

NTT DOCOMO's Location Information Notification Service for Smartphones for Juniors — Guardian Technology Protecting Children —

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The recent rapid expansion of the smartphone market has also seen a year by year increase of minors expressing intent to use smartphones, currently at the extremely high levels of 90% among high school students and 80% among elementary school students [1], with further popularization expected into the future.

However, parents who let their children have smartphones are concerned that their children may encounter on-line trouble such as adult dating sites, or that their children may become too preoccupied with their smartphones. In fact, a survey of parents with children in elementary and junior high schools revealed that in addition to smartphone purchase and maintenance costs, the most common reason that parents did not want their children to have a smartphone was the potential for trouble with adult dating sites and so forth. Aiming to further strengthen the “safe and secure” NTT DOCOMO brand image with the creation of Kids' PHONE and Raku-Raku PHONE series and respond to these trends, NTT DOCOMO developed a smartphone for juniors that meets the needs of parents concerned about costs and security (**Photo 1**).

In this article, we briefly described the child pro-

tection functions in these products, and the substantial requirements of location information notification services designed for child-friendly terminals, and their supporting technologies.

Child protection functions are listed below.

- Telephone and e-mail restriction functions
 - Functions to bar sending and receiving sp-mode mail/SMS^{*1} or making and receiving calls using numbers not registered in the phone book to prevent adult dating site trouble etc.
- Functions to bar download and use of certain applications
 - Functions to individually specify and bar application download or use of applications already installed.
- Functions to restrict usage and calling times
 - Functions to restrict usage time and calling times to appropriate usage scenes to prevent usage during school or late at night etc. These are also functions that can be used to set maximum daily usage and calling time to prevent overuse.
- Functions coupled to security alarm signaling, and functions to notify location information data
 - The security alarm function is operated by

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*1 **SMS**: A service for transmitting/receiving short text-based messages. SMS is also used for transmitting/receiving mobile terminal control signals.



Photo 1 SH-05E Smartphone for Juniors

pressing the volume control on the side of the telephone up or down for more than one second, which activates a loud alarm if there is an emergency. The function can also be set to automatically make a call and notify location information data when the alarm is activated.

Below, we described the location information notification service.

1) Basic Location Information Notification Service Functions

Currently, terminal positioning is possible with many smartphone terminals via GPS or base station positioning functions. Location services currently offered by NTT DOCOMO that use these functions include “Imadoco Search,” (meaning “where are you?”) “Imadoco Kantan Search,” (“where are you?” easy search) “Keitai-Osagashi Service” (lost mobile terminal locator service) and “Emergency Call Location Notification,” and are available through the docomo location information application [2], and the docomo location information application coupled with a security alarm called docomo location information (buzzer) application. We have added new child-friendly smartphone functions to these two DOCOMO applications. Firstly, we describe an overview of these DOCOMO applications and their existing functions by introducing the basic functions

of child-friendly smartphones below.

(a) docomo location information application

This application is designed to run the “Imadoco Search,” “Imadoco Kantan Search,” “Keitai-Osagashi Service” and “Emergency Call Location Notification” services developed for i-mode terminals on Android™*2 OS terminals. Below, we describe the application using Imadoco Search as an example.

Firstly, when a person searching with Imadoco Search makes a location search request (**Figure 1** (1)), a control SMS is sent to the smartphone for the docomo location information application from the server providing the service (Fig. 1 (2)). When this control SMS is received, the platform*3 notifies the application (Fig. 1 (3)), when the function that receives the control SMS performs reception processing for the notification to launch the application. When this control SMS is received ringing or vibrations occur according to ring tone settings to notify the person targeted for the search, and the application determines whether to provide location information according to settings made by the person targeted for the search. If settings are made to

*2 **Android™**: A trademark or registered trademark of Google, Inc., in the United States.

*3 **Platform**:The basic software required to run applications.

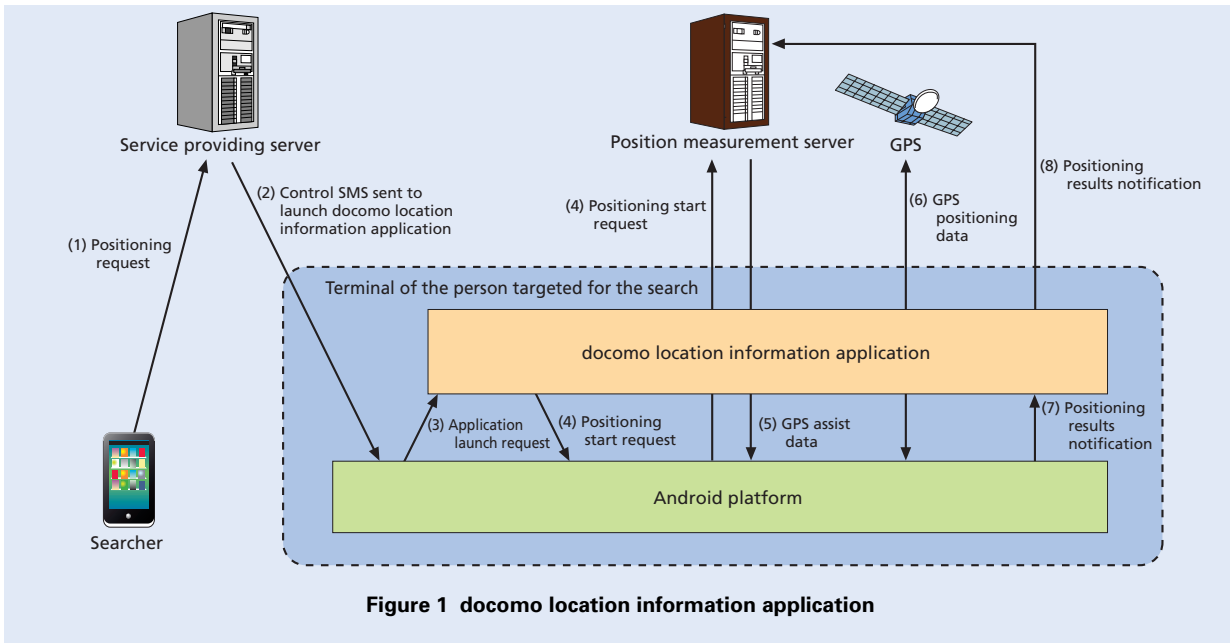


Figure 1 docomo location information application

provide location information, the location of the terminal is measured using GPS etc (Fig. 1 (4)-(7)). After measuring location, the application notifies the position measurement server of the results of position measurement (Fig. 1 (8)), which then notifies the person that requested the search of the terminal location.

(b) docomo location information (buzzer) application

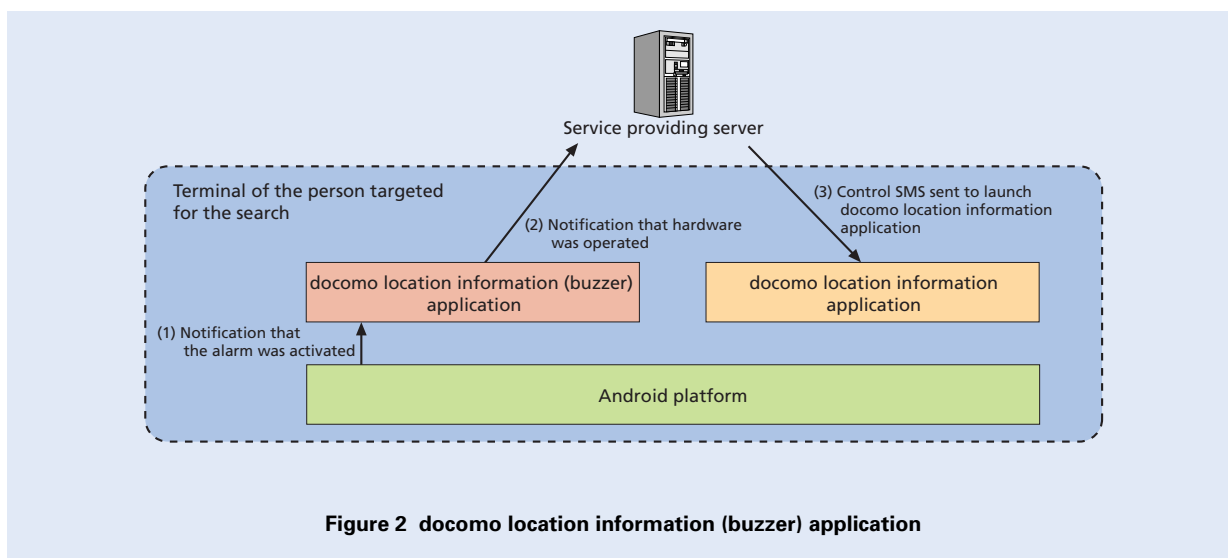
This application is coupled to a hardware alarm in Android OS terminals, and notifies the service providing server when the alarm is activated. When the service providing server receives this notification from the application, it sends a control SMS to the notifying terminal to launch the docomo location information application to enable the position providing function. We describe the operation of this application below.

Firstly, when the alarm is activated, the terminal notifies the application that the alarm was activated (Figure 2 (1)). After the application receives this notification, it notifies the service providing server that the alarm was activated (Fig. 2 (2)). When the service providing server receives this notification, it sends a control SMS to the terminal, and the platform launches the docomo location information application on reception of the control SMS (Fig. 2 (3)). The

above series of operations enable the docomo location information application to launch when the terminal user activates the alarm and enables the position providing function.

2) New Functions for Child-friendly Smartphones

Because child-friendly smartphones are designed for children, these devices must meet stringent requirements for safety and security. We have developed new additional functions for the docomo location information application and docomo location information (buzzer) application to meet these requirements. Previously it was only possible to link docomo location information (buzzer) application with hardware alarm activation to enable the position providing function with the docomo location information application (security alarm search function). However, we have developed additional functions to provide position using the functions in the docomo location information application via the docomo location information (buzzer) application, by making it possible to operate by touching an icon for the docomo location information (buzzer) application, or by switching the terminal power OFF on child-friendly smartphones. Touching the icon for the docomo location information (buzzer) application to provide location information is called the “Instant notice search” function, whereas providing



location information by turning the terminal power off is called “power OFF search” function. We described an overview and the operations of these functions below.

- Instant notice search

Instant notice search is a function that provides location information when the user presses the instant notice icon for the docomo location information (buzzer) application. In this case the alarm is not activated so that the user can provide location information unnoticed by others. Previously the docomo location information (buzzer) application only processed location search requests with notification of alarm activation, but we have modified the system so that processing for location search requests is also possible by pressing the instant notice icon for the docomo location information (buzzer) application. Coupling the instant notice icon with the docomo location information application enables the position providing function.

- Power OFF search

Power OFF search is a function that automatically provides location information of the terminal user when the terminal power is switched OFF. Similar to the instant notice search, this function has been designed to launch the docomo location information (buzzer) application to

process location search requests when the power is switched OFF. Even though this function employs the power OFF operation performed by the terminal user, it cancels power OFF processing and performs location provision processing, and once that is completed, it restarts the power OFF processing to turn the terminal power off. This enables coupling of the docomo location information application with the power OFF operation to enable the position providing function.

Child-friendly smartphone with those new functions is already available on the market, and we plan to offer new location information notification service functions for the product in the coming days.

By providing the product and services and cultivating IT literacy in children while mitigating the risks associated with IT activities, we plan to further invigorate and advance the ICT society and develop technologies to achieve social safety and security.

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