



MINDBill[®]

Billing and Customer Care Solution

Mobile Prepaid IN Solution Description

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Introduction

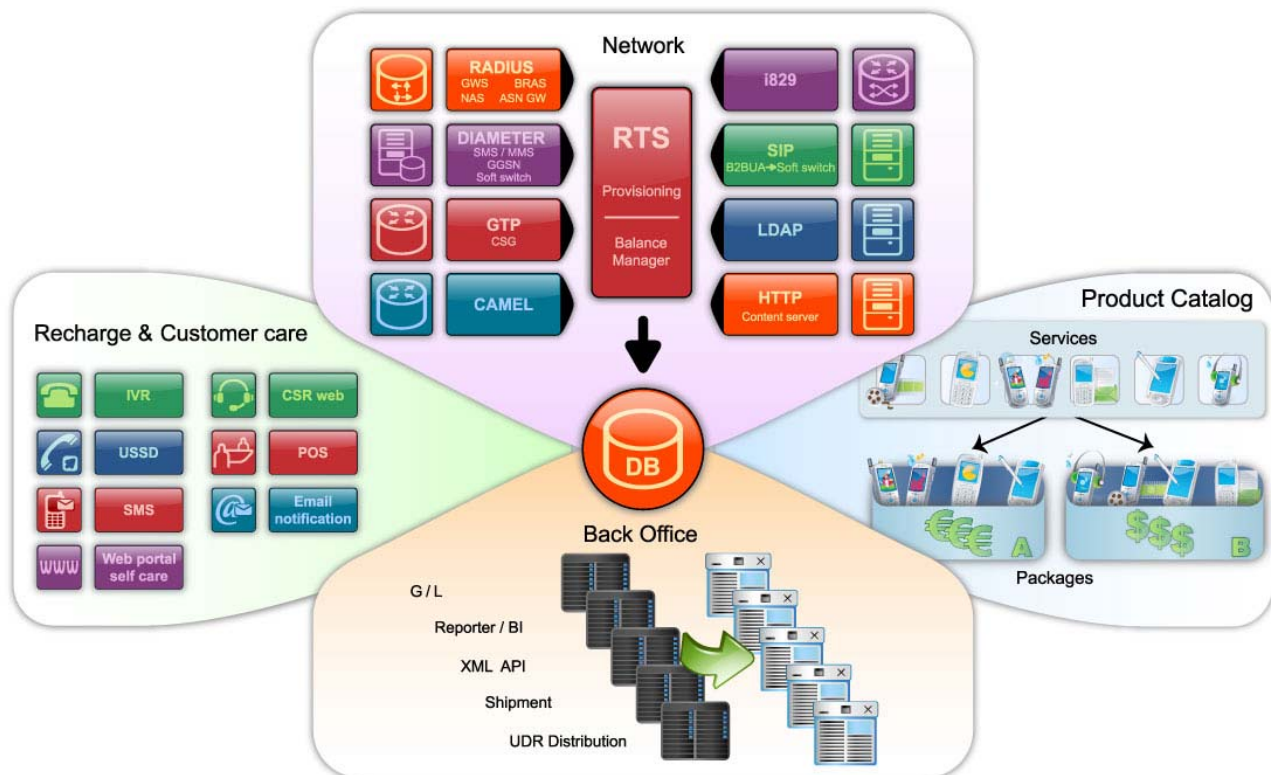
The **MINDBill** portfolio for convergent billing supports in one system both Postpaid and Prepaid for multiple services consisting of: Voice, Internet, Data, Content, and more. The **MINDBill** solution is an off-the-shelf product that includes billing, customer care, mediation, AAA, provisioning, and rating for multiple services. MIND has a proven track record in production implementations for a swift deployment of a complete turn-key product-based end-to-end Customer Care and Billing solution that is tailored to local needs accordingly.

The **MINDBill** Product Catalog is designed to adapt to the dynamic marketing requirements enabling Telecom operators to define, configure and deploy new packages and services, setting apart having distinct rating and discounting schemes to take advantage of market developments and to increase revenue. Operators that have deployed the **MINDBill** convergent solution are able to bundle groups of services into tailor-made packages targeting specific market segments for which they can offer special rates, discounts and promotions to **achieve a competitive advantage and differentiate their brand**.

MINDBill Prepaid IN complements **MINDBill's** prepaid offering for VOIP, Broadband and WiMAX, presenting a true quad play charging solution. **MINDBill Prepaid IN** is a convergent end-to-end billing and customer care solution for the prepaid mobile and wireline market segments.

MINDBill is a genuine convergent prepaid and postpaid platform that includes built-in billing, customer care, mediation, provisioning, and rating for multiple services. **MINDBill's** convergent prepaid and postpaid services platform supports a single front-end customer care interface; it incorporates the benefit of an integral comprehensive point-of-sale solution (with a very user-friendly sales clerk application) with modules for cashier and inventory management and introduces a wide set of BI capabilities.

MINDBill Prepaid IN supports all versions of commercially used IN protocols - CAMEL 2, 3 and 4 for GSM and IS-826 for CDMA. It is highly available and scalable from a few thousands to millions of prepaid subscribers.



1. *MINDBill Prepaid Topology Layout*

Mobile Prepaid IN Platform

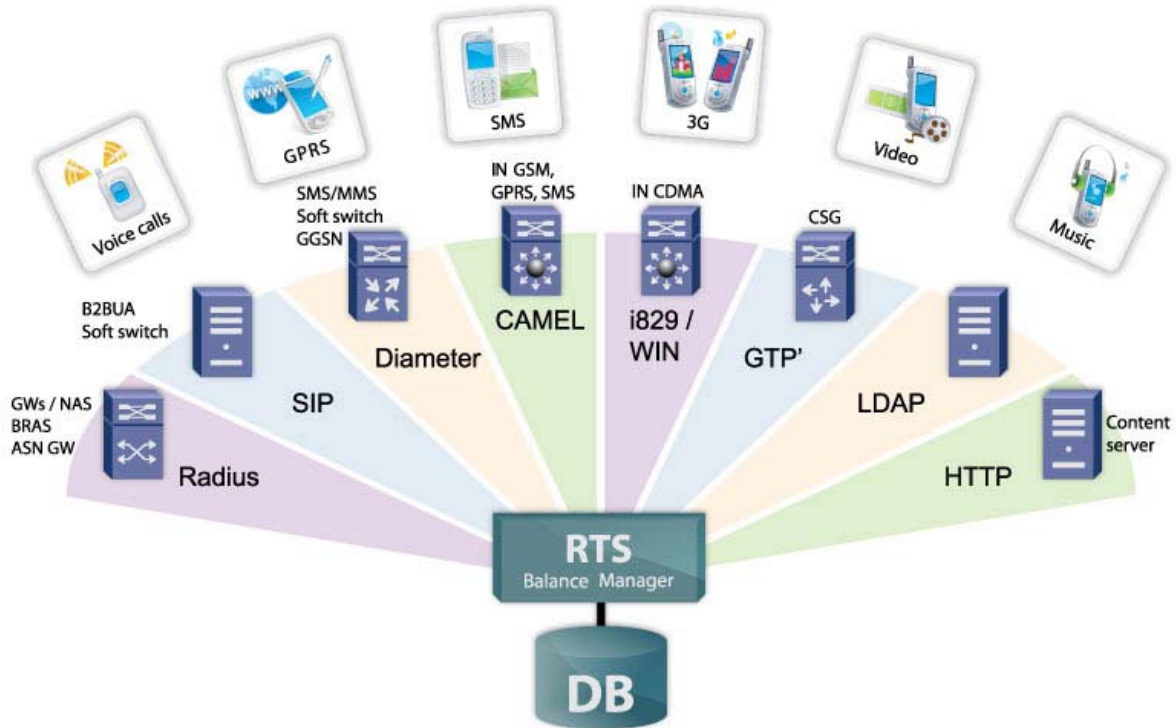
MSCC and Balance management

The **MINDBill Prepaid IN** platform supports multiple real time protocols enabling consumption of multiple services in parallel by a single subscriber: Voice, SMS, MMS, Data/GPRS, Content and more. The multiple services credit control mechanism is a centralized quota management that concurrently supervises all of the open sessions usage.



2. Balance Manager

MINDBill Prepaid IN charges for various services within the same account consuming from the same balance through multiple real-time protocols. This offers a Service provider access to a genuine single prepaid platform for deploying in prepaid mode a number of different services that are handled by different network elements communicating in different protocols (e.g. CAMEL, WIN/IS-826, RADIUS, Diameter, GTP', SIP, HTTP, TCP/IP, LDAP, etc.). The built-in Balance Manager is designated to provide the real time quota allocation that enables the simultaneous usage of a number of services while monitoring the consumption of a single account balance or a service wallet to avoid revenue leakage.



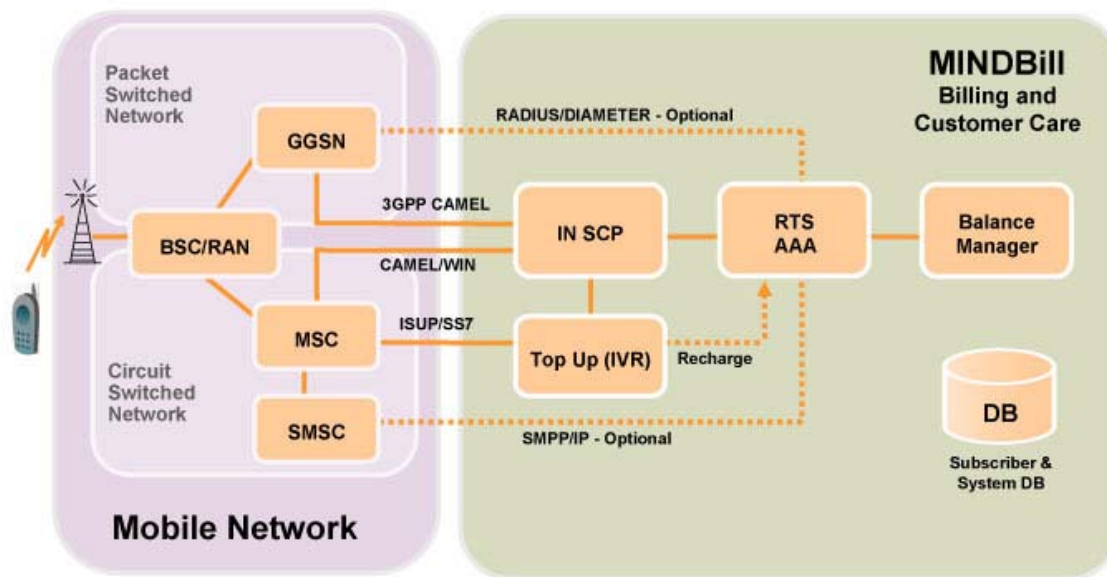
3. Multiple Services Credit Control

Roaming Challenges

MINDBill Prepaid IN multiple services credit control is a key differentiator that allows for full prepaid roaming in the mobile market segment. A particular case is that of some services which are not supported by the used version of the IN protocol. In this situation there is a need to overcome network limitations such as terminating SMS and MMS or GPRS roaming in CAMEL2 networks whereas **MINDBill Prepaid IN** connects directly to the relevant network elements (e.g. GGSN, SMSC, MMSC, Content) through their distinct AAA protocols (Diameter, Radius, SMPP/IP, etc.) in parallel to the IN signaling control for services like Voice and mobile originating SMS.

SCP and Signaling

The **MINDBill IN Service Control Point (SCP)** is used for providing prepaid support for IN-based networks. The IN SCP supports both CAMEL and WIN and it is capable of integrating into GSM and CDMA-based networks. Currently, it supports direct dial calls with built-in IVR announcements, roaming call scenarios, SMS, MMS and Mobile GPRS sessions.



4. Prepaid IN Solution Diagram

The **MINDBill** prepaid solution includes voice service applications for zero-stage direct dialing services without IVR, zero-stage direct dialing services with IVR for unsuccessful call announcements and an IVR-based Top-up application.

The ‘Zero-Stage’ direct dialing prepaid service includes the following features:

- Direct Dial service access by dialing the destination number directly.
- Automatic subscriber authentication based on Calling Line Identification – CLI.
- Call authorization based on balance and destination per subscriber.
- Automatic call cut-off when balance depletes.
- Emergency and Toll free calls support – even when balance is zero.
- A configurable balance depletion warning prompt playback support.
- Automatic redirection to the Top-up server – on call setup, if no sufficient balance is left, it is possible to automatically redirect the call to the Top-up server.

The IN SCP hardware highlights:

- Supports traffic rates up to several thousand TCAP transactions per second.
- Supports both low-speed SS7 links and high-speed, 2 Mbps Q.703, SS7 links configurable on a per-link basis.
- Supports SIGTRAN M3UA and SUA protocols.
- Based on a 2U carrier-grade server – Provides carrier-grade qualities that prevent revenue loss.
- Supports ITU-T, ETSI/3GPP and ANSI.
- Supports resilient system architectures and multiple point codes.

IVR

The **MINDBill IVR** is an integrated part of the **MINDBill** solution. This DSP-based IVR is capable of collecting and playing DTMF, prompt playback, barging in, voice recording and more. The IVR application provides all of the required features for setting up a prepaid solution, including a top-up service and warning prompts playback features:

- It supports multi-lingual prompt playback using language-specific number logic.

- Route incoming calls by automatically identifying the number the caller dialed. This is also known as the Dialed Number Identification Service (DNIS).
- Includes DTMF detection and generation – for caller authentication, password change, Voucher PIN insertion and menu selection.
- Supports both E1 and T1 trunks.
- Supports a wide range of PSTN protocols including ISDN and ISUP.
- GUI-based Plug-in developer IVR flow creation environment – customizing the IVR flows according to the service provider’s request is an option.

RTS

The **MINDBill Prepaid IN** billing is a real-time operation mode. Authentication, Authorization and Accounting (AAA) actions are all handled in real time. The role of the **MINDBill Real Time Server (RTS)** is to mediate in real time between the network elements, such as Signaling server, SMSC, MMSC, GGSN, Softswitches, access servers, Gateways and wireless service nodes, with the billing system database. The **RTS** provides a full set of real-time AAA functions responding in real time to the following events:

- **Authentication request** - the customer (and sometimes the actual service) can be identified by various methods, including: username/password, PIN, IMSI, MSISDN, CLI/ANI, MAC address, access device IP address and/or trunk ID, and others. If the customer (and the service) is authenticated successfully, the relevant response is returned to the network element that may include the current customer balance; otherwise, the customers’ service is denied, and the access attempt is rejected. If the authentication stage was successful, in certain cases an Authorization request follows (e.g., for a prepaid call). If authorization is not required, the service (session) is enabled immediately. The **RTS** provisions to the network element the subscriber service properties, for example: Bandwidth/Throughout setting; QoS value; Idle time out, IP allocation, etc.
- **Authorization request** - based on the type of service, dialed number and origination of the call, the rating plan and the customer’s balance, the **RTS** returns the maximum allowed duration of the call or to allocate a quota of usage such as volume of traffic bytes to download/upload. The session is either authorized or rejected, and the appropriate message is sent back to the network element with a cut-off parameter, where relevant.
 - When the **RTS** allocates a quota of volume MBs/KBs traffic or minutes:seconds duration, in this mode a repeatable cycle of Re-authorize or quota replenishment is performed according to the volume and/or duration threshold until the quota is completely consumed and the service wallet or account balance bottoms out.
 - During the call setup, the customer’s remaining balance or quota allocation provided by the balance manager is checked and based on the dialed number for which the maximum call duration is calculated for that call or quota. The **RTS** performs a reverse rating according to flexible multi-dimensional rating schemes and subscriber balance management. Advanced rating features such as rounding of call duration, call setup charge, minimal/maximal charge, minimal/maximal duration, stepped and tiered rates, special discounts and many more are fully supported.
- **Accounting message** - once the session is ended, a message is sent to the **RTS**, that includes usage parameters, such as the duration, volume upstream/downstream, QoS measures, and other attributes. The **MIND RTS** rates the session according to the relevant service tariff and usage parameters, stores a final rated CDR in the database and updates the customer’s balance simultaneously.
 - The **MIND RTS** includes the embedded logic for creating partial CDRs that is splitting CDRs when crossing billing periods, or a session transition from peak/off peak rates time profiles. This enables the customer’s continuous online service, paying the exact proportional amount according to the designated time profile rating, and for the service provider having precise resolution for reporting and auditing needs.
 - **Interim accounting messages** or quota access requests or **ApplyChargingReport** are also handled with incremental accumulation of the consumption and a CDR is inserted either upon crossing time profiles or starting on the next billing period.

The **MINDBill RTS** incorporates a built-in SCP for interfacing the signaling server for the IN, Radius server, DCCA, and more drivers for supporting concurrent multiple real time protocols in one single platform. This allows a Service provider deploying in prepaid mode a number of different services handled by different network elements communicating in different protocols supervised by a centralized quota management simultaneously.

All the AAA messages are processed, and the responses are returned to the originator instantaneously. One **RTS** can handle many concurrent requests, being built as a multi-threaded application.

Using an N+1 configuration, the **MINDBill Real Time Server** can be deployed for a full load sharing and automatic failover support. Therefore, if one of the servers fails, no data will be lost, since all subscriber-related data is stored in the central MINDBill Oracle Database.

RTS Plugins

MINDBill includes a Java plugin generator module for customizing a tailor-made flow in order to fit the processing requirements of the system to each of the customer's specific business logic. The **MINDBill** plugin generator is a graphical flow-chart to-java IDE that allows developers to: create and edit flow diagrams, decide which mediation functions to use, such as the following: filtering, guiding, correlating, etc. Furthermore, it enables developers to decide upon each of the record values and it translates the graphical flows into java class files or creates JAR files. The result JARs can be loaded at runtime to host application and executed as plugins. This allows developers to design business logic as graphical flows for ease of development and maintainability. Modifying business logic outside the host application (without the need for a whole build) is possible. Performance-wise, the result is a java class, which will execute as fast as it was designed, as opposed to interpreters. The jars are then defined in the **MINDBill** system and can be used for processing new data usage records.

The **MINDBill Real Time Server** includes the option to block the subscriber accounts after a certain (configurable) number of authentication attempts failure. The **MINDBill Real Time Server** also supports additional advanced features such as changing of passwords and recharging of prepaid accounts from vouchers and credit cards. It includes AAA event correlation across multiple network elements. Enhanced RADIUS features: Dynamic IP pool management and IP assignment; Local RADIUS or RADIUS Proxy to home server for Authorization; RADIUS Forwarding broadcasting Accounting to multiple RADIUS Servers.

Diameter

The protocol enables a Client to Authenticate, Authorize and Account (AAA) prepaid and postpaid users of the MINDBill system. It is based on Diameter Base Protocol (RFC 3588) and Diameter Credit Control Application (RFC 4006).

The Diameter base protocol is intended to provide an Authentication, Authorization and Accounting (AAA) framework for applications such as network access or IP mobility. Diameter is also intended to work in local Authentication, Authorization & Accounting and roaming situations.

The Diameter Base protocol provides the minimum requirements needed for AAA. The Base protocol may be used by itself for accounting purposes only, or it may be used with a Diameter application, such as DCCA to provide credit control for pre-paid services.

By utilizing DCCA, the MIND Diameter Sever can be used for real-time credit-control for a variety of end user services such as network access, Session Initiation Protocol (SIP) services, messaging services, and download services. It provides a general solution to real-time cost and credit-control.

Furthermore, this mechanism can allow users to be informed of the charges to be levied for a requested service. Also, there are services such as gaming and advertising that may credit as well as debit a user account.

It is necessary to provide encrypting methods for the information passed between the peers. The transport between the RTS and its Diameter clients is protected by using the IPSec security protocol.

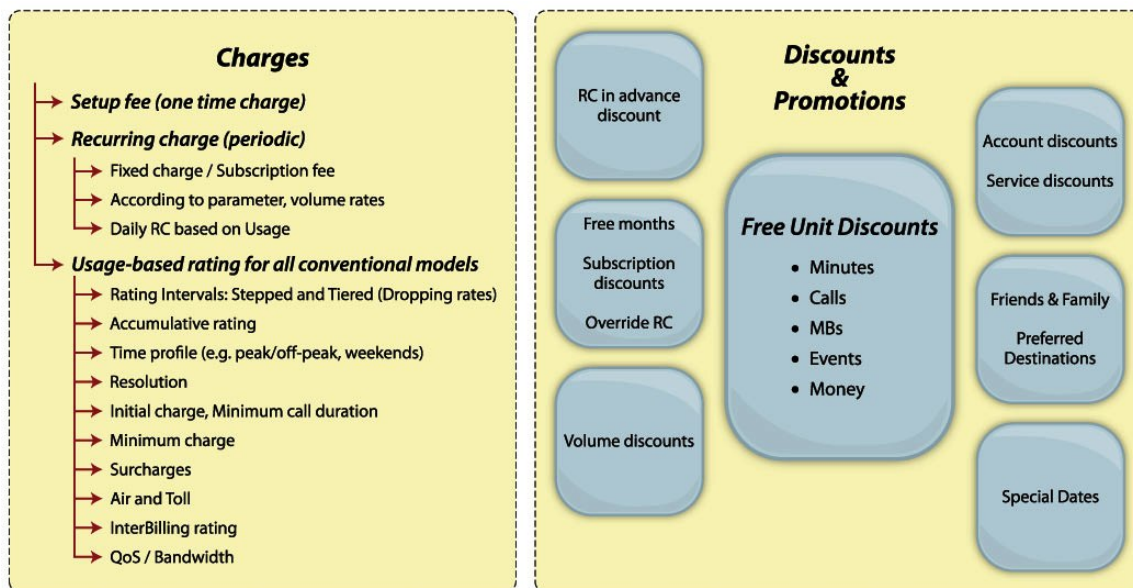
Rating

Product Catalogue

In the **MINDBill** design, an account is the billable entity having a balance. An account is assigned a Package that contains Products-Services-Features. The **MINDBill** account structure includes assignment of Goods reflecting mobile handsets, SIMs, IMSIs and other add-ons. The **MINDBill** product catalogue allows offering different combinations of services that are bundled into products. The Service is the consuming entity where the subscriber service profile is set, such as Bandwidth\QoS, IP address and other service-related properties that are provisioned in the AAA flow. Every service has a default tariff reflecting the costs.

Tariff Structure

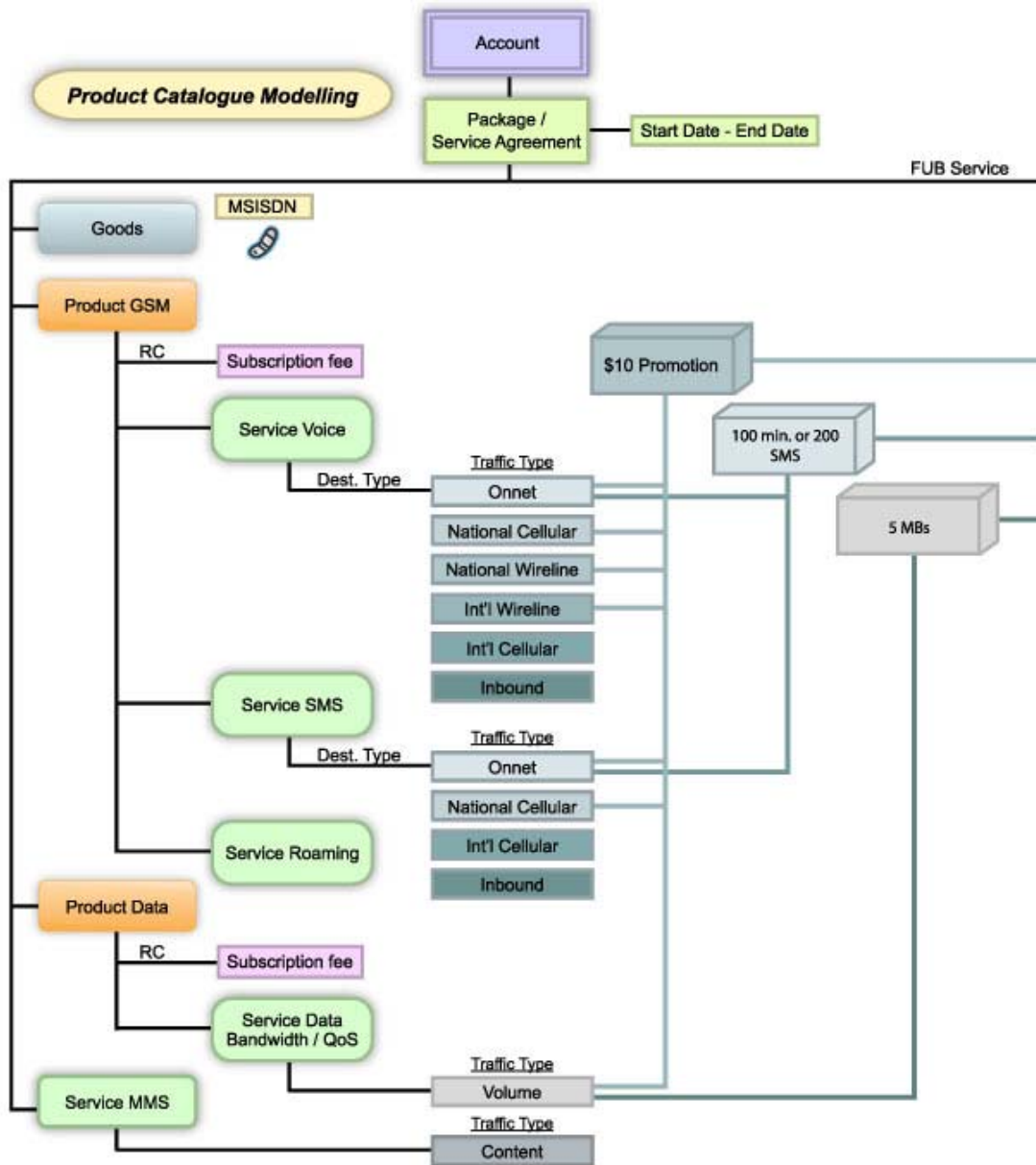
MINDBill allows true convergence of prepaid and postpaid services under the same account. The same rate plan may be used for both prepaid and postpaid as the same engine does rating and charging. The full richness of postpaid features and capabilities is available in real time for prepaid services, including: multi-dimensional rating parameterized using a very user friendly GUI, distinguishing Air and Toll usage; Rating intervals: stepped or tiered (dropping rates), configurable discounts, free unit bundles, taxation, recurring and one time charges and many more.



5. Charges and Discounts

Discounts – FUBs

In **MINDBill** the product catalogue includes an entity named Free Unit Bundles (FUBs). It is an external entity to the service that is "plugged in" to the package. The Free units bundles distinguish among destination categories, e.g. Local, National, Intl', Mobile, Wireline, Onnet, Data, SMS and more. The FUBs are applicable across service types and service codes within the same account package. The service provider can provide Free Units as voucher promotions or on a monthly basis as part of a subscription plan, etc. This is oriented towards the competitive mobile environment. A customer can get a promotion of, e.g. \$10 that can be applied to a number of services, for example SMS; Onnet calls and domestic wireline calls. Whatever consumption is made first consumes the promotion\free units.



6. Product Catalogue Modelling

Prepaid Data

An example for marketing offerings for usage-based vouchers is:

Plan	Price	Quota	Bandwidth	Effective period
Standard	\$10	1GB	512/256 Kbps	30-day
Bronze	\$20	2GB	512/256 Kbps	30-day
Bronze speedway	\$30	2GB	1024/512 Kbps	30-day
Silver	\$40	4GB	512/256 Kbps	45-day
Silver speedway	\$50	4GB	1024/512 Kbps	45-day
Gold speedway	\$75	6GB	1536/1024 Kbps	60-day
Platinum	\$100	10GB	2048/1024 Kbps	60-day

Typical marketing offerings for a monthly plan have a fair usage policy. The subscriber is allocated a credit quota according to the plan consisting of 4/6/10 GBs and when the credit quota is depleted the system automatically downgrades the bandwidth until the end of the month. The purpose of this plan is to enforce a fair usage policy avoiding abusing the spirit of the unlimited offerings.

Plan	Price	Quota threshold	Bandwidth	Downgrade bandwidth	Effective period
Starter unlimited	\$50	5GB	512/256 Kbps	128/64 Kbps	1-month
Surf unlimited	\$80	8GB	1Mbps/512 Kbps	256/128 Kbps	1-month
Pro unlimited	\$120	10GB	2 Mbps /1 Mbps	512/256 Kbps	1-month

An additional marketing offering is to encourage customers to pay in advance for a few months by providing discounting schemes relative to the advance payment:

Plan	Starter unlimited	Surf unlimited	Pro unlimited
Quota threshold	5GB	8GB	10GB
Bandwidth	512/256 Kbps	1 Mbps /512 Kbps	2 Mbps /1 Mbps
Downgrade Bandwidth	128/64 Kbps	256/128 Kbps	512/256 Kbps
Price 1-month	\$50	\$80	\$120
Price 3-month 10% discount	\$135	\$216	\$324
Price 6-month 20% discount	\$240	\$384	\$576

Additional types of usage-based pricing are for example having a combination of a monthly subscription fee that includes a predefined credit quota and pricing for additional usage having a volume discounting scheme.

Plan	ADSL beginners	ADSL light	ADSL pro
Monthly subscription fee	\$20	\$40	\$70
Bandwidth	1.5 Mbps	3 Mbps	5 Mbps
Quota threshold	1GB	3GB	5GB
Up to 10 GBs usage	\$10 per additional GB		
From 10GB-25GBs	\$8 per additional GB		
From 25GBs - unlimited	\$6 per additional GB		

The MIND Prepaid Data Internet service properties consist of four dimensions:

1. Face value amount: e.g. \$10; \$20; \$30; \$40; \$50; \$75, \$100, \$80, \$120, etc.
2. Expiration Period is the minimum between:
 - a. Utilization period (set during the voucher creation date “Recharge until date” e.g. ~2-year until 31/12/2011)
 - b. Effective period: 30-45-60 days
 - i) Relative to first usage
 - ii) Insert date
 - c. Optional Recovery period for consuming non-used quota in case of a recharge within a predefined period, e.g. 6-month relative to the end of the effective period.
3. Set service balance credit/quota: e.g. 1GB, 2GB, 4GB, 6GB, 10GB, etc. or threshold for bandwidth downgrade: 5GB, 8GB, 10GB
4. Set service throughput/bandwidth properties: 512/256; 1024/512; 1536/1024; 2048/1024 Kbps; etc.

The **MINDBill** system supports the challenges in handling the different properties for prepaid and postpaid Internet data services. This is primarily enforcing the subscriber suspension upon depleting the credit quota or alternatively applying the bandwidth downgrade in real time. An additional challenge is in handling package changes between plans having different properties seamlessly without disconnecting the end customer.

Prepaid Cards and Voucher Management

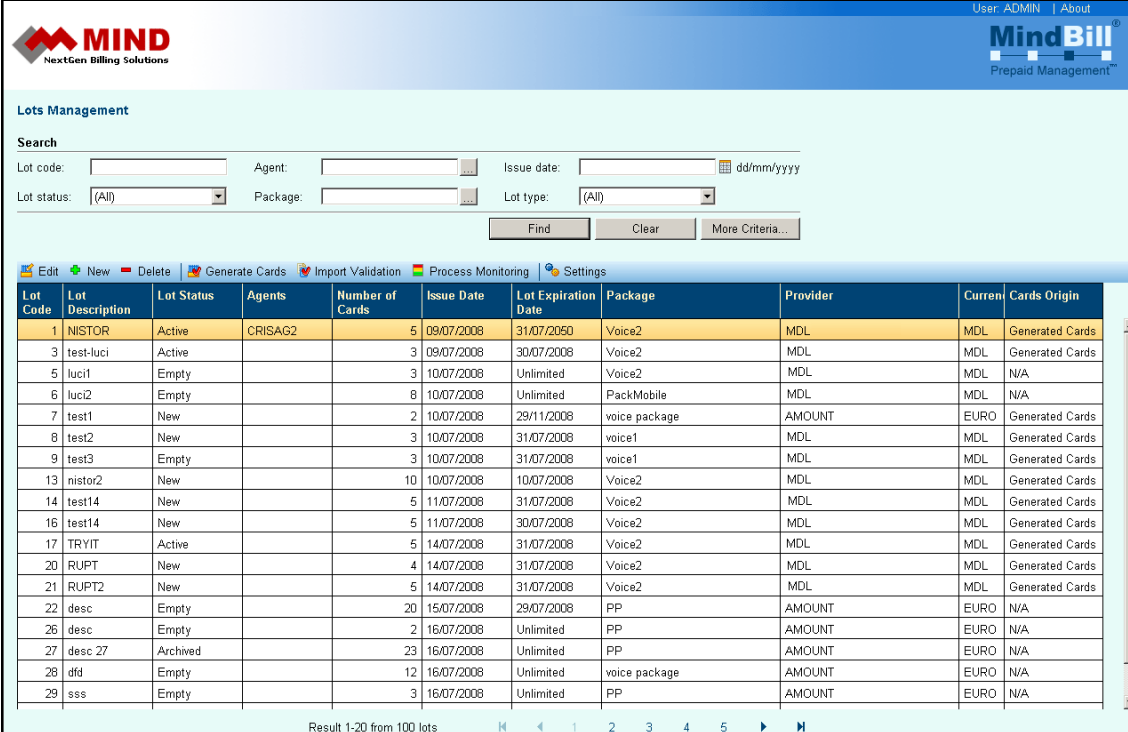
Voucher Management

The **MINDBill Voucher Management** functionality facilitates the automatic creation of voucher lots, each enabling different charging models, access restrictions and services associated. The vouchers can be used as rechargeable cards, one-time prepaid disposable cards, and for refilling existing accounts. Vouchers can be activated and used by accessing the operator's Web portal, USSD, or IVR and typing in the vouchers details, PIN code, and password. Vouchers may have an expiration date and usage limitations measured by time, volume, and location.

The **Prepaid Management** module features an intuitive and user-friendly web-based interface that allows the billing operations to manage prepaid calling card lots and vouchers. The application has two main modules: **Lots Management** and **Cards Management**.

Lots Management

The **Lots Management** module is used to perform various functions on batches of prepaid calling card lots or cards groups. The **Lots Management** tool enables the provider to manage the lots activation and promotions, to edit the lot and even to keep track of the lot history. Lots usually contain a very large number of cards, which puts constraints on the operators who need to operate with only part of the cards in a lot (e.g. assign it to an agent). In order to simplify such tasks, **MINDBill Prepaid Management** introduces the concept of Card Groups. Card groups are portions of the same lot (i.e. they have the same S/N prefix) and represent ranges of cards with consecutive S/Ns. There is no hierarchy between cards groups. Each such portion can be assigned, as mentioned above, to agents. The agent can perform several actions on its assigned cards group, such as activate or suspend them. The agent also obtains a commission on the usage of the cards in its groups.



Lot Code	Lot Description	Lot Status	Agents	Number of Cards	Issue Date	Lot Expiration Date	Package	Provider	Curren	Cards Origin
1	NISTOR	Active	CRISAG2	5	09/07/2008	31/07/2060	Voice2	MDL	MDL	Generated Cards
3	test-luci	Active		3	09/07/2008	30/07/2008	Voice2	MDL	MDL	Generated Cards
5	luci1	Empty		3	10/07/2008	Unlimited	Voice2	MDL	MDL	N/A
6	luci2	Empty		8	10/07/2008	Unlimited	PackMobile	MDL	MDL	N/A
7	test1	New		2	10/07/2008	29/11/2008	voice package	AMOUNT	EURO	Generated Cards
8	test2	New		3	10/07/2008	31/07/2008	voice1	MDL	MDL	Generated Cards
9	test3	Empty		3	10/07/2008	31/07/2008	voice1	MDL	MDL	Generated Cards
13	nistor2	New		10	10/07/2008	10/07/2008	Voice2	MDL	MDL	Generated Cards
14	test14	New		5	11/07/2008	31/07/2008	Voice2	MDL	MDL	Generated Cards
16	test14	New		5	11/07/2008	30/07/2008	Voice2	MDL	MDL	Generated Cards
17	TRYIT	Active		5	14/07/2008	31/07/2008	Voice2	MDL	MDL	Generated Cards
20	RUPT	New		4	14/07/2008	31/07/2008	Voice2	MDL	MDL	Generated Cards
21	RUPT2	New		5	14/07/2008	31/07/2008	Voice2	MDL	MDL	Generated Cards
22	desc	Empty		20	15/07/2008	29/07/2008	PP	AMOUNT	EURO	N/A
26	desc	Empty		2	16/07/2008	Unlimited	PP	AMOUNT	EURO	N/A
27	desc 27	Archived		23	16/07/2008	Unlimited	PP	AMOUNT	EURO	N/A
28	dfd	Empty		12	16/07/2008	Unlimited	voice package	AMOUNT	EURO	N/A
29	sss	Empty		3	16/07/2008	Unlimited	PP	AMOUNT	EURO	N/A

7. Lots Management GUI

Cards Management

The prepaid subscriber needs to have control of his prepaid account and requires the same level of service and customer care as a postpaid subscriber. The Cards Management module enables the user (for example an agent) to view information on the prepaid calling cards and vouchers. The agent can view only the cards that he has rights on. This application is a very useful tool for agents, who can edit calling cards and keep track of them and their usage.

After you locate the batch, you can perform one of the following functions:

- Delete the lot;
- Activate the entire lot;
- Deactivate the entire lot.

Self Care Recharge Options

MINDBill Prepaid IN enables the account balance recharge with all payment modes and voucher models, introducing new customer self-care facilities: IVR and USSD interfaces for balance inquiry, voucher insertions and credit card top up, complementing the existing Web Self Care and a rich set of Web Services for 3rd party application integrations.

IVR

The IVR Top-up service application includes the following features:

- Access to the service by dialing an access number from the mobile network and from outside the mobile network using a fixed line.
- Caller authentication by CLI within the mobile network or by PIN and password when calling from outside the network.
- Multi-lingual announcements – language may be assigned per subscriber, per special access number or by playing a language selection menu.
- Configurable number of failed PIN insertion or authentication attempts before the call is disconnected.
- Optional actions menu – allows the caller to choose whether to recharge their prepaid account or change their prepaid account password.
- Current balance prompts (configurable).
- Account or calling card recharge from voucher – by transferring money from another account or calling card, or from a credit card.
- Prepaid account password change – with optional new password playback.

USSD

MINDBill supports signaling for USSD enabling vouchers insert and credit card payments interface. An example for USSD deployments is:

- *ADD (*233) – VOUCHER TOP UP
- *PAY (*729) CREDIT CARD
- *MIN (*646) Check available Minutes in service wallet
- *BAL (*225) Check account Balance

Web Self Care

The **MINDBill WebBill** customer self-care application provides an interface to the customer to undertake a variety of business functions directly for themselves. This application interacts to provide fully automated service or assisted service over various customers touch points.

The **MINDBill Web Self Care** application enables convenient customer self-care through an efficient Web interface. The **MINDBill EBPP** enables easy customer verification of real-time balances, reduce the provider's costs, give subscribers real-time information on their account status and is accessible anywhere, anytime. The **MINDBill EBPP** is an optional add-on module Web-based application that links the provider's Web site and the **MINDBill** system.

WebBill can be easily customized from the form of a controlled 'secure window' application into the underlying OSS systems used by the customer to view and perform top-up payments to a complete portal where the customer can manage his entire relationship with the operator.

The default configuration of the **MINDBill** customer self-care application includes the following features:

- View the current balance
- Review invoices and call details

- View service usage charges
- Add a top-up payment or insert a voucher to recharge a prepaid account balance
- Add new payments to open invoices
- MINDBill EBPP can authorize the user's credit card in real time.
- Account management (such as contact attributes)
- Service management (such as PIN and password changes)

This default configuration, the look&feel HTML can be fully tailored according to the provider needs as a customization.

The system has an advanced security mechanism, enabling limiting the subscriber operation as subject to its profile. Based on this profile, a set of security items are assigned to the self-care user, thus allowing performing from a limited number of operations to a broad number.

Review section on Web Services that enable service providers to independently create their own web self care using the **MIND XML API** for this purpose.

Notification Emails and SMS

E-mail notifications are required to notify customers that their request or complaint is being handled, and they are meant to strengthen the connection with the customer. The **MINDBill** system supports sending notifications about the account, services, and order statuses to the workflow participants.

MINDBill supports defining different notification letter layouts per provider, bundling them in presentation formats, assigning them to accounts, and sending them at defined moments. The provider has the possibility to customize each notification letter template with specific parameters according to the account and account service entities. It is possible to override, at account level, the selection of notification letter layouts in the presentation format.

The following notifications can be sent:

- **Welcome Information:** sent after a service is successfully activated and provisioned;
- **Credit Card Expiration Notice:** sent when the credit card expiration date has reached a configurable threshold, defined in days;
- **Rate Plan Change:** sent at a package change;
- **CC Payment Failed:** sent when a payment by credit card has failed;
- **Invoice Ready to Be Automatically Billed:** sent at invoice generation, when the option to automatically pay the invoices is set at account level;
- **Invoice Ready Automatically Billed Not Set:** sent at invoice generation, when the option to automatically pay invoices is not set;
- **Automatic CC Payment:** sent when a batch CC payment is made;
- **Credit Card Declined:** sent on a CC payment rejection;
- **Monthly Bill is Now Available:** sent when the invoice has been made, after the completion of the billing cycle;
- **Service Plan is Expiring:** sent for all SIMs that have the expiration date relative to the thresholds configurable at the BP level;
- **Service Expired Notice:** sent when the services of a package have expired; the threshold used is the expiration date of the mobile incoming service designed under each package;
- **Cancellation Confirmation Notice:** sent on SIM account closure that was manually initiated;
- **Return Confirmation Notice:** sent as an acceptance of a return request that came from the end-user.

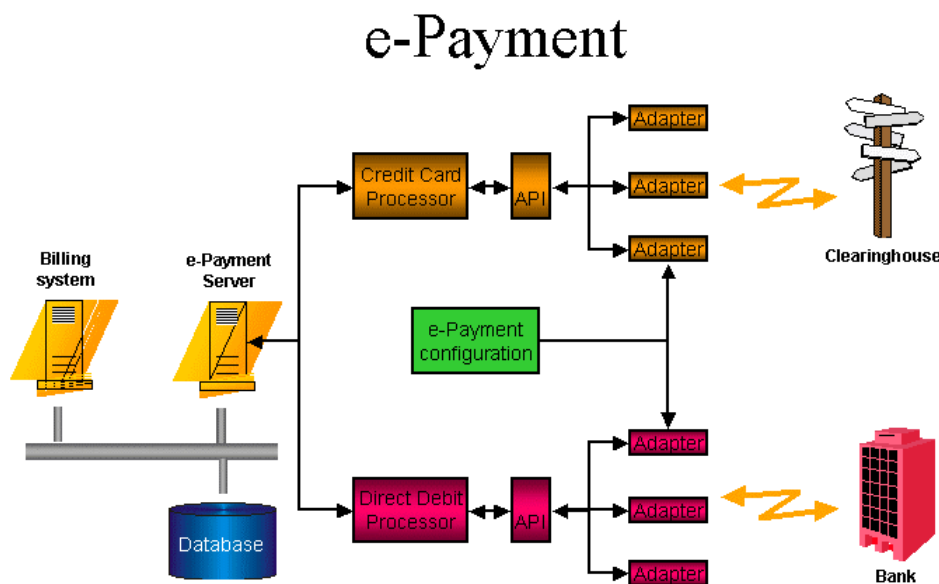
Credit Card Processor

The **Credit Card Processor** supports making credit card payments online in real time by sending a request for payment to the credit card clearing house when the customer asks through the self-care interfaces or via a customer care representative. The **Credit Card Processor** automatically sends requests for payment to the credit card clearing house and receives an immediate response (either an acknowledgement or a rejection). For pay-in-advance debit accounts, when the customer's payment becomes due, the **Credit Card Processor** automatically sends requests for payment by batch in the beginning of the month. In case the payment request is rejected, the account services can be automatically suspended.

Upon payment acceptance, the customer's balance is updated simultaneously. This is critical for prepaid customers and limited credit customers where the cut off duration is calculated based on the remaining balance in their account. Since **MINDBill** is a real-time billing platform, the payments module inserts records into the database and triggers the update of the subsequent fields in real time as well.

Adapter for Payment Processor

The **Credit Card Processor** processes all types of credit cards. For this purpose it is designed and developed to link up to all types of banks and credit card clearing houses. Each bank and credit card company has their own particular format and language for receiving and transmitting Payment transactions messages. MIND has created the ePayment adapter specifically to bridge any protocol gap. MIND takes the specific bank or credit card company's protocol and writes an adapter enabling seamless interface with the **MINDBill Processor**. This adapter enables the MIND Processor to communicate with the bank or credit card clearing house.



8. Credit Card Processor Adapters

The key concept behind this system is that the Provider does not need to change the software for every new bank and credit card clearing house that is added to the system. The software (Processor) and the intelligence inside of it remain the same. For each new bank or credit card clearing house that is added to the system all that is necessary is to write or define a new adapter. Each adapter is located in the *ePayment* folder of the **MINDBill ePayment System**.

Account Management

The account management application is called the **CSR** web client. It is a web based application GUI for CSRs to perform customer care activities consisting of creating accounts, updating subscriber service attributes, inserting payments, adjustments viewing invoices and call details.

The **Manager** and **Administrator** modules are LAN clients built on Delphi technology. The user configures the system tables, list of values, etc. and sets the parameters in the **Manager** and **Administrator** with the GUI.

The MIND billing system is the single front end for account management based on the **CSR** web client (and alternatively the XML API) that registers and creates new accounts and assigns the relevant package of services, that includes update of account profile and subscriber service attributes.

CSR

The customer-centric CSR handles and manages the entire life-cycle of the subscriber starting as a prospect, going through the account creation and order management, then with account maintenance and retention and at the end with ending the contract and closing the account.

This application gives the operator a centralized view on all the relevant aspects of the subscriber, including the services he consumes, the invoices that were generated, finance information, customer's complaints and so forth. The system enables tracking and recording all the interaction the CSRs had with the subscriber.

In addition, **CSR** supports full audit trail on any activity performed on the account, whether an automatic operation done by the system or a manual operation executed by a user, including time stamps.

The **MINDBill Account Home Page** gives one centralized and summarized view on the subscriber. It is tailored according to the operator's specific needs and business model, being fully configurable.

Thus, the account home screen shows the subscriber's contact details, the current package offering along with the discounts, the last unpaid invoices and the last payments made, the active business processes and last activities performed on the account.

Complex customer-care operations can be performed on an individual account or groups without interfering with the regular system availability. Change of product offering and promotions to customers can easily be applied. Printing invoices, entering payments and much more, either for an entire company account and all its employees, or for an individual customer's account are just two clicks away.

Quick access to the active business processes of the account as well as the last activities is provided through the account home page.

The quick launch commands from the header can be customized and tailored to meet operators' needs. For example, the system is configured to have quick access to the "Change status", "Add new adjustment" and "New trouble ticket" features.

Resource Management

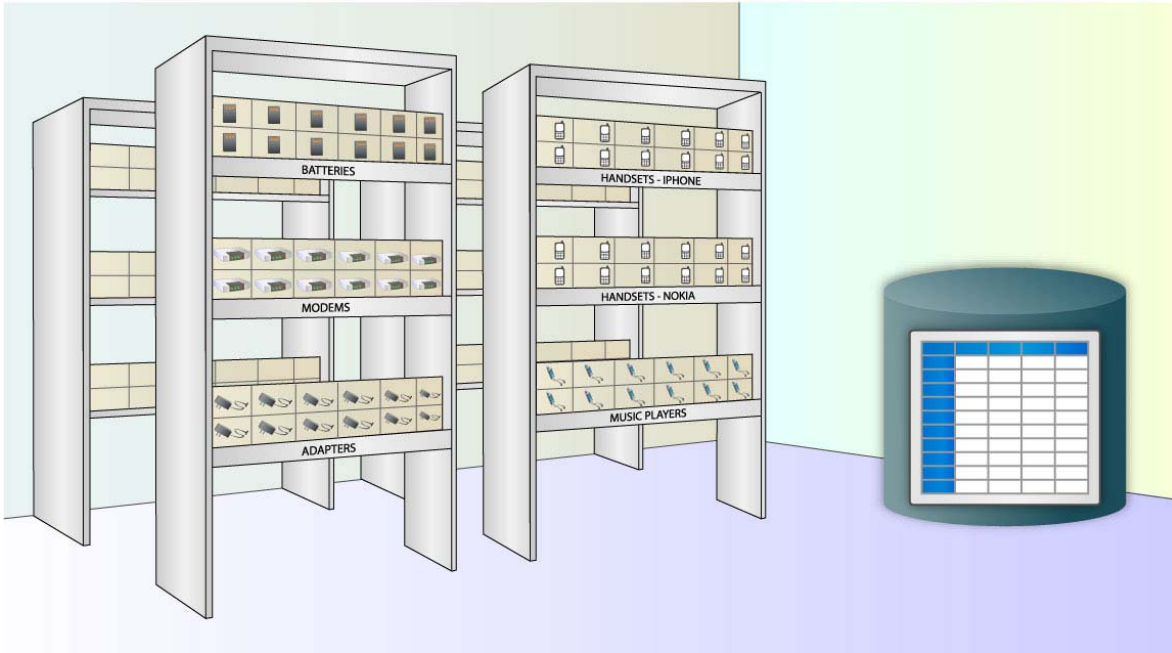
Various resources and equipment are necessary in order to offer services and products. The **MINDBill Resource Management** module automates the management and tracking of the items (handsets, phone numbers, etc.) sold to subscribers. The solution keeps track and manages the items by serial number, status, and location, providing solutions for the flow management from the reception of the items up to their allocation to the customers.

The interface with the **MINDBill** Billing and Customer Care platform provides an integrated solution for the service providers that support various business models. Equipment sold to subscribers can be charged to their invoice, or a direct sale feature allows for these items to be sold using a cashier interface including the selling of equipment to those who may not subscribe to regular services and don't receive a bill.

The **MINDBill Resource Management** features:

- Handling of item reception

- Item catalog and pricing management
- Item status flow management and control
- Items locations management
- Report generation on the inventory items
- Integrated solution with **MINDBill** Billing and Customer Care platform



9. Inventory Management

This service enables the assigning of inventory items to subscribers based on their services and charging them for the inventory items. The inventory application can act as a server, enabling the billing system to send requests and receive answers from the inventory. The request and its results are written in the journal.

The inventory journal includes inventory assignment, release and replacement with statuses and explanations. The inventory supports three types of tagged prices: Purchased price, Standard price (for calculating the value of stocked items) and Sales price to indicate the cost of the part to the customer.

The inventory service reserves maintenance information, such as maintenance provider codes, maintenance duration and dates, supplier Contact details as well as purchase order. The inventory system has a friendly user interface enabling users to search for items and filter results based on their status, suppliers, item SKU, etc. Summary reports can also be generated by the system using different filters such as date, location, status, item SKU, price and more.

The system enables providers to create an item path. These item paths define the logical stages (status, cycle) that an item goes through. For example, a returned item goes from return to test, to renovation or to unusable. The system can reserve new items as well as return items for the same customer for a defined period. **MINDBill Resource Management** controls and manages all the inventory management requirements from start to finish.

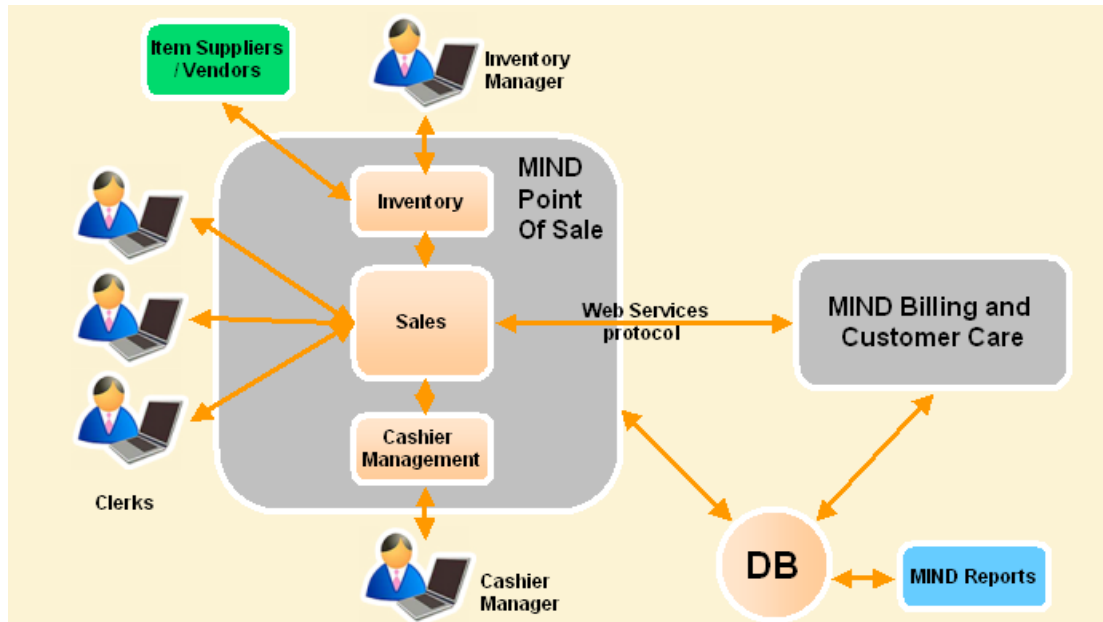
Point of Sale

The **POS** module is aimed mostly at the wireless retail market, enabling operators to offer their products and services in retail stores and manage the process within our enhanced solutions. **POS** is fully integrated into the MIND Billing and Customer Care solutions, allowing operators to offer seamlessly services and accessories for new and existing customers and even to non-subscribers. **POS** integrates with external systems such as the credit card clearinghouse, the external taxation engine and the address validation. **POS** includes three modules working together:

- The Resource Management Module
- The Sales Module
- The Cashier Management Module

Solution Architecture

The **MINDBill POS** solution functions within the operation support system architecture, enabling an unlimited number of Point-of-Sale terminal devices to be operated simultaneously.



10. MINDBill POS system architecture

The Sales Module

The sale module is an easy to use cashier station that supports all service activations, phones and accessories sales through one interface on a single receipt. The **Sales** module enables all payment methods such as Cash, Check, Credit Card, etc. It provides full control of the cashier devices such as Cash Drawer, Credit Card swipe, Bar Code reader and Ribbon printer.

The **Sales** module interacts with the **Resource Management** module to show the sales clerk the available items for sale in the store warehouse, to assign sold items to customer accounts, and to enable flows such as returns and repairs.



11. Sales Module

The Cashier Management Module

The **Cashier** module is a comprehensive store management environment that implements, in coordination with the Sales module, drawer and workstation assignments to clerks, Open day and Close day procedures, Cash transfers between drawer and safe, and a rich set of reports.

MVNOs

The MIND system supports a centralized billing system that is virtually partitioned for additional service providers all using one system without interference. A network operator can outsource billing services to MVNOs or other service providers that concentrate on market penetration for their brand and outsource the billing activity to a centralized billing system. The MIND solution supports a series of markup rates from Network operator-wholesale rates to Virtual provider-retail rates to end customer.

Virtual Providers

A partner management (and specifically, a virtual provider model) is a business model where the network provider leases its network equipment and its billing system to other providers (called virtual providers - VP). The **MINDBill** Billing and Customer Care platform provides operators, through the **MINDBill** Virtual Providers (called VP) functionality, with the ability to apply an independent business model of virtual operators in one centralized system.

The virtual providers are providers that offer services to end-consumers or other virtual providers using the services of a network provider, which leased its services.

A virtual provider entity is composed of two existing entities:

- A provider (Virtual Provider) that is subordinated to the parent provider;
- An account – Each Virtual Provider has a related account in the system, which contains its services. The provider of this account is the parent provider.

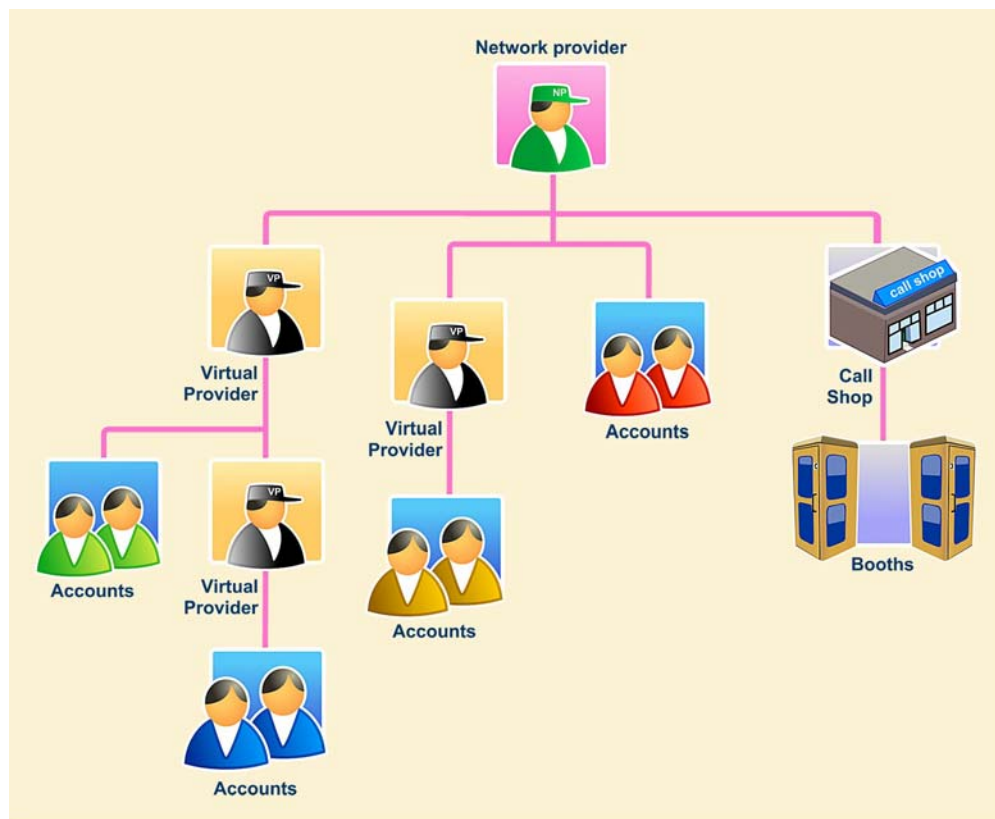
Virtual Providers are able to create subscribers (accounts) and assign them services that were created by their parent provider.

The VP bills its subscribers according to its business model (product catalog). Additionally, the parent provider bills its VPs based on diverse business models:

- Usage-based (the usage of the VPs' subscribers is billed by the parent provider);
- Flat fee/Recurrent charge (the parent provider bills the VPs charges that are not usage-dependant).

The key features of the Virtual Provider model are the following:

- Multi-level hierarchy of providers and virtual providers, accessible according to security permissions;
- Multiple currencies – every MVNO\Virtual provider can be defined with a different currency
- Each level can create and manage its own accounts and VP descendants;
- Visualized hierarchy;
- Each level can be billed by its parent provider according to the various rating schemes that exist in the system (e.g. usage-based, fixed rate, combination of the two etc.);
- Independency of the VPs to manage their business:
 - Complete business segregation (product catalog per each provider);
 - Enhanced security enabling the network provider to define the level of VPs' independency;
 - Web access to the VP functionalities;
- Ability to pass on parent characteristics to the descendants;
- Revenue leakage prevention:
 - Restricting the VP to offer only certain services and features;
 - Blocking the VP's subscribers according to VP's balance versus its parent provider;
 - Flexible mediation, enabling mapping a business event of a subscriber (e.g. a phone call) to a specific service of the VP (in front of its parent), according to customizable business rules.



12. Providers hierarchy

Solution Architecture Overview

Technology

The **MINDBill** Multi-layered infrastructure is supported by a modular software architecture enabling real-time distribution processing, achieving performance, scalability and high availability.

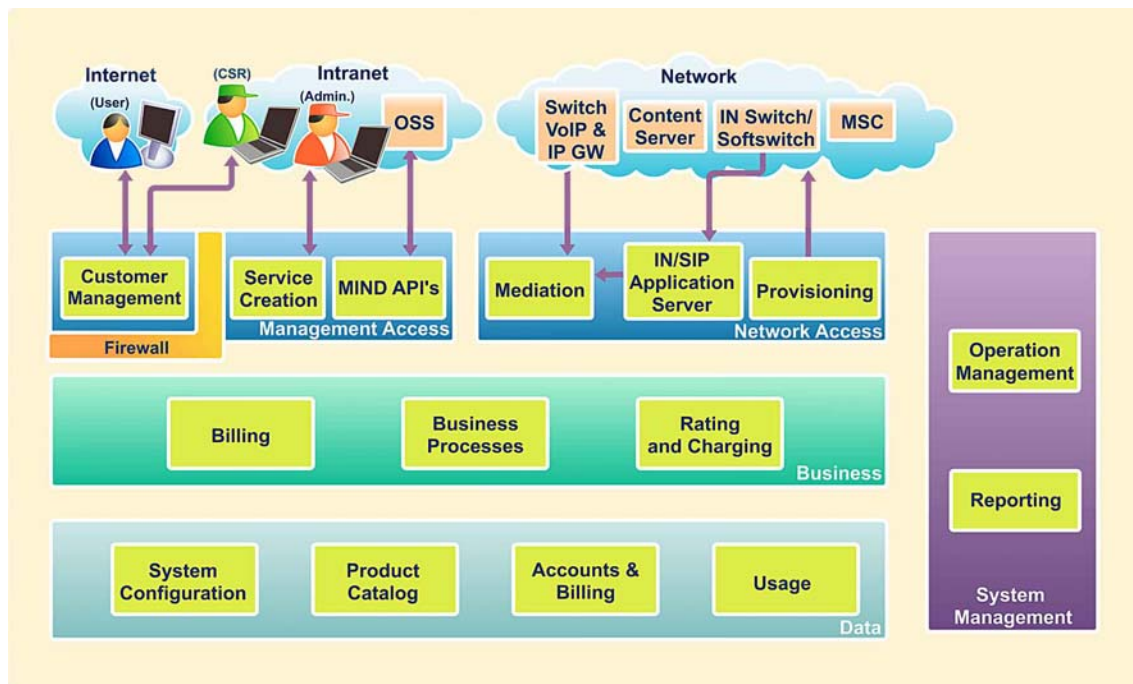
MINDBill uses an open architecture including the latest software paradigms - Service Oriented Architecture (SOA) and Document Oriented Architecture (DOA) - thus enabling fast and seamless integration with other systems and third-party applications

MINDBill is built using standardized best-of-breed object-oriented technologies such as Java and XML, and it is J2EE compatible as it is powered by a commercial Application Server.

Since **MINDBill** is developed using Java, it runs on any standard platform. It runs on SUN Solaris, IBM AIX, HP UX or Intel HW using Linux or Windows. It can be deployed on Web Sphere, Oracle and JBoss application servers.

Logical Architecture

The **MINDBill** logical architecture is based on four layers: the Access layer, the Business layer, the Data layer and the Management Layer.



13. MINDBill Logical Architecture

The Access Layer

All the modules that interface with external systems (i.e. Intranet, Internet, Telephony Network, etc.) are placed in the Access layer. The Access layer consists of the Management access and Network access sub-layers:

Management Access

MINDBill Management Access provides the operator with the following main modules:

- Service Creation and Product Catalog – allows providers to configure and launch new services and business models in fast time-to-market;
- Customer Care – Web-based Access tools for both Customer Service Representatives and for subscribers' Self Care;
- MIND APIs – Enabling open interface with external systems.

Network Access

The **MINDBill** Network Access enables the exchange of business and operational information between **MINDBill** and the various network elements. It consists of 3 main modules:

- Mediation – Provides both real-time and batch collection, analysis and processing of billing events;
- Provisioning – Updates and activates subscribers' services and features in the network elements;
- IN/SIP Application Server – Call Control for prepaid services such as prepaid card dialing based on IVR services, card recharging, etc. for both IN (SS7) and SIP-based Networks.

The Business Layer

The Business layer consists of the modules responsible for the various business processes and business logic of the **MINDBill** system:

- Rating and charging
- Billing and invoice generation
- Customer creation
- Trouble ticketing
- Additional business processes.

The heart of the **MINDBill** business processes is the Workflow Engine, which provides the operator with the ability to modify and create new business processes.

The Data Layer

The Data layer holds the business persistent data. It includes the database and the common storage. It is based on the Oracle industry-proof database engine.

The Management Layer

The Management layer includes business and traffic reporting tools.

Scalability and Expandability

MINDBill's modular and scalable architecture allows the system to grow with the service provider. Scalability is achieved by “scale-out” (adding more servers) or by “scale-up” (adding CPUs or the upgrading the existing servers with more powerful HW).

Scalability is achieved by increasing the number of CPUs and RAM per application server machine. Afterwards, installing additional application servers that increase the volume handled by the system supports scalability. For example, the J2EE **CSR** application is a built-in integrated application installed on a separate server. As the number of users of the Service Provider gradually grows, the number of application servers would need to be increased as well. Another example is the **RTS**, handling the mediation, which is scalable to the network by installing additional servers.

MINDBill is scalable both vertically, by adding more memory & CPUs, and horizontally, by adding additional servers to process in parallel (utilizing the Java and J2EE architecture). MIND's infrastructure department advises on the best H/W configuration so that the DB nodes capacity is balanced with the number of Client machines accessing it to support the expansion in simultaneous sessions.

MINDBill is designed to be easily adapted to changes in the size and configuration of a service provider's network. The product is designed to permit the service provider's network to grow from accommodating a small number of subscribers to accommodating a large number of subscribers, primarily through the addition

of hardware. The system's database capacity is made scalable and expandable by increasing the number of CPUs, memory (RAM) and disk space (external RAID). This feature allows a service provider to expand its infrastructure and its subscriber base without the need to redesign or replace its collection, correlation and rating software. This scalability of **MINDBill** software is important since many service providers can begin with a relatively small subscriber base and experience rapid growth.

The Oracle DB primarily drives the system throughput. The throughput that's provided by the Oracle Database Server scales to match the size of the H\W configuration as it grows.

Redundancy and High Availability

MINDBill provides a solution with built-in redundancy and high-availability (HA) architecture. It is reliable with no single point of failure, guaranteeing uninterrupted service for mission-critical systems. All servers are data-less, hence load sharing and HA are obtained using the N+1 architecture.

- **MINDBill** Data Servers HA are based on Oracle's Parallel Architecture and Clustering. The DB is installed in a cluster of high availability with one active node and another DB node in standby mode (SUN Cluster, Veritas, Red Hat Linux Cluster and more).
- The MIND system is installed on an Oracle DB having standard Oracle backup procedures (RMAN). Normally, the MIND embedded Oracle DB is installed on an external RAID 1+0 to achieve maximum throughput and redundancy.
- The mission critical applications are designed in a redundant configuration with an automatic failover mechanism.
- The J2EE and jBPM applications are installed using JBOSS that supports a cluster mode.
- Since the **RTS** is a mission critical application, it is programmed with a built-in fail-over mechanism, which is activated in case of application or server failure. If one RTS fails, another RTS can replace it without any data loss.
- When there is no connection to the Database, the **RTS** will write the information received from the network elements to files. This mode is named "No DB mode". The RTS stores the received information to files and processes them when the DB connections resume. The solution also includes the ability to manually switch a RTS to the no DB mode for testing purposes.
- In a typical network topology all of the applications are installed on a backup server that is in standby mode so that another instance of the same application can be easily activated.
- In addition to the above, MIND supports a DRC configuration having a remote site that is updated online using the Oracle Dataguard.

SNMP and Monitoring Tool

The critical **MINDBill** components externalize their status using SNMP. Alarms are sent using SNMP traps.

MIND's Monitoring Tool Suite (MMTS) is 24x7 operational control and proactive monitoring of the entire **MINDBill** system (hardware and software) based on Nagios, AWStats, n2rrd, Jopr, NagVis, NSClient++, NRPE, WMI and SNMP.

The MMTS provides:

- **Comprehensive Monitoring** of all the mission-critical infrastructure components including **MINDBill** applications, services, operating systems, network protocols, system metrics, and network infrastructure.
- **Visibility**: Provides a central view of your entire IT operations network and business processes.
- **Awareness**: Alerts are delivered to the IT staff via email and/or SMS. Multi-user notification escalation capabilities ensure alerts reach the attention of the right people.
- **Problem Remediation**: Event handlers allow you to automatically restart failed applications, services, servers, and devices when problems are detected.

- **Trending and Capacity Planning:** Allows organizations to plan for infrastructure upgrades before outdated systems catch them by surprise.
- **Reports:** Ensure SLAs are being met, provides historical records of outages, notifications, and alert response for later analysis.
- **Extendable Architecture:** Provides easy integration with in-house and third-party applications, the critical MINDBill components externalize their status using SNMP. This includes alarms that are sent using SNMP traps.

Business Intelligence & Reports Analysis

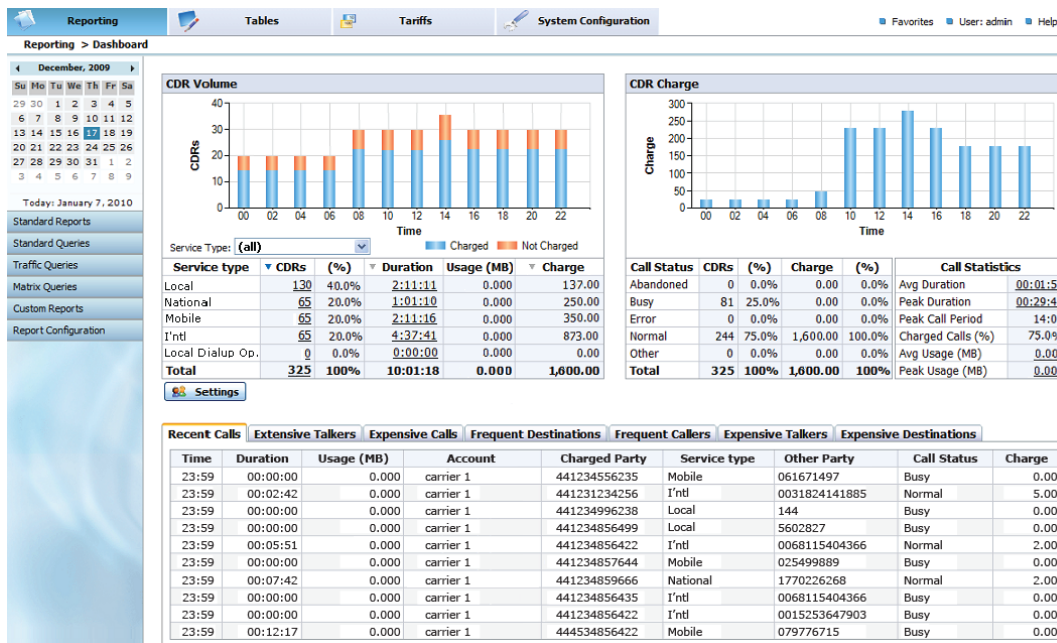
MINDBill incorporates a flexible reporting & BI platform allowing the operator to create, manage, and display all required data and activities.

The MIND reporting solution is based on SAP BusinessObjects Edge Business Intelligence (BI). This comprehensive, versatile suite delivers solutions that address any business intelligence requirement – from flexible ad-hoc reporting and analysis, to dashboards and visualization supporting all of a Telco operator needs. The solution is a powerful business intelligence choice for Telco providers that require a deep insight for traffic analysis, revenue sources, that want to improve costs effectiveness, comprehend resources utilization, discover new opportunities, and gain a competitive advantage.

Dashboard

The MINDBill system includes an online dashboard that presents the most updated information of the CDRs processed from the switches and presents an updated monitor view of the traffic, allowing the detection of problems and escalation at early stages. It provides useful graphs that show traffic per service type, call type, and time of day, recent calls, expensive calls, frequent destinations, expensive destinations, etc.

The ASR statistics is an important factor for a traffic termination environment, particularly as an additional factor for the LCR. In the MIND reporting system, the ASR parameter is configurable for any value starting with zero, since 1-2 seconds call duration is not necessarily an indication for a successful call attempt.



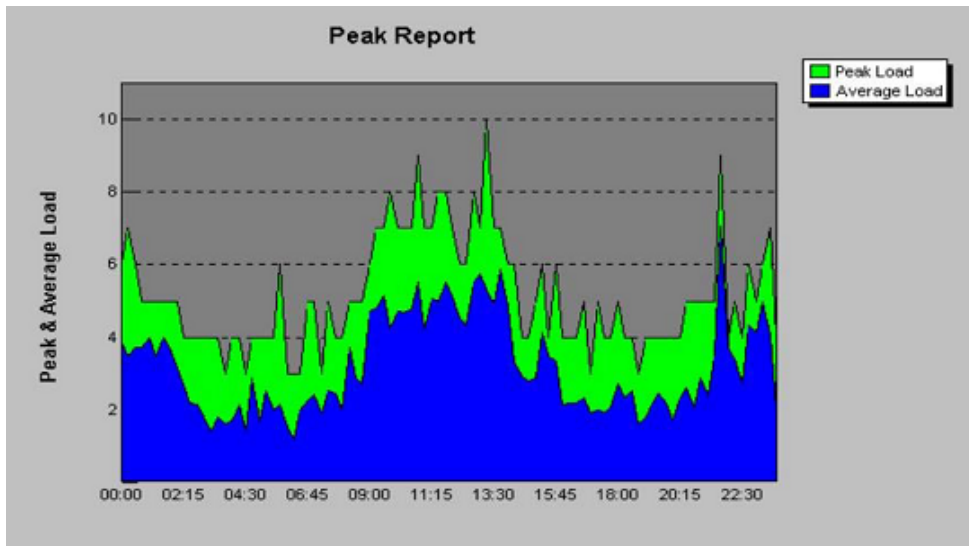
14. Traffic Dashboard

Call Traffic Analysis

Traffic Analysis reports serve as a basis for deciding on the optimum allocation of resources and other efficient revenue saving measures. This tool generates reports that measure call loads to different destinations, at different hours of the day, the number of calls per minute for a specific gateway or group of gateways, as well as providing a measurement for maximum network capacity. Traffic data is summarized in peak, average and daily traffic reports that may be displayed and printed in various graph formats.

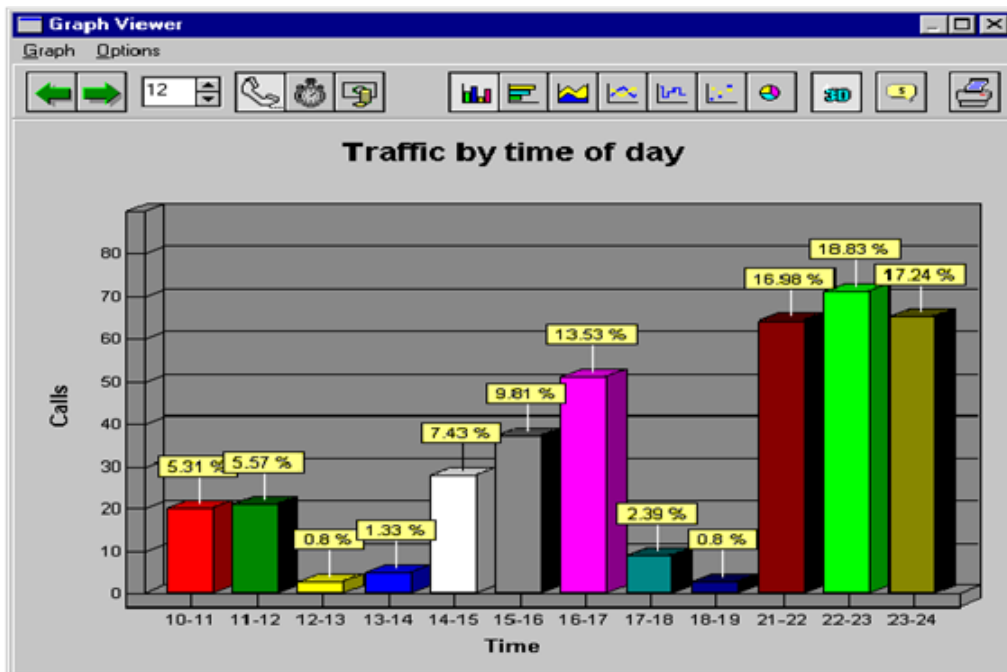
The **Call Traffic Analysis** tool allows:

- Monitor all call traffic on the network.
- Analyze trunk utilization.
- Display and print data conveniently in bar, line and area graph formats.
- Measure call loads to different destinations.
- Select the resolution to calculate the average.
- Export reports and graphs for use in other applications.



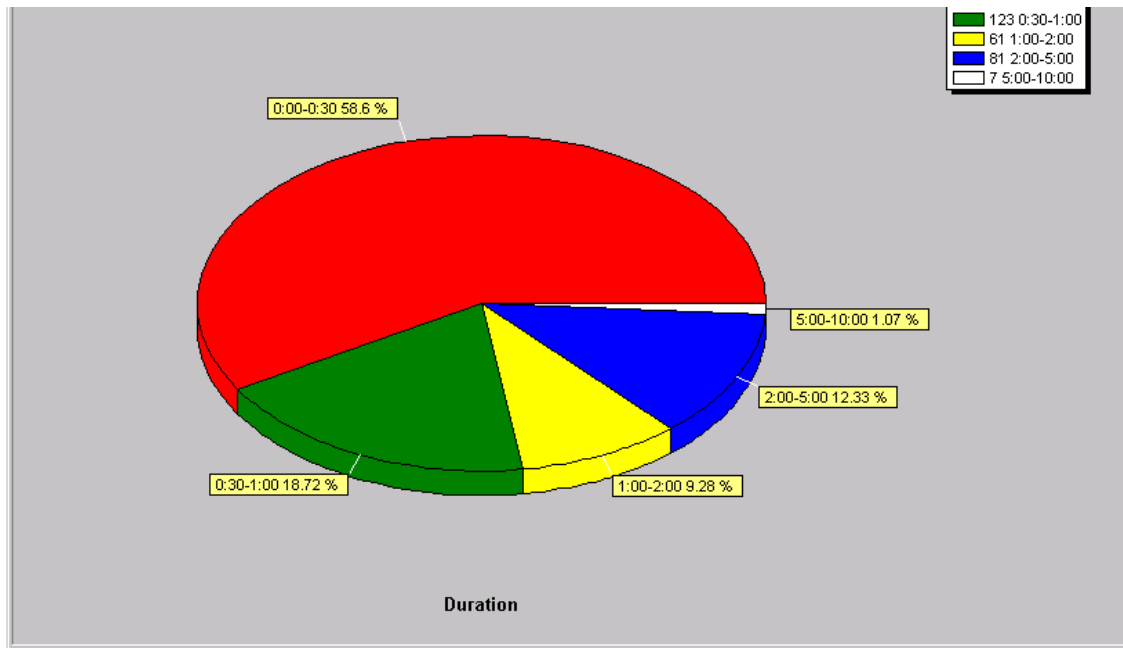
15. Traffic Report

All summary reports created by the Query Generator can be broken down per carrier, network element, IP address, Trunk ID and are presented in a graph form. The format, colors, gridlines and titles to control the look and style of the graphs can be defined.



16. Traffic report by time of day

Call Summary by Call Duration: The Service Provider can analyze and assess QoS. If more than 50% of the calls are less than ½ a minute, then there is a definite problem in the quality of the Voice. The following graph (report) displays the distribution of calls by duration.



17. Call duration statistical analysis

Roaming management

NRTDE

The MINDBill system provides the ability to generate NRTRDE files for inbound traffic of visiting roamers and also process incoming NRTRDE files for outbound roaming usage traffic.

Glossary of terms:

- NRTRDE – Near Real Time Roaming Data Exchange
- PLMN – Public Landline Mobile Network
- HPLMN – Home PLMN
- VPLMN – Visited PLMN

Roaming call: is a call made by one PLMN subscriber using another PLMN network. The call would be considered made by the home PLMN using the Visited PLMN network. The calls are exchanged between the different roaming partners using a clearing house.

The VPLMN calculates amounts and/or taxes that he will request from the HPLMN for the roaming calls based on the roaming agreements.

A long period of time passes between the call processing until it is received by the HPLMN. This poses a challenge since during a relatively long time period prevents the HPLMN from applying efficient Fraud detection processes for example.

The MINDBill NRTDE module allows exchanging of Roaming CDR information in a short time.

The exchanged data is based on subset of raw CDRs data only and is simple to read and analyze.

Unified data file format to be used by all roaming partners TD.35

The time period between the roaming call ends until it is received by the HPLMN should not exceed 4 hours.

There is no standard way for sending files between the roaming partners and clearing houses, this is usually done by FTP.

The application may produce multiple NRTRDE files per PLMN each day, normally on a 15-min. intervals.

Only Voice, SMS and GPRS calls are handled by the NRTRDE application.

Back Office Integrations

G/L

The **MINDBill G/L Module** provides the full flexibility for handling and supporting all accounting functionality. It follows the Financial accounting standards. Furthermore, all the financial transactions are segmented, aggregated into predefined groups and the system enables posting all the transactions amounts per G/L code to an external accounting system by reports or by files that are generated by the built-in export utility.

Since the G/L account can vary from one system to another, depending on the resolution needed by the accounting system, the mapping between financial transactions and the G/L account codes is done in a highly flexible manner in order to comply with the providers' business model.

The **General Ledger** represents the individual accounts used by an organization to record its assets, liabilities, equity, revenues, and expenses. One of the basic rules in accounting is the association of different types of fiscal transactions to specific balance sheets (or G/L accounts). The G/L accounts record business transactions as totals. The **MINDBill G/L** system associates different types of fiscal transactions (e.g. taxes, discounts, usage, payments etc.) to specific balance sheets (or G/L accounts). The **MINDBill G/L Account** system enables a wide range of mapping options. Each fiscal transaction is assigned to a G/L account code. The system allows posting transactions amounts per G/L code to an external accounting system using reports or the export utility.

A Segment is a sub-organization that may have separate accounting/reporting, e.g. a department, subsidiary, etc. Each segment is represented by a different G/L code prefix. This enables G/L codes hierarchy (similar to the account hierarchy).

The following capabilities exist within the **GL** Module:

- **Relate financial activities to General Ledger Accounts:** Transactions related to specific types of assets, liabilities, equity, income (revenue) or expenses.
- **G/L Cycle frequency and time:** Collect and aggregate the financial transaction for the General Ledger account per G/L Cycle. The G/L cycle frequency and schedule is defined per provider.
- **Revenue recognition:** The G/L reports provide the required information on Revenue recognition (i.e. billed/ unbilled, earned/ unearned).
- **Hierarchy Segmentation:** enabling tracking of G/L revenues according to the accounts hierarchy in the system.

Web Services

The **MINDBill** platform is built as an open platform, for easy integration with the existing Operations and Business Support Systems (OSS/BSS). The solution is equipped with a comprehensive set of APIs that cover all CRM needs, business rules and reference data. The interfaces are based on open standards, such as SOAP/XML and J2EE, and out-of-the-box middleware support (CORBA, Tibco, etc.). In addition, import and export utilities enable en-masse updates toward external systems. These characteristics enable easy integration with multiple OSS/BSS, including billing, fraud, lawful interception and data warehousing.

The API handles account, account-service and payment-related functions. Using this API, any external application, irrespective of platform, can create, update or query accounts, account-services or payment details. MIND's billing API can be used by any third-party application, through HTTP requests in standard SOAP protocol. The data is expressed in standard XML format. The application that uses the API can be located anywhere, locally or remotely with Internet or intranet connections to the API server.

Summary

Prepaid Challenges and MIND Solutions

A major goal of the operators is to maximize ARPU. One of the major means is by promoting Value Added Services to subscribers. The challenge in a prepaid environment is the simultaneous consumption of Multiple Services. MIND's solution is the Real-time Multiple Services Credit Control to prevent revenue leak. This enables a single balance for Voice, SMS, Data and content. Or alternatively a service wallet of Free units that are first/last consumed in addition to a common account balance.

An additional type is Roaming handling prepaid concurrent services consumption. This is circumvented by the MSCC communicating directly with the network element, e.g. GGSN, SMSC, MMSC, etc. There is a challenge for supporting of multiple protocols required for interfacing with different vendors' equipments. **MINDBill** includes an intelligent, scalable mediation, including AAA and built-in quota management; with the option for interfacing to a legacy system.

Operators need to introduce marketing differentiation and this is achieved by the **MINDBill** flexible rating multi dimensional parameters.

Another challenge is promoting different channels to markets in order to maximize market share and penetration to many segments. This is achieved in **MINDBill** with the virtual providers model (MVNOs).

Delegate sales to dealers and resellers. Operators require supporting for various recharge options that sustains customer-provider relations. This is achieved using the user friendly and easy to use sales clerk application in the **POS** and **Web CSR**. The solution includes the Web-based Calling cards and voucher management for Web self care, USSD, IVR recharge.

MIND Solutions Differentiators

- **MINDBill** is a convergent Prepaid and Postpaid platform encompassing functionality that includes billing, customer care, mediation, provisioning, rating for multiple services.
- A key differentiator is that the Prepaid rating capabilities are compatible with postpaid flexibility particularly for volume discounts for example.
- MIND deploys a proven platform product based solution with a track record for swift deployments and the flexibility to tailor for customer requirements in a short time frame. Operators achieve a quick time to market by launching the system early to gain a marketing advantage and ROI.
- The MIND company group of veteran professionals has extensive experience in Billing models with a deep understanding of business processes related to the Billing. Our broad experience includes IT systems integration with Billing and many network elements.
- The **MINDBill** solution is a multi platform technology. The Open architecture with SDKs and APIs facilitates local independent customizations, extensions and integrations.
- MIND has a long list of interoperability with many network vendors enabling service providers unlimited selection of the best of breed to accommodate their operational and commercial needs.
- The **MINDBill** solution is scalable and expandable architecture with proven production experience.
- The **MINDBill** Product infrastructure is built on latest technology that ensures long durability for many years ahead as a sustainable development platform.
- MIND has developed a proven platform that has been operational for 12 years in Telecom operators Experienced in: Wireline, Mobile, VoIP, ISP and Cable. Experienced deployments worldwide references: Europe, Asia, Africa, USA: H3G Italy, China Unicom, Singtel, Moldova Telecom and more.
- MIND's company culture is committed to our customers' success providing excellent ongoing support to the dynamic needs of the service providers having to be in the frontier of the competition.

About MIND

MIND CTI Ltd. is a leading provider of convergent end-to-end billing and customer care product based solutions for service providers as well as telecom expense management (call management) solutions. MIND provides a complete range of billing applications for any business model (license, managed service or complete outsourced billing service) for Wireless, Wireline, VoIP and Quad-play carriers in more than 40 countries around the world.

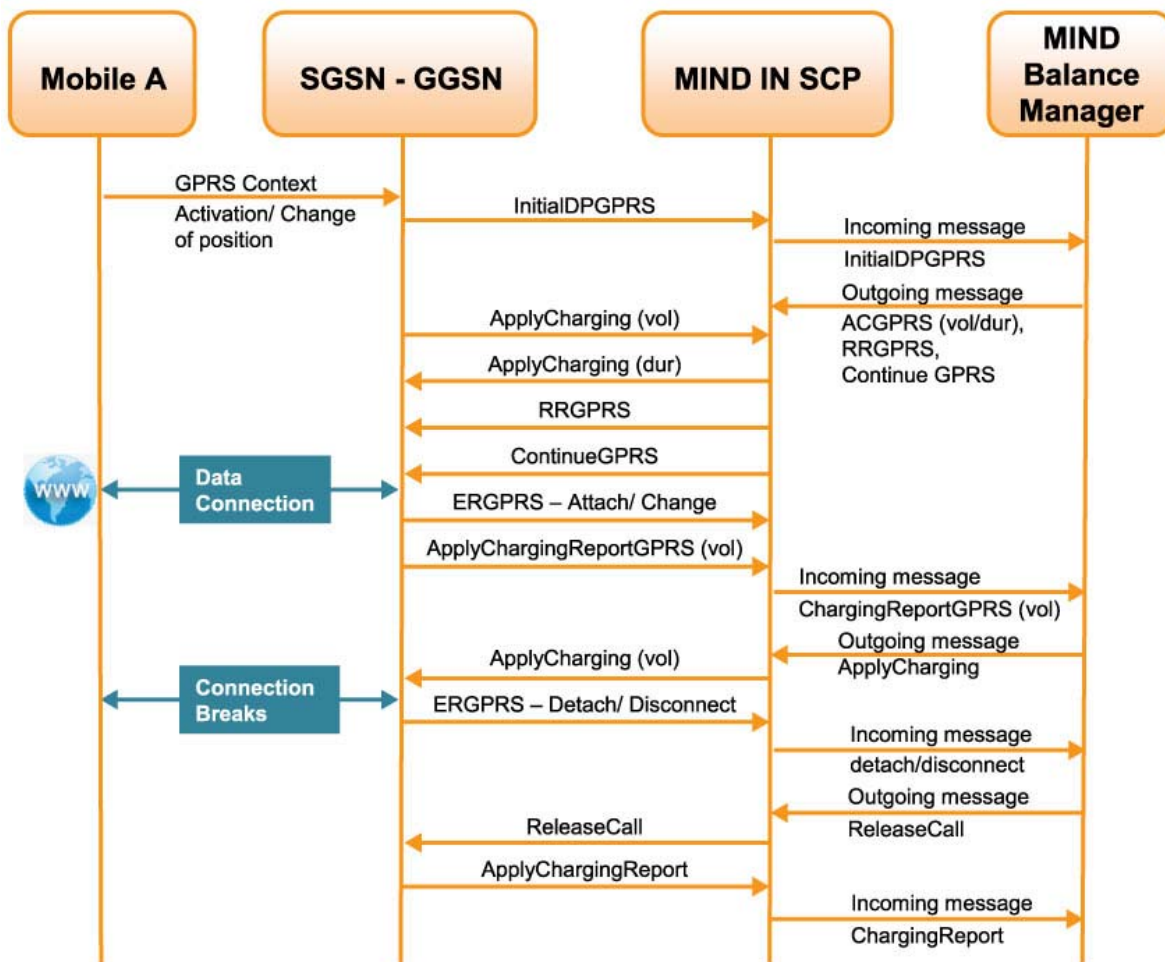
A global company, with over twelve years of experience in providing solutions to carriers and enterprises, MIND is a leading provider of solutions for Tier 2 and Tier 3 n-play (multiple services) carriers that require a complete end-to-end BSS (Business Support Systems) solution.

A public company (NASDAQ-MNDO), MIND operates from offices in the United States, UK, Romania and Israel.

Appendixes

IN Call Scenario – GPRS Data Session with Quota Management

The following scenario illustrates the flow of a GPRS mobile call with a recurring quota allocation procedure. After a number of quota allocations, the mobile user normally terminates the session.



18. GPRS session with Recurring Quota Allocation

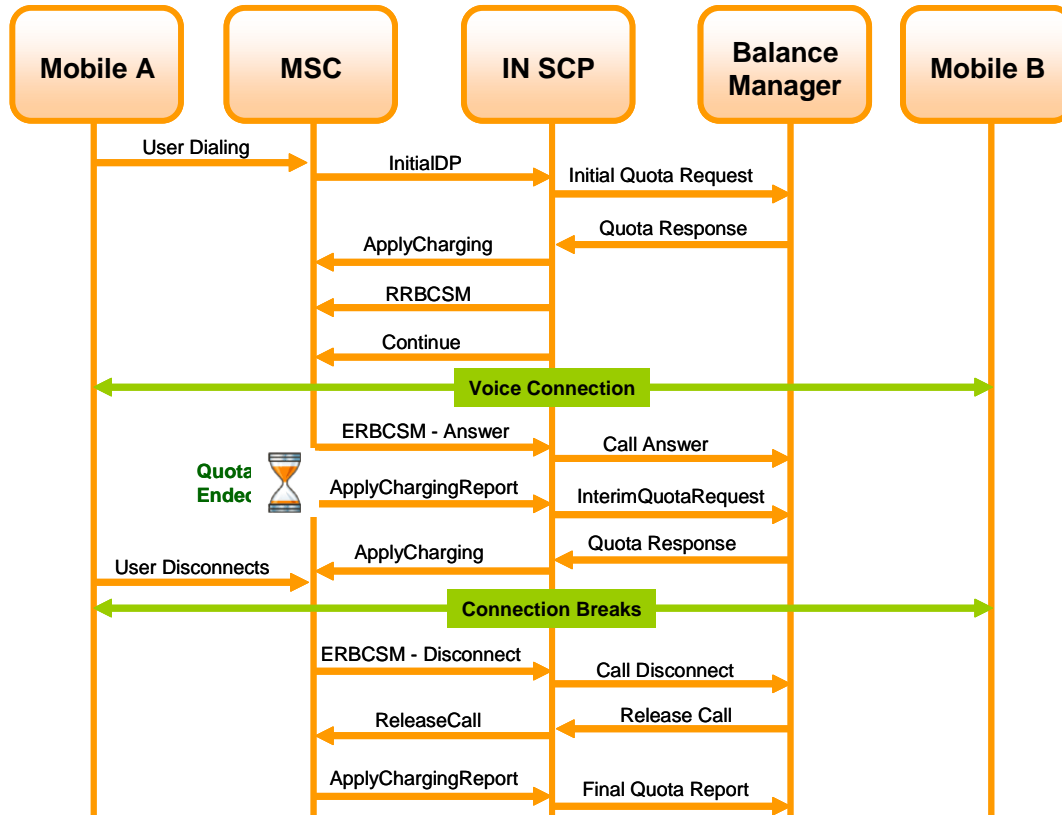
The above flow describes direct dial mobile call with a recurring quota allocation procedure:

- Mobile A starts a new GPRS session
- 1. The SGSN sends an initialDP GPRS (Initial Detection Point) event which notifies the SCP of the new session or context change
Main Parameters:
 - a. MSISDN
 - b. IMSI
 - c. AccessPointName (distinguish MMS)
- 2. The SCP sends the incoming message to the RTS/Balance Manager which grants authorization with the time available for the call and instructs the IN SCP to send 3 messages to the switch:

- a. ApplyChargingGPRS – Two of these messages may be sent either for: limiting the time of the session or limiting the data volume of the session.
 - b. RRGPRS – Request Report GPRS This is used to ask the SGSN to inform the SCP whenever a new DP occurs, and in this case we will ask for attach, attachChangeOfPosition, detached, and disconnect .
 - c. ContinueGPRS – this directs the SGSN to continue call processing and connect the call.
3. Mobile A can now use the data connection.
 4. Once the connection is made, a new ERGPRS (Event Report GPRS) is sent to the SCP to inform that the session has started
 5. The SCP passes that info on to the RTS server\Balance Manager.
 6. When the first quota ends, a new event of ApplyChargingReportGPRS (either volume or time quota is finished) to notify the SCP.
 7. The SCP notifies the RTS server \Balance Manager which returns the next quota volume\time.
 8. The SCP sends a new ApplyChargingGPRS request to the SGSN which will add the new quota to the volume\time left for the user. This can be done repeatedly throughout the call.
 9. When the session is disconnected (for any reason), a new ERGPRS is sent to the SCP to inform it of the disconnect event.
 10. The SCP passes that info to the RTS/Balance manager which in turn allows it to release the session.
 11. Once the session is released, a new ApplyChargingReportGPRS arrives to the SCP which contains full time/volume usage data on the session.
 12. A final CDR is inserted

IN Call Scenario – Mobile Calling with Recurring Quota Allocation

The common IN prepaid call is a direct dial call. The following scenario illustrates the flow of a direct dial mobile call with a recurring quota allocation procedure. After a couple of quota allocations, the call is normally terminated by the mobile user.



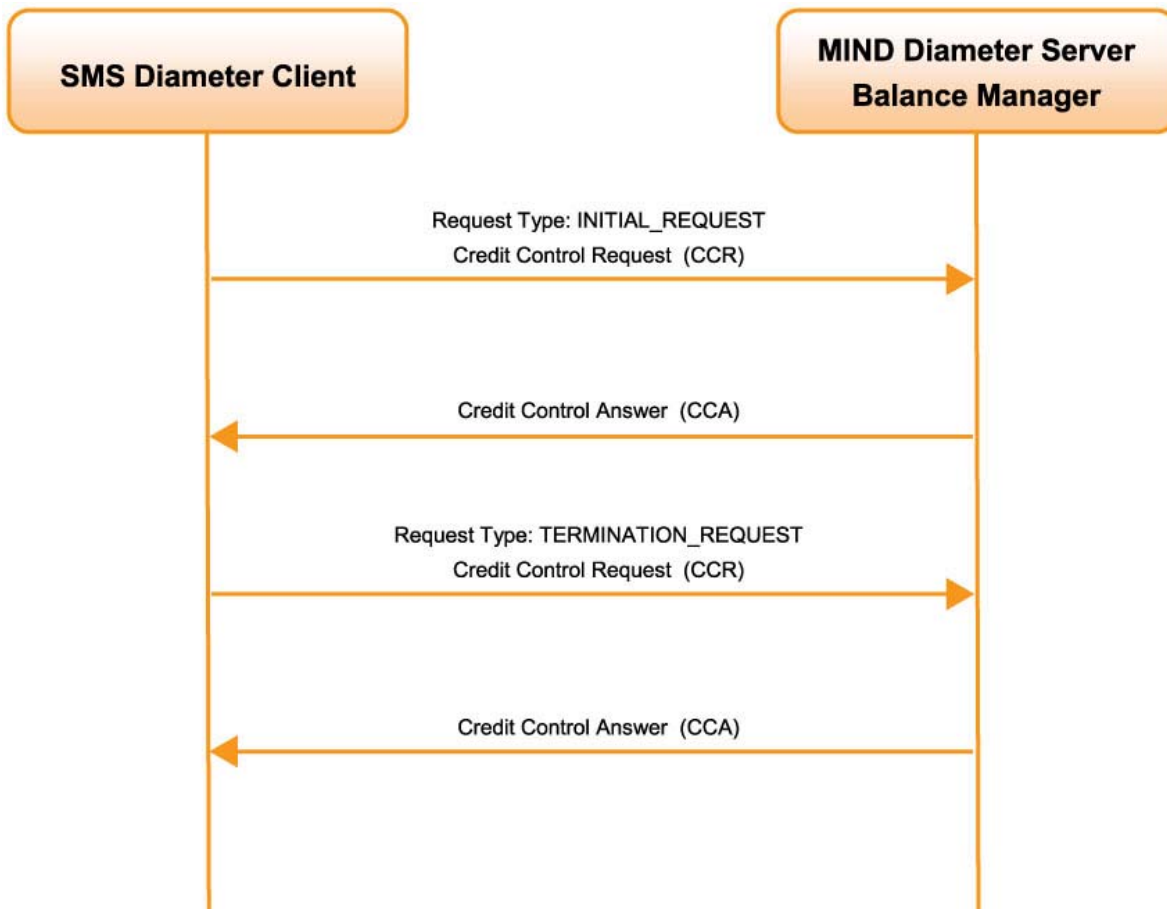
19. Direct Dial Call with Recurring Quota Allocation

The above flow describes direct dial mobile call with a recurring quota allocation procedure:

1. Mobile A starts a new call by dialing Mobile B.
2. The MSC sends an InitialDP (Initial Detection Point) event, which notifies the IN SCP of the new call.
3. The IN SCP processes the request and sends an initial quota request to the Balance Manager. After authorizing the user, the BM grants the available duration quota for the call to the IN SCP.
4. Then, the IN SCP sends 3 IN messages to the MSC:
 - a. ApplyCharging –Setting up the call timer for the initial call duration. Includes the tone field that is played 30 sec before disconnect. (only CAMEL3)
 - b. RRBCSM – Requesting the MSC to inform the IN SCP of an ANSWER or DISCONNECT events.
 - c. Continue – Directs the MSC to continue call processing and connect the call.
5. Next, Mobile A is connected to Mobile B.
6. Once the connection is made, an event report (for ANSWER event) is sent to the IN SCP.
7. The IN SCP passes the event information to the Balance Manager for preventing any potential revenue leakage.
8. Based on the initial RRBCSM setting, when the timer is about to deplete, the MSC will send an event report to the IN SCP.

9. The IN SCP processes the request and sends an interim quota request to the Balance Manager. The BM grants the available subsequent duration quota for the call to the IN SCP.
10. The IN SCP sends an additional ApplyCharging request to the MSC, which sustains the call for the additional duration granted.
11. When the user disconnects the call, the MSC sends a new event report to the IN SCP.
12. The IN SCP passes this event information to the Balance Manager, which in turn instructs to release the call.
13. Once the call is released, a new ApplyChargingReport is sent to the IN SCP, which contains full time usage data on the call.
14. The information is sent to the Balance Manager for accurate and final call charging.

Diameter SMS Client Scenario



20. Diameter call flow