and is expected to continue to grow in the future. In March 2014, NTT DOCOMO began providing the Pet Fit *1, pet monitoring service in Japan, the first of its kind in this market. Pet Fit provides health monitoring as well as search and detection features for when pets get lost, and uses a compact and light-weight dedicated device that incorporates various sensor and communication functions. This article gives an overview and describes the functions of the Pet Fit service.

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1. Introduction

Pets have become like members of the family, and can play a therapeutic role, which makes them indispensable partners in our daily lives. The petrelated market has also grown to exceed 1.4 trillion yen and is expected to continue to grow in the future.

As such, NTT DOCOMO has begun providing the "Pet Fit" service as of March 14, 2014, in addition to its conventional services for people. It is a new pet-minding service for the other members of our families, our pet dogs. The service provides visualization of data, not previously available, related to the pet's current state and health, enabling the customer to maintain its health and support its growth like never before. Note that the service currently is only for dogs.

This article gives an overview of the Pet Fit service and describes each of its features.

2. Service Overview

2.1 Features

An overview of this service is shown in **Figure 1**. With the service, sensor data related to the pet's condition, such as ambient temperature, healthrelated data, and location, is gathered by a dedicated device attached to the dog, and can be viewed by the user through the Pet Fit server using a special applet. The main features of the service are described below. Sensor data gathered by sensors in the dedicated device (health data) are analyzed, allowing the user to check their pet's current (and past) state of activity and the ambient temperature through the service site. The service can also send email notifications if the ambient temperature exceeds a pre-set value, such as if an air conditioner malfunctions.

2) Enables Easy Health Management

Users can check comments from veterinarians and other specialists on the service site, selected based on health data and information registered by the user, and on data such as the number of steps taken by the dog, distance traveled, intake and burned calories, hours

*1 **Pet Fit:** A trademark of NTT DOCOMO.

¹⁾ Remotely Indicates Current State

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of sleep and number of sleeps.

 Indicates Location, Including When Missing

If the service determines that the pet is lost (or missing), the Pet Fit server notifies the user with an email, and the user can use the service site to view on a map, the GPS readings from the device attached to the pet.

2.2 Device

To use the service, a dedicated device called a Pet Fit Tag 01 (hereinafter referred to as "tag"), which is attached to the pet, and a Pet Fit Station 01 (hereinafter referred to as "station"), which is installed in the home, are required. Some specifications for the tag and station are shown in **Table 1**. The tag has 3G communication and GPS functions and is compact and lightweight, so it can be used for small dogs as well. It also has accelerometers and a temperature sensor, which are used for health management. This is the first service in Japan for pets that uses a dedicated device with 3G communication capabilities and which automatically gathers, stores and manages pet health data.

2.3 Rate Plans

A pre-paid fee model is used for the rate plans. When a user first accesses the service site and activates the line of an un-registered tag, the line can be used for up to 75 MB of data over a period of up to 365 days. With this rate plan, tags can be sold through existing NTT DOCOMO sales channels as well as through new sales channels such as pet shops and veterinary clinics.

A single user can register up to ten tags. A single tag can also be registered by up to ten users, so the whole family can keep an eye on how their pet is doing (**Figure 2**).

3. Functions

3.1 Support for Multiple Carriers and Devices

The service can be used from smartphones from NTT DOCOMO and other carriers and from PC as well. It is not limited to NTT DOCOMO subscribers or terminals and is available to a wider range of users and terminals (a dedicated applet must be downloaded from



Table 1 Device specifications

Device	Pet Fit Tag 01	Pet Fit Station 01
Size	Approx. 32(H) × 50(W) × 17.3(D) mm	Approx. 76(H) × 76(W) × 45(D) mm
Weight	Approx. 29 g	Approx. 92 g

Google Play^{TM*2} to use it).

In order to implement for multiple carriers and devices, authentication with a docomo ID and password is used. The docomo ID is an ID used to authenticate users when they use smartphones from NTT DOCOMO, various services for PCs, and sites that support "docomo Login". It is also available to users not subscribing to an NTT DOCOMO phone.

The authentication sequence is shown in **Figure 3**. The user requests the Pet Fit server login screen, and the server responds to the request with the login screen. The user enters a docomo ID and password on the login screen and clicks the login button, is notified of the authentication result by the docomo ID infrastructure, and then transitions to the service home screen.

3.2 Activity State Monitoring and Health Management Functions

Many users are quite concerned about managing the health of their pets, and keep records such as what they eat, vaccinations, illnesses, injuries, weight, and height. However, this is generally done manually, using an "analog" method such as a pet note book. As such, we implemented functions to monitor the pet's conditions and manage its health by automatically gathering health data from the tag, storing it on the Pet Fit server, and analyzing it, without the need for user intervention. 1) Activity State Monitoring

This function automatically uploads health data collected by the accelerometer and temperature sensors in the tag to the Pet Fit server and analyzes it using proprietary algorithms to classify the pet's activity state into one of four categories: "sleeping", "resting", "walking" or "running". These can then be displayed on the service site (**Figure 4**). Users can then access the service site using a smartphone or other device, even while they are at work or away from home to see, for example, that their dog is behaving normally and appears in good health. This can help







^{*2} Google Play[™]: A service from Google for delivering applications, video, music and books to Android terminals. Google Play[™] is a trademark or registered trademark of Google, Inc. U.S.A.

increase their sense of security.

2) Health Management

This function provides health related data on the service site based on information including the health data from the tag, information registered beforehand on the site, and diet information. The main data items displayed are listed below.

- Activity state/Sleep time
- · Activity state summary
- · Calorie intake/burn
- · Distance traveled
- Walk record (No. times/Minutes/Distance)
- · Ambient temperature

Besides these, comments from veterinarians and other specialists are also displayed. These comments use proprietary algorithms designed to provide detailed advice suited to each individual pet (**Figure 5**).

3.3 Search and Detection when Lost

A survey regarding concern over pets going missing indicated that most users do feel concerned about their pet getting lost (**Figure 6**).

To help eliminate such concerns, the tag and the station are used to provide detection and search functions (**Figure 7**).

For these functions, the station emits a short-range radio signal, and the range of this signal is called the minding area. The tag detects whether it is within this







Figure 5 Health management screen example

minding area or not in order to decide whether the pet is missing. Specifically, when the Bluetooth^{®*3} communication used between the station and the tag is interrupted (at distances beyond roughly 50 m) (Fig. 7(1)), the system determines that the pet has gone missing and the tag notifies the Pet Fit server (Fig. 7 (2)),

*3 Bluetooth[®]: A short-range communications standard between mobile terminals, such as cell phones, notebook PCs, PDAs, etc. A registered trademark of Bluetooth SIG Inc. in the United States. the server sends a notification email with a pass code to an address preregistered on the server, and the tag begins taking GPS measurements every three minutes (Fig. 7(3)). The user can access the service site using the applet after receiving the email notification, and check the current location on a map from the GPS measurements taken by the tag.

3.4 Pre-paid Data Charging

NTT DOCOMO already has prepaid rate plans, including "Pre-paid Data Plan 20H" and the "Pre-paid Data Plan 100H" provided on a time-based model, but we have introduced the new "Prepaid Data Plan 75MB" provided on a data-volume model for the Pet Fit service.

The tag is equipped with an NTT DOCOMO User Identity Module (UIM)^{*4} card, and each tag is associated with a mobile phone line. The subscription information for each line and data balance remaining is centrally managed in a line-management system that is independent from the Pet Fit server.

The line management sequence is shown in **Figure 8**. When the line management system receives a connection request from a tag, it checks whether there is a valid subscription and data balance remaining, and if there is a valid subscription and remaining balance, it enables data communication. After communication begins, it accumulates



Figure 7 Search and detection functions for when pets go missing



^{*4} UIM: An IC card which stores subscriber information including the phone number. Inserted it into the mobile terminal and used to identify the user.

data usage in bytes and subtracts it from the remaining balance. When communication is disconnected, it stops subtracting and sets the remaining balance.

During communication, if the data balance becomes zero, data communication is terminated. Note that if the usage period (365 days) expires before the data balance has reached zero, the remaining balance is lost and no further data communication is possible, but if the account is renewed within the renewal grace period (30 days), the same account can be used continuously. The line management system also has a function that sends a notification to the pre-registered carrier email address if the remaining data balance drops below 5 MB earlier than 30 days before the end of the usage period. This encourages the user to complete the renewal process and avoid having the service cut off unexpectedly.

4. Summary

In this article we have given an overview of the Pet Fit service and described its features. In order to further expand the range of new services in the future, including the market for devices incorporating communications functions, it will be important for NTT DOCOMO not to work alone but to actively pursue cooperation in various industries, and to generate synergy effects among them. To realize "Shaping a Smart Life" with every one of our customers, we will continue to work on making life safe, secure, convenient, and comfortable for our customers, including the other members of our families, our pets.