

Billing/Settlement Platform “InfoBilling Lite” to Support Systems Integration and Platform Business Start-ups

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Abstract

Most of the billing/settlement platforms available today target large-scale core systems and are very expensive to deploy. We have developed a unique approach to billing logic, and used it as the basis of a lightweight billing/settlement platform that by specializing in flat-rate billing functions can be deployed at much lower cost than other platforms that are currently available. The new platform could provide a billing and settlement solution for data centers or basic billing and settlement functions for e-commerce businesses.

1. Introduction

The sheer number and variety of new businesses springing up on the Internet continue to grow at a phenomenal pace. In order for these businesses to get up and running in a reasonably short amount of time, all the systems upon which they are based are certainly not developed and built from scratch. Rather, it is far more effective to combine the shared functions that are typically required by such businesses: a user management function, a content delivery function, a user authentication function, and so on. A billing/settlement platform is essentially an integrated solution that provides all of the shared functions associated with billing and settlement of payments.

Figure 1 illustrates how a billing/settlement platform might be used by a business. When a user buys a product or service, the application providing the service requests the billing/settlement platform to issue a bill. Upon receiving this request, the billing/settlement platform registers the user who is to be billed, stores the billing data (known as billing tanking), generates request data, and sends the settlement data to a credit card clearing company. In addition, the platform also manages the receipt of payments from users, notification of receipt to the application providing the service, and reconciliation.

Billing is generally based on a metered pricing model such as charging 10 yen per 3 minutes of usage according to a charge table that is established in advance (metered billing), or based on a flat-rate pricing model such as charging 300 yen per purchase (flat-rate billing). And in terms of timing, bills can be issued for a one-time event (one-time billing) or can be issued at regular periodic intervals such as a monthly billing for basic services (periodic billing).

The billing/settlement platforms that are available on the market now offer a full range of sophisticated capabilities including metered billing and realtime processing based on complex rate tables. However, the services requiring these sophisticated capabilities are mainly just those of the phone service carriers and ISPs (Internet Service Providers) for connection charges, and these businesses constitute a very small fraction of services that could make effective use of a billing and settlement platform. The overwhelming majority of services use just a few of the functions that are provided by the high-powered billing/settlement platforms that are on the market. More recently, we have seen an increasing number of providers that offer services based on a simple, easy-to-understand flat-rate or price-per-event billing structure.

There is thus a significant demand for a cost-effective billing/settlement platform that provides simple billing functions and is easy to deploy in starting up new businesses and integrating systems.

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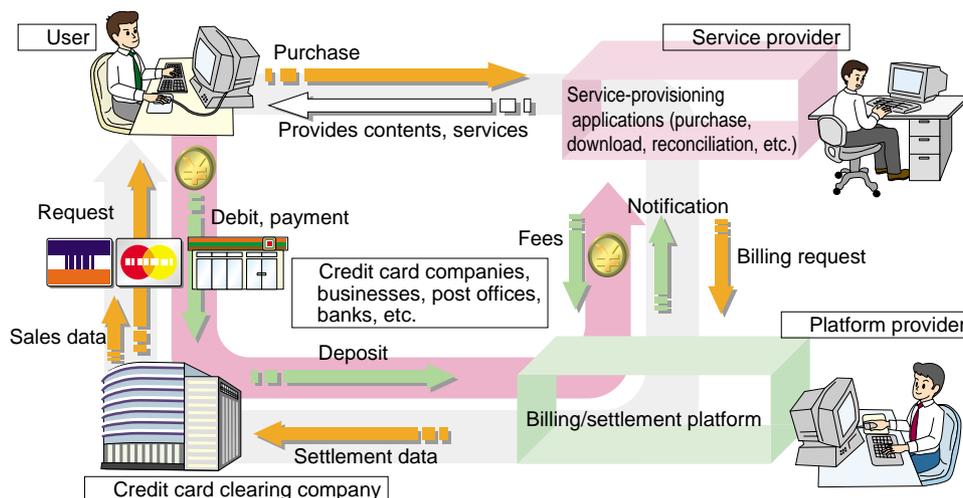


Fig. 1. Overview of how businesses might use the billing/settlement platform.

2. InfoBilling Lite

These considerations led NTT Information Sharing Platform Laboratories to develop InfoBilling Lite as a fast, lightweight billing/settlement platform that supports flat-rate billing for business needs and focuses on the specific functions needed for systems integration and platform businesses.

Table 1 shows an overview of the functions that are supported. As shown in Fig. 2, InfoBilling Lite consists of two basic modules: the billing server and the settlement gateway.

The billing server provides a number of APIs (Application Programming Interfaces) that support users and provider registration, billing management, and system monitoring. By creating an interface on the service-provisioning application side for linking to InfoBilling Lite, the platform can interwork with a diverse range of different applications. More specifically, the billing server provides the following functions.

- Billing execution and billing storage.
- Immediate card and credit verification with the credit card company when registering new users, purchase authorizations with the credit card company at time of purchase, and the generation of request data to be provided to the credit card clearing company.
- System management functions to administer and control the system.

The primary functions of the settlement gateway are managing credit card clearing companies, converting data into the respective formats of different credit card companies, and transmitting data. The

gateway is currently capable of credit card settlement and billing for payments at convenience stores, banks, and other kinds of businesses, to facilitate the rapid start-up of new businesses.

The functions required by a billing/settlement plat-

Table 1. Functions.

| Category | Function |
|--|---|
| Billing tacking functions | |
| Service provider bills users | Periodic billing |
| | One-time billing |
| | Platform provider bills service provider |
| Platform provider bills service provider | Periodic billing |
| | One-time billing |
| Settlement, credit functions | |
| Credit card payment | Immediate card credit acquisition function |
| | Immediate authorization function |
| | Batch authorization function |
| | Authorization canceled |
| | Reversal (card validity check) |
| | Generate request data |
| Pay bills (company, bank, etc.) | Generate request data |
| | Deposit result notification |
| | System management functions |
| System management functions | Batch automatic monitoring |
| | Recovery function |
| | Load distribution, redundant functions |
| | Blocking |
| User management API/DB | |
| User management API/DB | User data management (registration, updating, etc.) |
| | User data reservation processing |
| | User data batch processing |
| Provider management API/DB | |
| Provider management API/DB | Service provider |
| | Service provider data management |
| | Service provider manager data management |
| | Platform provider |
| Platform provider | Platform provider data management |
| | Platform provider manager data management |
| Billing management API/DB | |
| Billing management API/DB | Order data management (look up, modify, etc.) |
| | Cancel periodic billing |
| | Billing data management (look up, modify, etc.) |
| | Request data management (look up, modify, etc.) |
| System monitoring API | |
| System monitoring API | Health-check function |

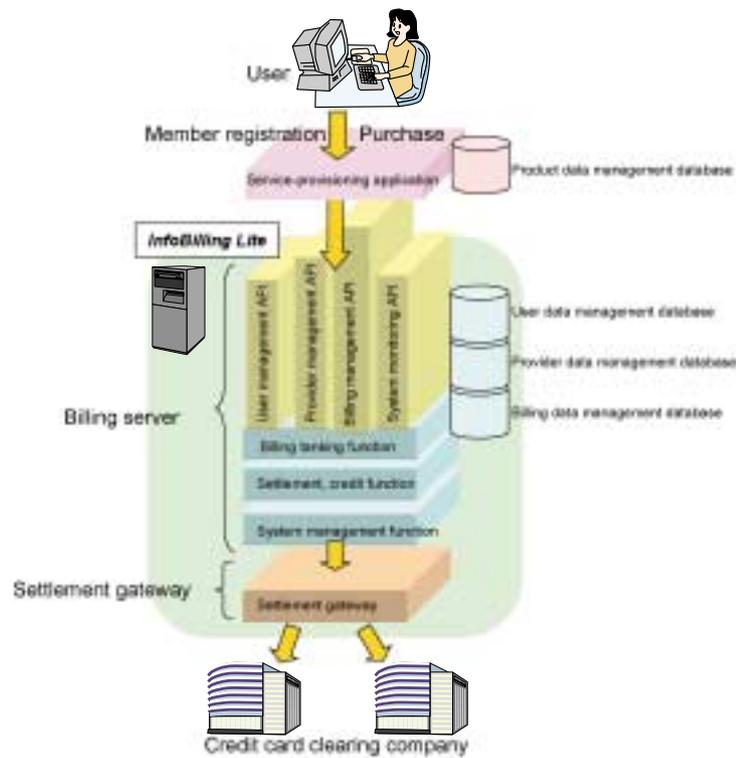


Fig. 2. System configuration.

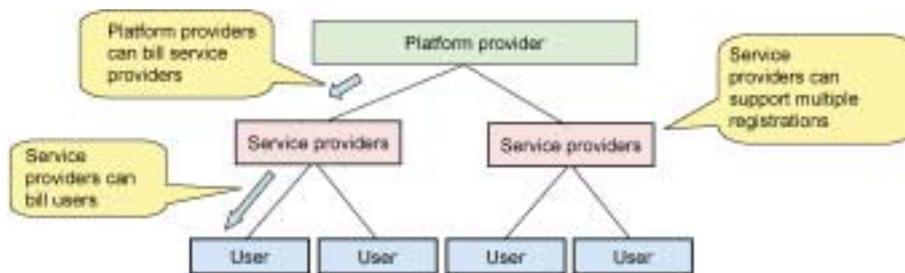


Fig. 3. Player model.

form differ depending on the business model (e-commerce, B2B, VoIP (Voice over Internet Protocol), portal, etc.) and the service layer that is supported. InfoBilling Lite is built around a “bill tanking function” as the basis of the billing function, and by separating the functions required by the different business model, the flexibility of the billing settlement platform has been greatly enhanced.

3. Application areas

Let us consider the InfoBilling Lite model shown in Fig. 3 in which several service providers are registered under one platform provider. The end users are then registered under the service providers. In this

model, two types of billing can occur: a service provider can bill a user of the service or the platform provider can bill a service provider. The platform thus supports not only billing and settlement for EC malls, content delivery services, and other Internet businesses, but also can be applied to billing and settlement proxy businesses through ISPs, data centers, and other platform providers. Table 2 shows some typical services that could be supported by the platform.

4. Key features and technical aspects

4.1 Reliable and expandable

Billing/settlement platforms demand a high degree of reliability. InfoBilling Lite was designed with reli-

Table 2. Service examples.

| Type of business | Service examples |
|---------------------------|---|
| Infrastructure businesses | <ul style="list-style-type: none"> • xSP billing users fixed monthly basic charges and optional usage-based charges. • Platform providers billing service providers for use of the billing platform. |
| Service businesses | <ul style="list-style-type: none"> • Billing for products purchased over the Net. • Billing for music, images, articles, and other digital contents. • Billing for lecture notes associated with e-learning. |
| Support businesses | <ul style="list-style-type: none"> • Billing for sales agency fees associated with auctions. • Billing online advertising businesses for advertising fees. • Billing for mediation services associated with e-markets. |

ability in mind and features automatic monitoring of batch and other processing times, automatic recovery in the event of a failure, preventative-maintenance health-check capabilities, system redundancy, and other safeguards to ensure the reliability of the platform. In addition, the system is not confined to a single server, but can be deployed as a load-distributed configuration, which enables the platform to grow along with a company's business.

4.2 Support for multiple types of credit card merchant agreements

When a product or service is purchased with a credit card, the transaction must be authorized by the credit card company. InfoBilling Lite supports multiple types of merchant agreements between a service provider and a credit card company to enable time-of-sale authorizations when a user makes a purchase, or batch authorizations that are processed on a monthly basis. This provides billing and settlement support for a full range of purchases from more costly items (time-of-sale authorization) to the sale of digital contents that cost very little (monthly authorization).

4.3 Credit card clearing

As it becomes increasingly commonplace to buy

music and digital images and similar digital contents for very small sums of money (micro-payments) over the Internet, it is not practical to obtain authorization from the credit card company every time a purchase is made. What is required is a type of merchant association agreement for transactions without obtaining authorization when the amount is below a certain predetermined threshold. This involves a processing procedure in which the credit card company verifies a registered user's credit card once a month (clearing), and InfoBilling Lite was designed to support this kind of processing.

4.4 Interworking with other platforms

As illustrated in Fig. 4, the InfoBilling Lite platform can be easily interconnected to other platforms through the Platform Integration Environment developed by NTT's Information Sharing Platform Laboratories. This enables new services to be rolled out very quickly by linking billing and settlement, Intellectual properties management platform, and other shared function modules.

4.5 High-speed processing

The InfoBilling Lite architecture features multiplexed processing and limits the data being operated

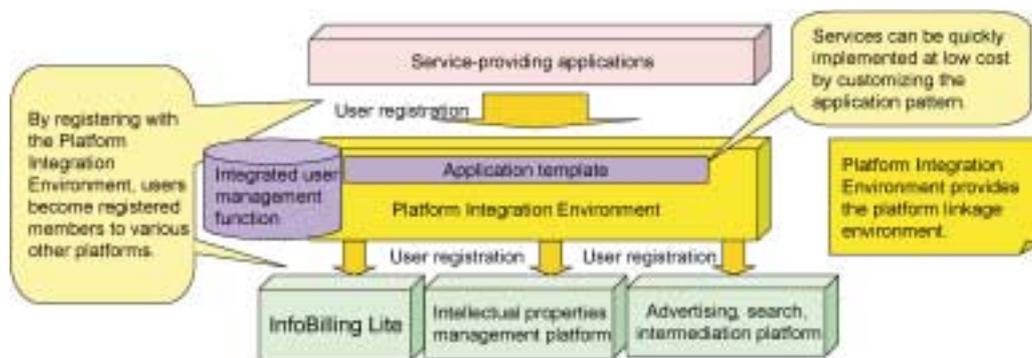


Fig. 4. Information distribution platform mediation function.

on at one time. The platform thus achieves high-speed processing with minimal fall-off in performance as the volume of data increases.

4.6 Settlement gateway

The settlement gateway absorbs interface differences among credit card clearing companies, and this enables the platform to interwork with most clearing companies.

5. Web server demonstration trials

Figure 5 shows a schematic of a billing/settlement platform based on InfoBilling Lite that is being made available on an experimental basis by NTT's Information Sharing Platform Laboratories as an independent Web service*1. The trials will give us an opportunity to assess the service-related aspects and the performance of the billing/settlement platform as a Web service.

6. Conclusion

Billing and payment functions are indispensable when services are offered on a commercial basis. By continuing to apply these capabilities to the various products and services developed by NTT Research Laboratories, we are working to achieve a comprehensive billing and settlement solution for services.

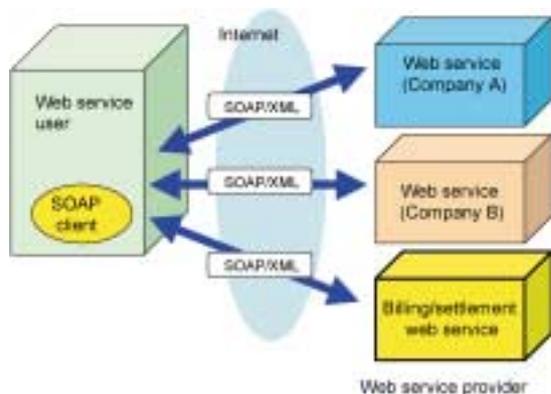


Fig. 5. Billing/settlement web service.

*1 The concept of a Web service involves the dynamic linkage of various applications distributed over the network using data formatted in SOAP (Simple Object Access Protocol)/XML to provide a single service.



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