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Executive overview

3G mobile technologies offer a totally new experience and a variety of services to mobile subscribers. The mobile handset, sometimes combined with a PDA, is not just a voice and text-messaging terminal anymore, but is becoming a multimedia, gaming, and advanced communications tool. To fully exploit the technology's potential and increase the ARPU from these new services, operators and service providers are required to have a flexible environment for creating, enabling, controlling and charging new and upcoming services.

Mobile operators face many challenges when introducing these new technologies and entering uncertain markets. Some of the main challenges are:

- Support and charge for multiple concurrent sessions of voice, data and content.
- All services and content should be available to all subscribers, regardless of their payment method (prepaid or post-paid).
- Various content, application and network providers need to share the revenues with the operator, based on different revenue-sharing models.
- Time to market is a key issue - minimum time from the marketing requirement until the service is available to the subscribers. This includes provisioning, enabling and charging of the new service.
- A single view of all subscribers and services over the entire BSS/OSS.

To overcome these challenges, MIND offers the MINDBill Service Enabling for Mobile platforms, which allows mobile operators to:

- **Authenticate** and **authorize** subscribers and their services based on profile and available credit.
- **Collect** all usage information from multiple sources in real time, **correlate** and **aggregate** the various events into a normalized billable record.
- **Control** the on-going **sessions** and terminate them due to credit limit or fraud suspicion.
- **Rate** different services and content by flexible **pricing models**.
- **Manage** the subscriber **balance** and per-service **wallet**. Allocate quotas for multiple simultaneous services, based on predefined rules and limits.
- Support vertical and horizontal **convergence** – **prepaid** and **post-paid**, **voice**, **content** and **data** under a single platform.
- **Provision** the network with static and dynamic subscribers and services profiles.

- **Allow self-registration** and **self-provisioning** for subscribers and services via the Web.
- Support multiple **revenue-sharing** models with content, application and network partners.
- **Simplify** the integration with **legacy infrastructures**, by easily interfacing with existing OSS/BSS such as IN and Billing for real-time charging, and Fraud for event feeding.

The MINDBill service enabling solution for mobile

The MINDBill Service Enabling System (SES) for Mobile functions at the Service Management layer, interacting within a triangle which consists of **Subscribers**, **Services** and **Infrastructure** - both network and OSS/BSS parts.

The MINDBill Service Enabling platform is a modular, scalable and access technology-agnostic solution. Based on best-of-breed technologies such as J2EE and Oracle as the central RDBMS, it includes an internal common data model that holds the profiles of services, subscribers and providers.

Comprising a set of applications and integrated tools, the MINDBill Service Enabling platform helps network operators and service providers manage all aspects of the services they supply, starting from definition, provisioning and activation, event collection, rating and charging, up to real-time AAA, session management and balance management.

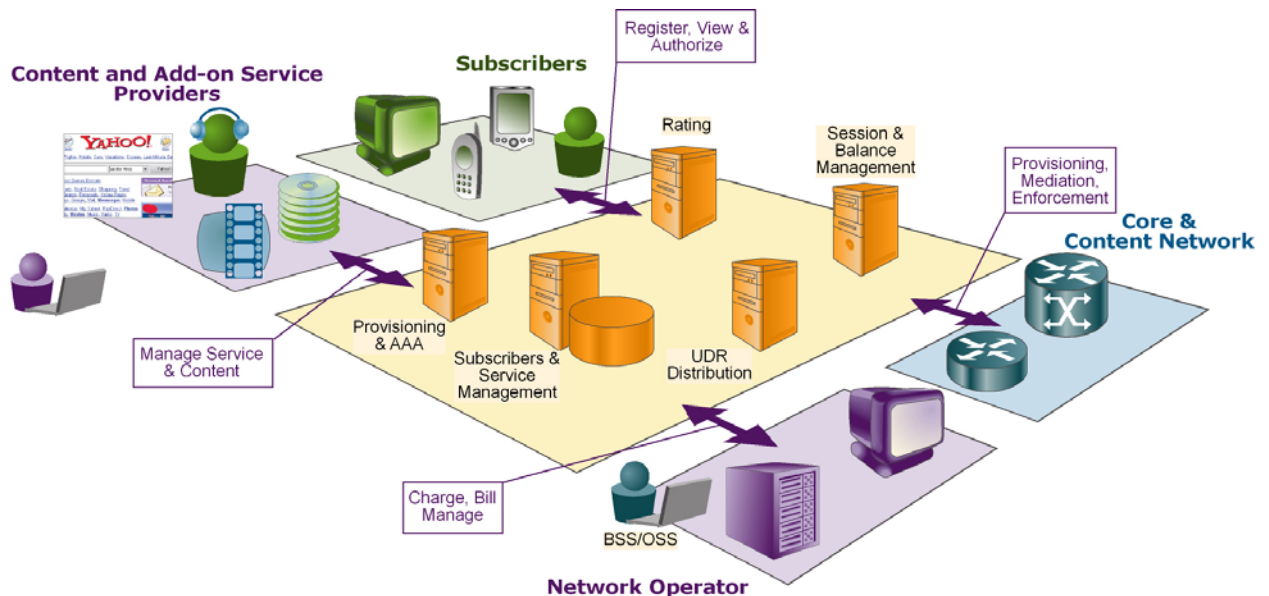


Figure 1: The MINDBill Service Enabling System

Authentication, Authorization and Accounting (AAA)

The MINDBill platform includes a comprehensive AAA server – MINDBill Real-Time Server (RTS). It provides the basic network access authentication and specific service authorization. Extended authorization options per service and content are included, where the service is authorized only if matching the subscriber profile, SLA and credit. Fraudulent usage, such as concurrent access or very long sessions, can be prevented. Full support of prepaid subscriber authorization, where the current balance and the specific content or service prices are taken into account. AoC (Advice of Charge) and two-stage authorization are available, when the user confirms the service activation and the cost prior to starting the service. An option of IP addresses pool management and dynamic assignment is part of the AAA capabilities.

Session management and control

The MINDBill system is able to keep track of each subscriber on every active session and supports simultaneous sessions. All session characteristics, such as the type of content or application, volume (uplink and downlink), QoS and location, are monitored and collected. Multiple records can be created per session in case parameters are changed during the session (such as location or QoS). A set of counters is kept per session – based on time, volume or items, which are used for real-time charging and control. A session can be cut-off based on a counter, a credit threshold, or as a result of the operator or user requests.

Event collection, correlation and aggregation

The system collects events in real-time from many sources in the network, such as GSN nodes, firewalls, WAP servers, messaging, application and content servers. The powerful correlation and aggregation capabilities provided by MINDBill Intelligent Processing Engine (IPE) enable creating a normalized UDR from the multiple events related to the same session, and identifying the parties involved in each session – the subscriber, the service and network providers. This valuable information is used to monitor and control the activity and performance of the network, subscribers and providers. In addition, this capability enables charging the subscribers, the service and network partners. The collected information can be distributed to diverse OSS/BSS systems either in real-time or in scheduled modes.

Rating

Simple rating models, like flat rate per transaction and duration-based rating relying on the 2G “call” concept, are no longer valid for 3G services. Customers therefore will need to be billed for the actual volume and value of the service, making usage and content-based billing a must. The billing metrics that can be used and are supported by the next-generation mobile infrastructure are:

- **Volume of upstream and downstream data.** This can differentiate the cost of downloading data from that of uploading.
- **Content type and value.** Rating can be based on the APN as content identifier. If this distinction is not sufficient, MINDBill is able to retrieve usage information directly from the content and application servers or from IP traffic

probes, such as Cisco CSG, which enable more precise rating (e.g., according to a specific URL or clip title).

- **Quality of service (QoS).** Customers can sign a SLA with the operator and get discounts that depend on the actual vs. promised QoS level. Different SLA levels will be priced differently.
- **Location.** Since the same session or application can be activated from several locations as the subscriber travels, the real-time capabilities of the mediation and billing system enable accurate billing of location-sensitive services.

MINDBill's rating schemes support all the above parameters and more, both separately and in combinations. The same service can be differently rated based on the time-of-day, access device (mobile handset vs. PDA), and the subscriber's loyalty. Several discount options, based on a certain service or the total volume consumed, are available.

MINDBill's rating engine supports both regular and reverse rating. Regular rating computes a price for each transaction and content item based on various parameters; reverse rating converts a monetary amount into units such as bytes, seconds or number of events, based on the rating scheme of the specific service.

Prepaid and post-paid

Prepaid services are a key factor in the subscriber base growth for mobile operators. Prepaid services offer a low-risk business model for the operators and more convenience for the customers. The youth market, which will probably be the first to massively use the new services, is a prepaid sector.

MINDBill supports prepaid services required by mobile operators having 2.5/3G networks. The Authentication, Authorization, Accounting (AAA) and rating operations are all handled in real time, enabling the operator to offer prepaid services for access, content, location-based services and m-commerce.

MINDBill's prepaid engine is able to authorize a service as a whole (e.g., allow or deny a clip download according to the subscriber's balance and profile) or can utilize different cut-off units, such as duration, volume, or number of items, based on the type of service and the relevant tariff. The Subscriber's balance is immediately updated. and when it bottoms out, the relevant sessions are instantly cut-off. Several options exist to warn the subscribers when the balance is below a threshold, and to enable online recharge.

Post-paid customers are important for the operator, as they represent a more reliable sector. Enterprise, SME and SOHO customers are usually post-paid customers that require special treatment and a higher service level. MINDBill's extended flexibility in defining promotional packages, SLAs, pricing plans and discounts is best suited to this market.

The MINDBill SES includes comprehensive support for managing and charging prepaid and post-paid subscribers for their services. Different bundles, business models and charging schemes are easy to define and apply. The system can be integrated with the legacy billing (for post-paid) and prepaid systems. The MINDBill

Web-based self-care module enables all customers to view their usage, register for new services and make online payments.

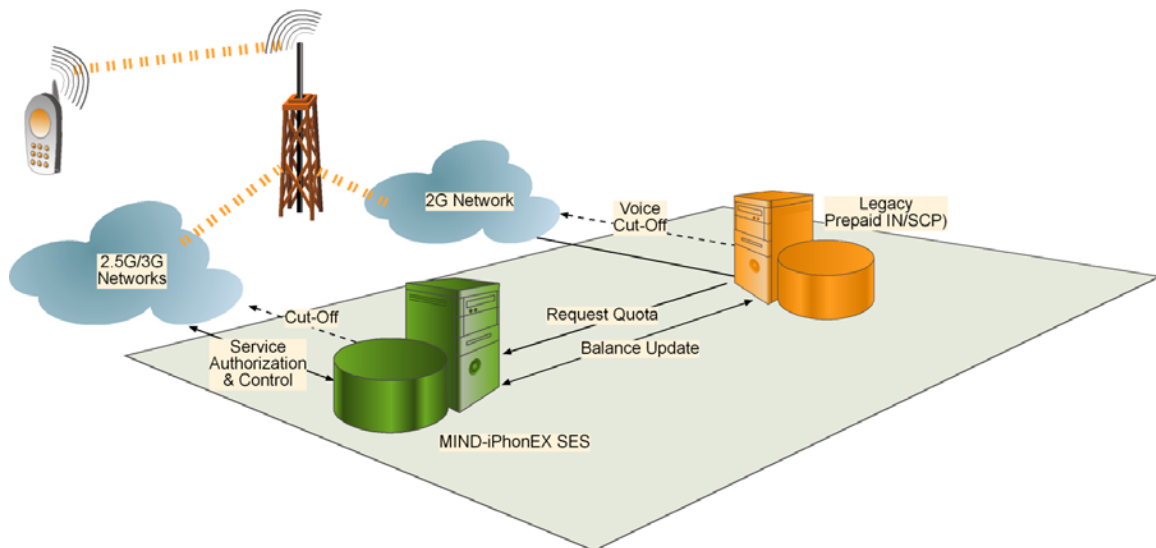


Figure 2: The MINDBill Integration with Legacy Prepaid

Balance and wallet management

Balance Management refers to the general ability to manage the subscriber balance, and share a single balance among various concurrent sessions of voice, data and content, based on predefined settings.

Wallet Management refers to more advanced capabilities of managing subscribers' credit, namely: split the balance of a subscriber down the account hierarchy into multiple wallets, use various wallets with different profiles and limits for different services and advanced replenishment and balance transfer options between wallets.

Balance Management

The MINDBill Balance Manager (BM) is designed to interact in real-time with the operator's network elements and other internal and external modules. In accordance with the OSA framework, the MINDBill BM encompasses the Payment and Rating Engine components with interfaces to all other components, such as the User Agent, Authorization Engine and Clearinghouse.

The MINDBill BM enables mobile operators to manage multiple prepaid services for a single subscriber. The services can be of a different nature: traditional voice, simple data transmission, rich content, video streaming, MMS, gaming and others. In 3G networks the subscriber may download a video clip, read an e-mail message and have a phone call, all at the same time, using a single prepaid balance.

The account balance is stored internally and managed in real time. MIND's mediation engine collects and aggregates the usage information from the various network elements. Traditional prepaid voice services can be managed separately using the

existing prepaid systems (IN/SCP or similar), or a single balance can be used, as the MINDBill BM takes care of the real-time synchronization between the balance and the legacy prepaid system.

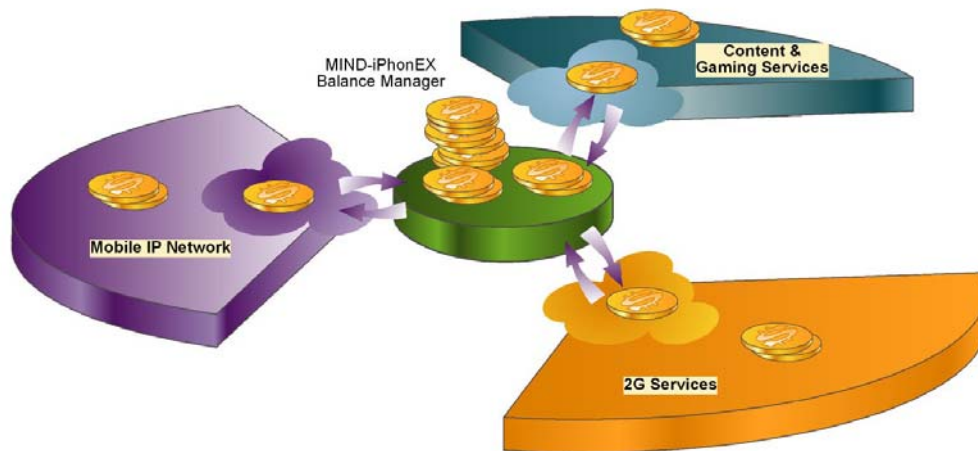


Figure 3: The MINDBill Balance Management

By interacting in real time with the network elements and content servers, the MINDBill BM can deny or cut off the content download, based on the service, its cost, the current balance and the number and nature of the other concurrently active services. Different cut-off and reservation rules can be defined for each service and content item. For example, a certain content download may not be authorized unless there are €4 or more in the account, while another has a threshold of €10.

MINDBill is able to share and synchronize the subscriber's balance with the legacy system balance, using its flexible real-time APIs. When the subscriber is out of funds, both the traditional and the IP services are cut-off, and future usage is denied until the account is recharged.

Wallet Management

To further refine the management and control of subscribers' spending options, comprehensive wallet management capabilities are integrated within the MINDBill SES for Mobile. All types of subscribers, prepaid and post-paid, residential and commercial, can easily configure how their wallets are created and assigned per service, bundle of services, content type or merchandise. Each wallet has a full set of properties to control limits, set top-up options, thresholds and related actions. Based on his/her credentials, a subscriber can manage his/her own wallet policies, as well as those of the sub-accounts. An unlimited number of wallets and combinations of rules can easily be configured.

For example, a parent can limit his child's expenditure for Gaming services to \$15 per month. At the beginning of each month, the wallet is automatically replenished from the parent main wallet.

Different wallets can be based on different currencies or usage units. For example, an SMS wallet can be recharged with 50 SMS "units". When transferring amounts between wallets, the current exchange rate of the involved currencies, or the tariff plan of the specific service are used.

If wallet management is enabled, the MINDBill Balance Manager makes use of the wallet profile, remaining balance, units, rules and limits, when authorizing a service and allocating the relevant quota in real-time.

Revenue sharing models and partner management

In 2.5/3G environments, many players, such as content providers, service providers and roaming partners are participating in the service supply chain. The number of business partners, as well as their service portfolios, pricing plans and revenue sharing models change regularly. These collaborations result in a wide variety of business models which are all supported by MINDBill, giving operators the flexibility to define their own business models with other partners.

The system offers diverse revenue sharing models, including fixed, one-time commissions, recurring commissions based on the number of subscribers using a certain service, or varying amounts based on the actual usage. A single billing solution may encompass an unlimited number of partnerships with various agreements. The system also supports settlement agreements between business entities within the system, as well as external entities. Each internal or external partner will get aggregated statements and reports, with details on the amounts owed to each partner, per service (settlement reports).

MINDBill addresses a variety of business models for wireless operators and providers, with combinations of the following:

- Retail – Where the operator provides services directly to the subscribers.
- Wholesale – Where the operator/provider provides services to other operators and providers.
- MVNO – Mobile Virtual Network Operator – Where the main operator provides hosting services to other operators, who conduct their businesses under their own branding using the main operator's infrastructure.

Interoperability with other operations and business support systems (oss/bss)

MINDBill SES is built upon a modular and open architecture, using standards such as J2EE, XML and Oracle. These characteristics make the solution suited for mobile operators that already have legacy billing and prepaid systems for traditional (2G) services but require a flexible and scalable add-on solution to support next-generation services.

The platform is equipped with a set of APIs, import and export tools, and out-of-box middleware support (CORBA, Tibco, SOAP/XML and others). These characteristics

enable easy integration with multiple OSS/BSS, including CRM, post-paid billing, prepaid platform (IN and similar), fraud, lawful interception and data warehousing.

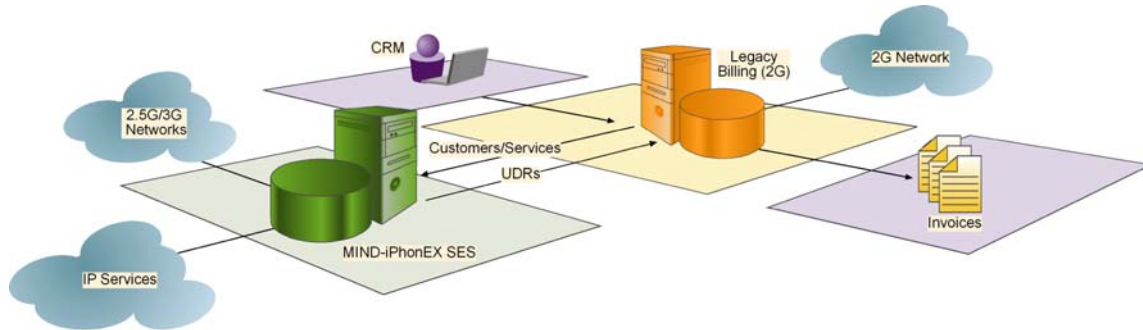


Figure 4: The MINDBill Integration with Legacy Post-paid System

Service provisioning

The solution provides direct provisioning to the network layer or interfaces with specific tools in order to provision the subscriber's services and profiles to the network. Upon subscriber registration, and on any update of service profiles, the detailed parameters are updated using the MINDBill Provisioning Server. Each target system is managed by a Provisioning Agent, which is triggered by specific changes, and is in charge of interacting with specific network elements using a designated provisioning scheme.

Both Static and Dynamic (on-demand) provisioning options are available. Static - as the user registers, de-registers or changes his preferences; Dynamic - as the session starts or in the case of 'on-demand' service scenarios, where specific parameters are changed for a predefined period or for the current session only.

Reliability, scalability and high-availability

Mobile operators are looking for a secure, reliable and scalable carrier-grade service. The billing system must handle millions of subscribers and countless simultaneous transactions, and be able to instantly react to the subscriber's actions. The billing system must be able to grow with the mobile operator's infrastructure.

MINDBill SES for Mobile is a real-time solution with built-in redundancy and high availability architecture. MINDBill provides a reliable solution that guarantees uninterrupted service for mission-critical applications. The core real-time components are installed in a redundant configuration (at least N+1) with a fail-over mechanism. MINDBill uses an Oracle RDMBS as the central data repository, in order to provide a scalable and reliable solution.

Summary

MINDBill Service Enabling System (SES) for Mobile allows mobile operators to easily adjust to the challenging business requirements of the 3G era. The solution enables

managing and charging prepaid and post-paid subscribers and their services in a complex and heterogeneous network environment, that includes new network elements and technologies. The system is built to run side-by-side with the legacy billing and prepaid systems, thus significantly reducing the initial investment and deployment time, speeding up time-to-market and improving ROI.

Comprising of a powerful set of applications and integrated tools, the MINDBill Service Enabling platform helps mobile operators to manage and charge new and upcoming data and content services. All stages of service fulfillment, control and charging are covered, starting from definition, provisioning and activation, through real-time AAA, active mediation and session control, and up to balance management, rating and charging.

MIND provides sales and support to its worldwide customers from offices in the United States, Europe, China and Israeli headquarters. MINDBill track record includes more than 70 successful installations, for Voice, Data and Content services, in mobile and fixed-line environments. Service providers working with MINDBill found it to be a reliable tool that offers a fast return on investment and gives them the flexibility needed to meet any market demand. All these, together with the constant commitment toward quality and efficiency, make MINDBill the solution they need to move forward.

To learn more about MIND CTI, please visit www.mindcti.com or call a MIND representative.