

# Real-Time Billing for Internet Protocol (IP) Services

## Definition

Real time billing is the capability of doing business in real time, where up-to-the-minute information is instantly available and can be acted on immediately in response to customer expectations.

## Overview

The objective of this tutorial is to provide an overview of how real time billing works, the challenges of batch billing environments, and the importance of real time billing for Internet service providers.

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4. Provider Challenges
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## 1. Introduction

Few people could have predicted the rapid proliferation of the Internet that has occurred within the last decade. Once a haven for computer scientists, the Internet is now being used by tens of millions of people each day. The explosive growth of the World Wide Web (WWW) is fueling comparable growth in the Internet services market. International Data Corporation (IDC), the Framingham, Massachusetts-based research house, estimates that there were

over 68 million Web users worldwide at the end of 1997. IDC, meanwhile, projects an annual growth rate of 32 percent, resulting in 319 million Web users by the end of 2002.

Given this large base of potential customers, it is not surprising that the Internet services market is experiencing rapid growth as businesses increasingly turn to service providers to design, implement, and host their presence on the Web. In a recent research report entitled *The Internet is No Longer Optional*, Forrester Research, Cambridge, Massachusetts, declared that "Having grown from virtually nothing to \$2.8 billion in just 3 years, the Internet services market will continue to post stellar growth rates across all segments. The U.S. business Internet services market—nearly \$58 billion in 2003—will rival business long-distance phone spending in size."

As competition among service providers heats up, these providers are exploring new ways to increase margins, differentiate their services, and secure their place in an industry that is beginning to undergo a consolidation and shakeout. Peter Kastner, chief research officer, Aberdeen Group, states, "The Internet is truly a dog-eat-dog competitive world. We just can't use the technology that we used to in the past. Because of that, all of our traditional infrastructure things like billing, that used to work fine on a 30- or 45-day cycle, don't work any more. We need to allow customers to turn on a dime, try new services right away."

One of the most effective strategies being adopted by the leading providers is to take full advantage of recent advances in customer management and billing (CM&B) systems—advances that move CM&B out of the back office to take their place as real time front-office strategic systems. Within the larger Internet revolution, these new CM&B systems are causing a revolution of their own.

The service provider's infrastructure is critical. It can facilitate rapid adaptation and innovation or it can be a major stumbling block. The CM&B system is a fundamental component of this infrastructure because it performs the following functions:

- controls the key asset (the subscriber database)
- supports the primary value proposition (providing the service)
- manages the key interaction (collecting the money)

This tutorial will examine the differences between batch and real time CM&B systems, review challenges that providers are facing, and discuss the benefits of a real time CM&B system.

## 2. From the Back Office to the Front Lines

One of the most innovative features of today's CM&B systems is to turn the back-office billing system into a front-office, customer-facing selling system. The old-world model (i.e., the batch model) is relatively simple. After a network transaction (e.g., a voice call) three steps occur:

- The network element generates a usage record (CDR) and forwards it to the rating server.
- When there is sufficient volume or on a regularly scheduled basis, the CDR transactions are loaded and each transaction is rated.
- Rated events are then sent to a billing system and posted to the customer account.

The information flows in a single direction—from the network element to the billing system—and is the outgrowth of decades of 30-day billing cycles. No matter how much the batch process is speeded up, latency problems still exist.

In an article titled *Batch Systems for Internet Billing? Think Real Time!* in the January 1999 issue of *Billing World*, the authors (Dr. Matthew Lucas, consultant, and Dave Labuda, chief technical officer and vice president of engineering for Portal) pointed out that "When billing for Internet services, it is critical that the billing system is closely synchronized with network activity. This is the fundamental limitation with the batch model."

Revenue leakage is a common problem with batch billing systems, as subscriber usage is not rated immediately, and when rating later occurs, problems are uncovered. For instance, with a batch system, providers will detect missing call start times only when billing is run, which may be several weeks after an event occurred. Revenue recovery procedures are costly and cumbersome.

With batch billing systems, the provider cannot tell what the subscriber is doing at any given point in time. Effective target marketing, which calls for making an offer based on the most recent activity of the subscriber, is very difficult in this environment. In addition, preventing fraud is practically impossible with a batch system. While batch systems can detect fraud—for instance, determining that multiple people used the same user identification—batch systems can only react to the fraud once the fraud has occurred. Batch systems are incapable of actively preventing duplicate log-ins, as real time data is not available.

Batch systems cannot track a subscriber's real time balance, a fact that may disadvantage both the subscriber and the provider. Subscribers cannot obtain real time account balances and must instead wait until a billing cycle has been run. The account balance becomes outdated as soon as another usage event, such

as a CDR, is generated. Providers suffer because they are unable to detect if a subscriber has reached a credit limit. Overextending credit to unworthy customers increases a provider's bad debt expenses.

Companies are finding that traditional billing systems are ineffective for the Internet. Real time CM&B systems are replacing older batch systems that lack the real time capabilities and flexibility required by Internet services. By turning the CM&B system into a customer-facing application, the provider's management can make decisions based on real time data.

### 3. Real-Time Billing

The next-generation CM&B systems allow the provider to link subscribers, services, and money in real time in order to identify and take advantage of new IP-based business opportunities proactively while providing superior customer service. For example, one large telecommunications company had purchased a site license to use a batch billing system for its telecom business. The Internet division of this company was also covered under the site license. However, the company determined that a batch system was inadequate to meet the real time nature of the Internet and instead chose to invest in a real time billing system.

A trend that is having a major impact on providers and the evolution of CM&B is the move from flat-rate billing to usage-based IP services. Rather than bill subscribers a flat fee for services, providers are billing customers based on their service usage—megabytes of disk space or e-mail messages sent, for instance. With usage-based billing, subscribers are more likely to request their account balance in real time rather than wait for the next bill to be generated.

Because many subscriber accounts will be created on-line, the billing system must be able to support prepaid, credit-card, and debit models and provide subscribers with accurate, instant access to current usage data and account balances. The CM&B system's account management functions must include the capability to monitor balances, detect when a subscriber has exceeded the credit limit, and take the appropriate business action.

For instance, the provider can instantly send subscribers e-mail notification or instant messages informing them that their credit threshold has been reached. The subscriber may then be offered an option to purchase additional services. The provider may also decide to extend additional credit or to interrupt or block certain services in real time. All of these examples require complex, real time CM&B systems, as back-office legacy billing systems are unequipped to handle the fast-paced world of IP.

Providers are also conscious of managing customer service costs. According to a Forrester report entitled *Telecom Self-Service Debuts*, a single customer service call costs a provider \$8. Reducing call volume by providing subscribers with the

ability to make real time changes to their own accounts results in a substantial cost savings to the provider.

Scalability is a concern for many providers as their businesses expand. The billing system must scale to support the Internet service provider (ISP). Given the rapid growth of the Internet, providers must be confident that their systems will scale to meet the increased demand for services. The billing system must also be extensible so that it can integrate with general ledger systems, customer care applications, legacy billing systems, and other applications that the provider is using. Real time CM&B systems are able to accommodate legacy batch processes for those applications where time is not a factor and a batch mode is more cost-effective. The reverse is not true—batch systems cannot accommodate processes that must be performed in real time.

## 4. Provider Challenges

Fundamentally, a real time billing system shares many of the same design challenges as an air-traffic control system, a pacemaker, or the space shuttle. Some of the more significant challenges are scalability and performance, reliability, security, and extensibility.

Real time CM&B systems easily scale to handle rapid subscriber growth and large numbers of subscribers while maintaining outstanding performance. Providers can add multiple servers as needed to any or all levels of the system while the system is operational. Automatic load-balancing smoothly handles usage spikes. Indeed, a real time system's object-to-relational model is optimized for high-performance on-line transaction processing (OLTP).

Real time systems provide 24-hours-a-day 7-days-a-week, telecommunications-grade reliability with features such as automatic reconnection in the event of a lost link and automatic rerouting if reconnection fails. Both features occur without interrupting the client application. In addition, a real time system guarantees transactional integrity through the entire system, maintaining a reliable status on every account. Because they are designed to take advantage of redundancy, adding additional systems to the architecture increases reliability.

Firewalls, proxies, and filters can be installed between every tier of the real time system's architecture to prevent unauthorized access to the database. Providers can determine and audit who has access to the system. Critical business functions run at the secure business process tier, and access lists restrict the use of critical operations. All session monitoring, analysis, and control occur in real time so that problems can be identified and stopped immediately.

Real time systems offer open, documented programming interfaces at every level of the system. These interfaces give providers the ability to integrate a real time system with legacy and external software. Furthermore, real time systems go

beyond simply allowing providers to tailor their basic capabilities. Because the system's architecture is extremely extensible, it enables providers to add new, value-added services to their menu of offerings. These can range from capabilities such as cable-modem access and global roaming service to on-line games and entertainment to Web site hosting and Internet telephony.

## 5. Summary

The pace of change and innovation among Internet companies is astounding. A real time CM&B system is essential for IP service providers that must respond and adapt rapidly—in Internet time. Businesses that cannot act in real time will find themselves overtaken by competitors.

Real time CM&B systems are designed specifically to support Internet services. Unlike traditional batch systems, real time systems meet the real time needs of Internet providers and subscribers. A real time system supports the creation and management of customer accounts; development, pricing, and provisioning of service offerings; and activity tracking, rating and billing. With a real time system, service providers can bring new services to market quickly, increase profitability, and improve customer satisfaction while reducing costs by managing services in real time.

## Self-Test

1. The IDC projects that 319 million people will be using the Internet by the end of 2002.
  - a. true
  - b. false
2. Speeding up a batch billing system provides a reliable Internet services billing system.
  - a. true
  - b. false
3. The move from flat-rate billing to usage-based IP services is having no significant effect on providers.
  - a. true
  - b. false

4. Real time systems are easily integrated with legacy and external software.
  - a. true
  - b. false
5. A real time billing system will help providers bring new services to market quickly.
  - a. true
  - b. false
6. Why is the CM&B system a fundamental component of the service provider's infrastructure?
  - a. It collects the money.
  - b. It is the only system a service provider is likely to utilize.
  - c. It controls the subscriber database and provides the service.
  - d. all of the above
  - e. a and c
7. What is one of the three steps following the completion of a network transaction in the batch processing model?
  - a. immediately update account balances
  - b. generate a CDR and forward it to the rating server
  - c. load the CDR batch as soon as the customer logs off
8. Providers are concerned with which of the following?
  - a. credit management only
  - b. customer self-service costs only
  - c. customer self service, credit management, and scalability only
  - d. service provisioning, customer self-service, simplicity, and credit management

9. What are some of the design challenges for a real time billing system?
- a. reliability and failover
  - b. programming capabilities and security
  - c. performance and credit-card billing
10. What aspects of billing does a real time system support?
- a. the creation and management of customer accounts
  - b. development, pricing, and provisioning of service offerings
  - c. activity tracking
  - d. rating and billing
  - e. b and c
  - f. all of the above
  - g. none of the above

## Correct Answers

1. The IDC projects that 319 million people will be using the Internet by the end of 2002.
- a. true**
  - b. false
- See Topic 1.
2. Speeding up a batch billing system provides a reliable Internet services billing system.
- a. true
  - b. false**
- See Topic 2.



3. The move from flat-rate billing to usage-based IP services is having no significant effect on providers.
- a. true
  - b. false**
- See Topic 3.
4. Real time systems are easily integrated with legacy and external software.
- a. true**
  - b. false
- See Topic 3.
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- a. true**
  - b. false
- See Topic 4.
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b. development, pricing, and provisioning of service offerings

c. activity tracking

d. rating and billing

e. b and c

**f. all of the above**

g. none of the above

See Topic 5.

# Glossary

**CDR**

call detail record

**CM&B**

customer management and billing

**IP**

Internet protocol

**ISP**

Internet service provider

**OLTP**

on-line transaction processing