"Smart Mobile Cloud" Contributing to the Use of Smart Devices

MATSUNAGA Keiko, NAKAYAMA Yoshitarou, TAKAGI Takahiro, HONGO Takuya

Abstract

Smart devices such as smart phones and tablet terminals are gaining remarkable popularity as their utilization spreads among both consumers and enterprises. As various services are now deployed on smart devices and the volume and complexity of such services are increasing more than ever, it is now necessary for the required solutions to be provided as a one-stop service so that solutions are capable of producing optimal value-added services. This paper describes the efforts being made by the authors at NEC for dealing with the current market environment in developing a cloud-based service solution for smart devices.

Keywords

smartphone, tablet, smart device, cloud

1. Introduction

Popularization of smart devices (the generic term for referring to smartphones and tablet terminals) has been remarkable in recent years (**Fig. 1**). A wide range of commercial interests including carriers and service providers have noted the capability of providing various services via sophisticated smart devices and are actively developing businesses in this field.

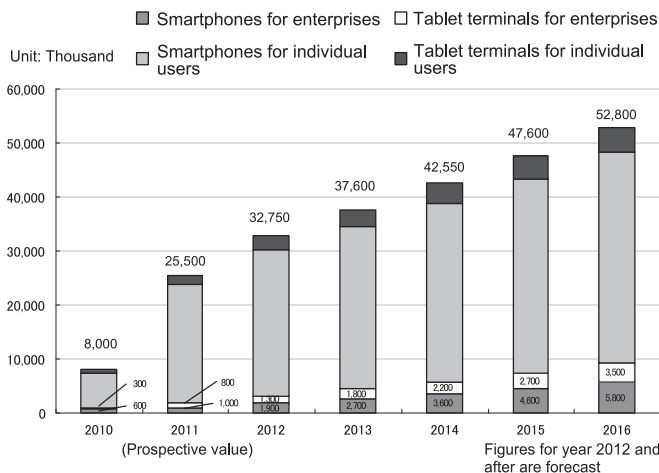Under such circumstances, it has become an important challenge for a business to start provision of services at low cost and quickly. The cloud service (XaaS) is attracting attention as a solution for this challenge and its market scale is expected to increase in the future.

This paper describes the Smart Mobile Cloud (SMC), which is a cloud-based service solution for smart devices that has been developed by NEC to deal with such a market environment.

2. Outline of Smart Mobile Cloud

The SMC is composed roughly of three layers (**Fig. 2**), and by combining the layer components flexibly a service that offers extendibility is enabled. This feature thereby provides the SMC user with solutions that meet a wide range of options
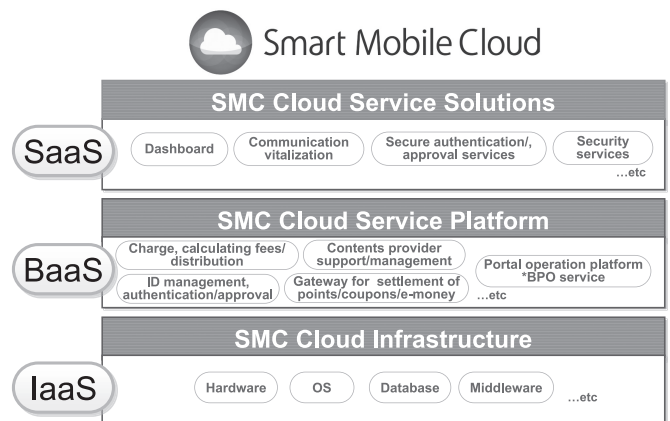

[Source] :Fuji Chimera Research Institute, Inc.: Smart Device related business for enterprises

Fig. 1   Estimation of smart device sales.

Fig. 2   Configuration of the Smart Mobile Cloud Solution.

according to business plans and functions. These are seamless solutions that are effective from startup to operation and administration.

The next section describes the efforts achieved so far and the features of each layer.

3. Efforts and Features of Each Layer

3.1 Efforts and Features of the SaaS Layer

The SaaS layer provides services that support positive use of the open & mobile values of smart devices. In this section, we will deal with smart communication support solutions that utilize smart devices.

● **Smart Communicator "Catch!"**
This solution estimates the status of the communication recipient (while walking or traveling in an automobile or in a train, etc.) based on the information from the acceleration sensor incorporated in each smart device and recommends the smartest method of communication to suit the status (**Fig. 3**).
This procedure supports efficient communications when using smart devices by determining the status, recommending the optimum communication method and offering a reply template selection function. The status determination technology can also be applied to support automatic selection of the optimum network communication environment for the smart device. As various means of communications including 3G and Wi-Fi are
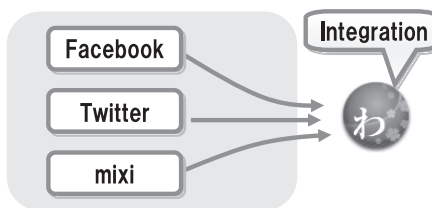

Fig. 4   Image of service provided by "Wa."

available for smart devices, selecting the best communication method for the current status contributes to a reduction in the battery load of devices as well as to the network load of the carriers.

● **Social Communicator "Wa"**
One of the most frequently used services for smart devices is the SNS (Social Networking Service).
In addition to SNSs such as Twitter, Facebook and mixi, a large number of convenient web services are currently available including Google news, YouTube and the Hatena Bookmark.
Social Communicator "Wa" performs integrated management of information and provides a communication application with an easy-to-use user interface, instead of leaving the user to access the frequently-used services individually (**Fig. 4**). Active use of "Wa" will implement smart information management of smart devices.

3.2 Efforts and Features of BaaS (Backend as a Service) layer

The BaaS layer componentize on the functions required for deploying services and provides them as service development infrastructures. The specific function components include authentication, billing, settlements and loyalty points service management. The member authentication, service billing, settlement and loyalty points service management services are essential service components. If a provided service can implement these functions by utilizing the function components of the BaaS solution of the SMC in place of development from zero (**Fig. 5**), it will be possible to reduce the service and application development loads and to concentrate resources on the creation of the value-added elements of the services.

The functions provided as the service development

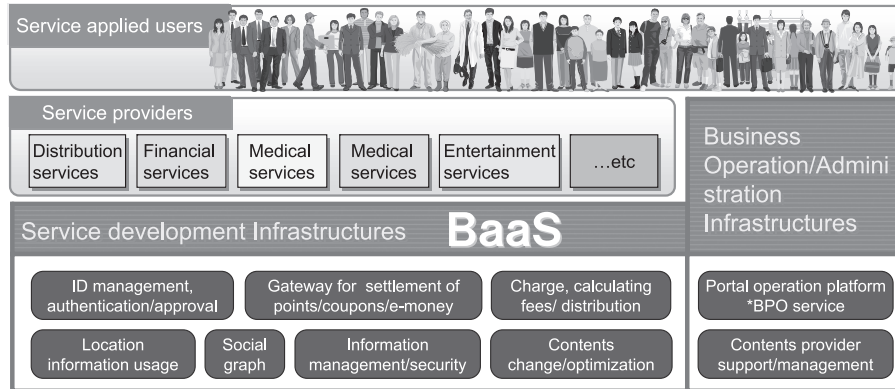Fig. 3   Image of service by Smart Communicator "Catch!"
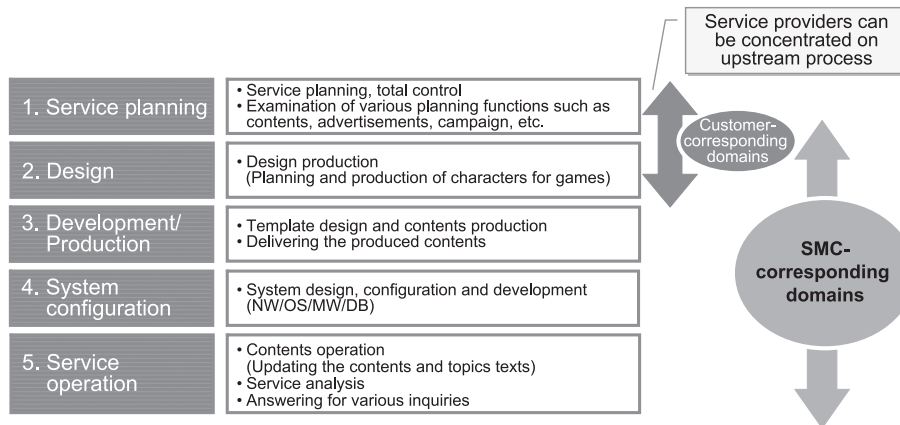
Fig. 5   Outline of BaaS function.

Fig. 6   Example of use of business operation/administration infrastructures.

infrastructures are based on the expertise that has accrued via our development of carrier and business service systems and our NC7000 Series network service infrastructure software. We provide API that ensures easy access to a number of high-quality features without exposing the complexity of the functions and services of high difficulty for the users.

To ensure service support from startup to actual operations as well as to improve the efficiency of service development, functions and services for supporting the operation and administration are also provided. These functions are defined as the business operation/administration infrastructures and their workflows (procedures) are stylized and automated in order to reduce the workload related to service administration and to increase the speed of the PDCA cycles of services (**Fig. 6**).

3.3 Efforts and Features of the IaaS (Infrastructure as a Service) Layer

The IaaS layer provides the flexibility that makes it possible to secure the IT resources quickly according to the degree of growth of each service in the service business where estimation of growth is highly difficult. At the same time as

"Smart Mobile Cloud" Contributing to the Use of Smart Devices

ensuring the availability and scalability of the system, this layer provides the functions relevant to the system monitoring/operation. These infrastructures function in common for improving the efficiencies of the design, construction and testing that have been done individually, as well as reducing the operation and maintenance costs of the IT resources.

The public cloud IaaS market provides a large variety of services. However, some of these are not provided with quality guarantees while some do not provide accurate information on payment before use and the prices may become very high due to detailed pay-as-you-go billing.

NEC provides safe and secure IaaS by incorporating our expertise in the provision of carrier system infrastructures in order to make it capable of providing service quality at a level that allows it to be used as a substitute for telecommunication equipment for carriers. We also manage the utilization situations minutely by distributed management and by provision of resources.

For the future, we are planning to automate the service extension simulation and evaluation testing and to build a platform that features high compatibility with other IaaS services, so that service providers can perform service transition and service extension more flexibly.

4. Examples of Services Utilizing SMC

4.1 Improvement of User Attraction Performance and Profits

The SMC creates new service values by capturing how the information element related to the services provided via smart devices are exchanged between the users on an SNS and by utilizing the results in the form of life logs and social graphs. Specifically, we analyze the influential users (those users who can easily influence other users) and support serendipity (potential interest that is not yet noticed). We then feed back the information optimally to the service users and service providers in order to offer new, personalized values and effects.

In the retail industry the O2O (Online to Offline) service has recently become topical. Services that support the attraction of consumers to retail stores and their purchases based on linkage with their smart devices are attracting attention. The SMC can detect the location information of smart devices via Wi-Fi and acoustic-wave equipment and implement a mechanism for promoting revisits of consumers based on linkage with the obtained information by applying gamification factors, for ex-

ample by offering points and coupons and by sending messages as well as by analyzing data such as the utilization history of consumers. This facility makes it possible to set a management policy that can build a win-win relationship between consumers and retail stores.

4.2 Provision of Added Values and Differentiating Elements for IaaS Services

The previously stated IaaS layer businesses has difficulty differentiating IaaS infrastructure which results in falling into price competition. On the other hand, users also have a need to reduce the lead time to the start of the IaaS service, including user provisioning and checking detailed charge billing policy. The BaaS solution of the SMC is capable of solving these issues by providing authentication/billing infrastructures for the IaaS service providers. This facility makes it possible to implement services that are more convenient and competitive for both users and managers of IaaS.

4.3 Marketplace

By consolidating several services for smart devices as a marketplace and providing them in an easy-to-use format such as a flat-rate system, while implementing mashup services, essential functions for the market place such as portal, user management and user authentication as well as a profit-distributed charging and utilization of situation analysis can be provided on SMC. This facility makes it possible to start up a new market business quickly and it also contributes to the operation and administration of the service after startup.

5. Future Perspectives

It is expected that the smart devices will evolve and diversify in the future. It will be required to provide services for various OSs, browsers and devices, so that multi-OS and multi-browser compatibility as well as enhanced user experience will be required. To meet this trend, we are making every effort to enable more convenient, simpler use of the SMC by developing technologies that make use of the HTML5 and by preparing SDKs and libraries for the smart devices.

We will also enhance linkages to our proprietary technologies including the big data, M2M and social media-based solutions in order to optimally improve the values of our total solutions.

6. Conclusion

In order to realize a society in which smart devices can be used safely, securely and more conveniently, we are refining the SMC into a one-stop solution that unify the process from planning of smart device services through their development, distribution, operation and maintenance.

SMC will continue to evolve as a foundation for creating new business.

*Google and YouTube are registered trademarks of Google Inc.

*mixi is a registered trademarks of mixi, Inc.

*Facebook is a registered trademark or trademark of Facebook, Inc.

*Twitter is a registered trademark or trademark of Twitter, Inc.

*Wi-Fi is a registered trademark of Wi-Fi Alliance.

*Hatena Bookmark is a registered trademark or trademark of Hatena Co., Ltd.

Authors' Profiles

MATSUNAGA Keiko
Department Manager
3rd Carrier Services Division
Carrier Services Operations Unit

NAKAYAMA Yoshitarou
Manager
3rd Carrier Services Division
Carrier Services Operations Unit

TAKAGI Takahiro
Manager
3rd Carrier Services Division
Carrier Services Operations Unit

HONGO Takuya
Assistant Manager
3rd Software Development Division
Network Software Development Operations Unit
NEC Communication Systems, Ltd.

Information about the NEC Technical Journal

Thank you for reading the paper.
If you are interested in the NEC Technical Journal, you can also read other papers on our website.

Link to NEC Technical Journal website

Vol.7 No.3 Smart Device Solutions

Remarks for Special Issue on Smart Device Solutions
NEC Group Paves the Way for Smart Devices

◇ Papers for Special Issue

Service platforms

Smart Device Management/Security Solutions Regardless of OS or Carrier

Solutions Supporting the Utilization of Smart Devices: System Introduction Case Studies

Authentication Solution Optimized for Smart Devices

"Smart Mobile Cloud" Contributing to the Use of Smart Devices

"BIGLOBE Cloud Hosting" Supports Building of High Quality Services

"Contents Director," Content Distribution Service for Smart Devices

UNIVERGE Mobile Portal Service: A Smart Device Utilization Platform Optimized for BYOD

Remote Desktop Software that Supports Usability of Smart Devices

SystemDirector Enterprise - A Business System Construction Platform to Facilitate Development
of Applications Compatible with Smart Devices

Smart Device Content Distribution Platform Service Using the BIGLOBE Hosting

Smart devices

Overview of "LifeTouch" Series Android Tablets

VersaPro Type VZ - A Windows 8-based, Large-screen Tablet PC

Development of an Android-based Tablet(Panel Computer series)

Solutions

ConforMeeting: A Real-time Conference System Compatible with Smart Devices for Conducting Paperless Meetings

BusinessView Maintenance Work Solutions Utilizing Smartphones

Application of the UNIVERGE Remote Consultation Solution to Elderly Care

Introduction of the GAZIRU Image Recognition Service

Tablet Concierge- An Ultimate Customer Service Solution -

Development of a Business Systems Template for Use with Smart Devices

Introduction of Video Communications Cloud Services Compatible with Multiple Devices

Technical researches

Towards a User-Friendly Security-Enhancing BYOD Solution

Implementing Secure Communications for Business-Use Smart Devices by Applying OpenFlow

Human-Computer Interaction Technology Using Image Projection and Gesture-Based Input

Noise Robust Voice UI Technology and Its Applications

◇ General Papers

Efforts to Solve the Congestion Problems of Mobile Communications Services during Major Natural Disasters
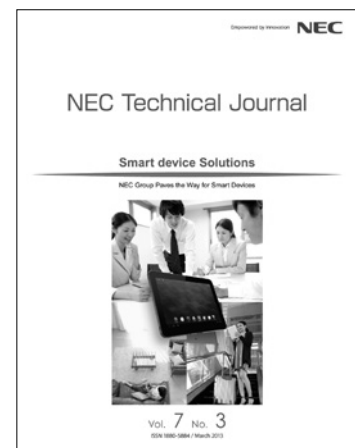
Vol.7 No.3

March, 2013

Special Issue TOP