Technology Reports

Special Articles on Services for Next-Generation Smartphones

Platform for Providing New Smartphone Services

*NTT DOCOMO has achieved an application platform for providing new services geared to smartphones. This platform provides users with safe, secure, and convenient access to services while leveraging the advantages of the Android[TM*1] OS known for flexible application development. It facilitates the development of multiple applications for configuring new smartphone services through appropriate mapping of applications and functions thereby achieving future extendibility, ease of maintenance, and more efficient development.*

Communication Device Development Department

Mao Asai[†]
Ayaka Otake

1. Introduction

An open platform[*2] like Android OS provides for flexible development of applications. This feature must be exploited when seeking to develop new services for use on smartphones. At the same time, users who have grown accustomed to using conventional feature phones (i-mode terminals) must be provided with a platform that they can feel comfortable in using. Additionally, as new services for smartphones will be configured using multiple applications, developing applications in a vertically integrated manner is not the most efficient approach. At NTT DOCOMO, we recognized beforehand that future development work had to be made more efficient and that development periods had to be shortened, and that a highly extendible and flexible platform was therefore needed. In this article, we describe platform and application design/evaluation policies for achieving new smartphone-oriented services.

2. Design Policy

With the aim of achieving existing services developed in the past for conventional feature phones on Android OS, we extracted essential feature configurations and policies and studied means of implementing them on this OS. A precondition that we established here was that these services would be achieved on the application layer in order to facilitate function extensions and improvements, maintainability at the time of OS updates, and overall extendibility. Thus, instead of simply transplanting existing services and functions in their present state, we revised them with the result that they would appear in equivalent form or meet the service requirements and functional specifications of a smartphone.

However, as an exception to this policy, we made only the minimally required extensions with respect to the Android OS for functions involved with user safety and security. In making these extensions, we avoided original

† Currently Product Department

*1 **Android**[TM]: A software platform for smartphones and tablets consisting of an operating system, middleware, and major applications. A trademark or registered trademark of Google Inc., United States.

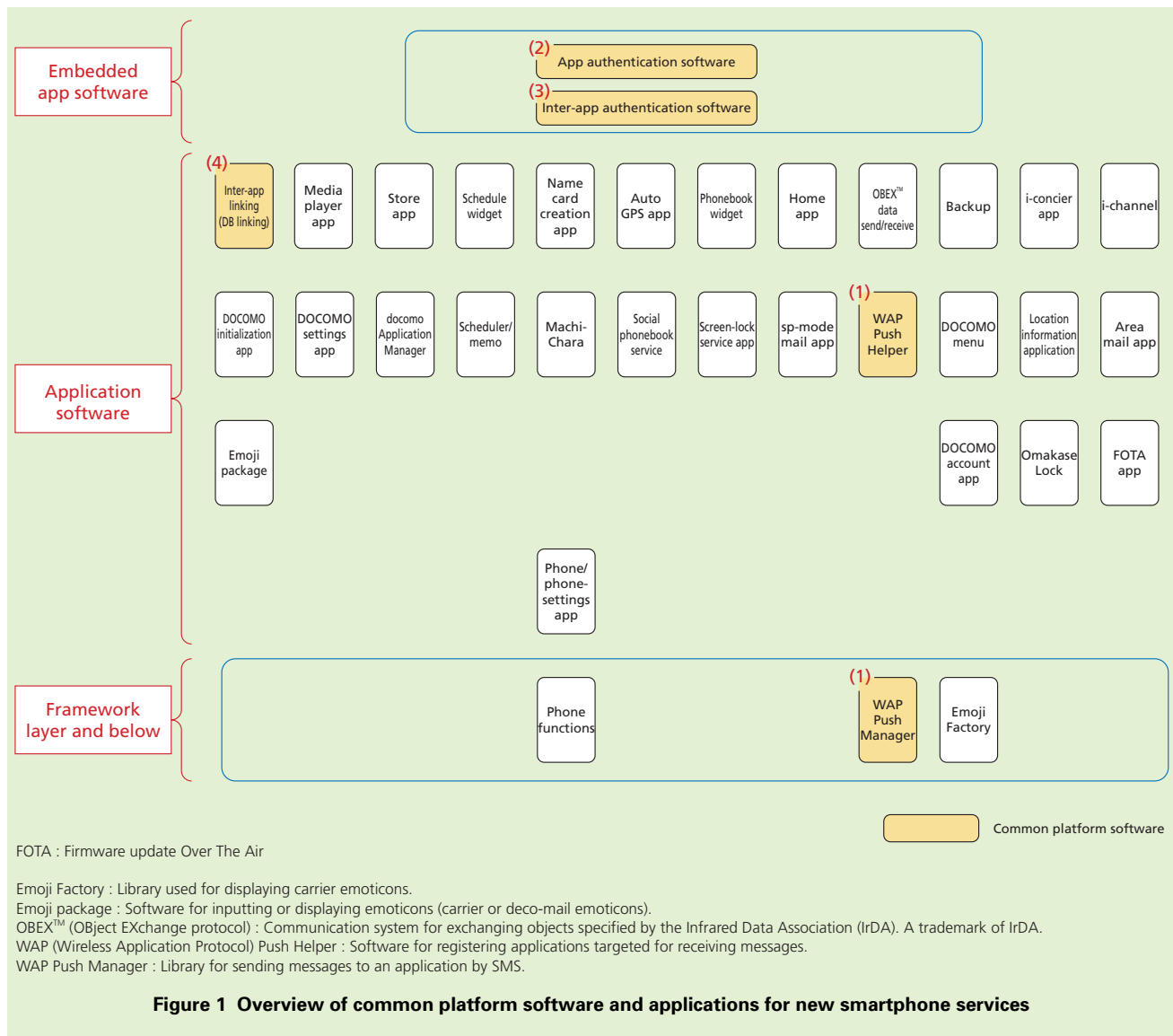extensions taking future affinity with the Android OS standard into account.

Furthermore, from among the function configurations and policies that we extracted and analyzed as described above, we treated those that could be used and applied in a general-purpose manner as constituting a platform for achieving new services geared to smartphones.

3. Common Platform Software

We extracted functions that could be used in common and in a general-purpose manner in applications making up new services for smartphones and provided them as common platform software. An overview of common platform software and applications for new

smartphone services is shown in **Figure 1**. Identifying, developing, and providing common platform software in this way has helped to improve development efficiency and shorten development time while enabling a consistent policy to be applied through services.

Specifically, the following functions are provided as common platform software:

FOTA : Firmware update Over The Air

Emoji Factory : Library used for displaying carrier emoticons.
Emoji package : Software for inputting or displaying emoticons (carrier or deco-mail emoticons).
OBEX™ (OBject EXchange protocol) : Communication system for exchanging objects specified by the Infrared Data Association (IrDA). A trademark of IrDA.
WAP (Wireless Application Protocol) Push Helper : Software for registering applications targeted for receiving messages.
WAP Push Manager : Library for sending messages to an application by SMS.

Figure 1 Overview of common platform software and applications for new smartphone services

*2 **Platform**: Base software for running applications. In this article, refers to software lying above the OS.

- Message sending by SMS[*3] to specific applications (Fig. 1 (1))
- Server-application authentication to ensure that the application is one providing an NTT DOCOMO service (Fig. 1 (2))
- Application-application authentication in the case of an application used by several applications so that the former can control any application that attempts to use it (Fig. 1 (3))
- Database linking so that data managed individually by several applications can be accessed as if that data are all stored in a single database (Fig. 1 (4))

4. Common Policies and Guidelines

More than 20 applications were developed at the same time to introduce new services for smartphones. When dividing up the work of developing many applications among different developers, it is important that they share a comprehensive picture with respect to what they are about to develop and that they clarify common principles. To this end, we have established policies and guidelines irrespective of service requirements that cover such areas as security, protection of personal information, traffic, and charging. These policies and guidelines include provisions for a variety of characteristics such as performance, power saving, user interface, external output, and operation during roaming, tethering, etc. The requirements for individual applications are determined on the basis of these provisions.

Also of importance here is that applications used for achieving a new smartphone service frequently interface with each other and exchange data. To ensure that each application performs the operations expected of it by other applications, application developers must establish a common direction beforehand. We accomplished this by extracting the relationships among the individual applications and matching them up accordingly in the early design stage. We also made sure that the applications share the same interface specifications to prevent issues from occurring in the development stage.

5. Customized Elements

Some applications leave alone elements that handset makers can customize depending on the product, or they enable functions associated with certain handset brands or that have been traditionally incorporated by handset makers to be used. This makes it possible to introduce new service applications for smartphones provided by a wide variety of handset makers.

6. Quality Evaluation and Checking

A platform for achieving new services geared to smartphones must enable multiple service applications to be executed simultaneously. We first constructed an environment for transplanting the new service platform to a personal computer or to smartphones already on the market separately from evaluating the performance or quality of individual applications. Next, we evaluated the simultaneous execution of multiple applications with a focus on compound and competitive operation, linked operation, and overall performance, and used the results as feedback to enhance the individual applications and the product itself. This approach achieved an overall improvement in smartphone products and services.

7. Conclusion

NTT DOCOMO has introduced a new service platform for smartphones, and to continue developing and expanding smartphone services into the future, it has also established design policies, guidelines, and interface specifications for common platform software and applications as essential platform elements. Looking forward, we will use the effects of these developments and areas deemed targets for improvement as feedback for enhancing the platform and expanding services and functions. We will continue our efforts toward the selection and construction of an optimal platform and application configuration as a foundation for providing NTT DOCOMO services.

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