

OpenCloud Rhino Sentinel

Real-time services and charging for
next generation telecommunications



OpenCloud was founded in New Zealand in 2000, to create open standards-based network transformation products to revolutionise the creation of telecommunications services. The goals are service agility, innovation, portability and price / performance of classic and telco2.0 telecommunication services across next generation IP and legacy networks.

OpenCloud and its eco-system of partners and application developers deliver, integrate and support end-to-end solutions to network operators and service providers worldwide.

Rhino Sentinel
enables rapid delivery
of real-time charging
and telecom services

CHALLENGES

Every hour of every day, we depend upon the telecom network to meet our ever increasing communication and information needs.

As more and more capabilities are added to networks and mobile devices, people are enjoying increasingly greater freedom to communicate, access information and interact with others whenever and wherever they wish. Across the globe, Communication Service Providers (CSP) are competing to attract and retain customers with innovative and valued services. As the range and value of the services has increased, all-you-can-eat packages have become less attractive and sustainable for CSPs. Indeed, when CSPs work with third parties to provide value-added services such as payment services or content delivery, it becomes essential to distinguish each service use, its success or failure and to allocate costs and revenues accordingly.

As consumers depend on and use multiple mobile devices more and more, it becomes increasingly important to provide tariffs for the customer (or group of customers) rather than for the device. With multiple people and devices consuming service at the same time, it becomes much more important to know how much a service costs as they use it. This means that real-time charging is needed regardless of whether they are a "prepaid" or "post-paid" customer.

The details of how a service behaves – such as location-specific behaviour, multi-party communication, redirection of voice and video calling, providing extra band-width as required etc – is implemented in the Service Layer. The Service Layer also controls all service behaviour when the service is charged in real-time, such as prepaid service plans or when roaming.

Rhino Sentinel, OpenCloud's next generation service layer solution, enables genuine service and rate plan innovation for all types of telecom service.

Consumer and enterprise telecom services may be charged on a prepaid or post-paid basis, in real-time or after the fact.

In today's competitive telecom climate, CSPs use pricing, payment models, service packaging and promotions such as "inclusive usage" bundles as key weapons in their armoury. Modern charging systems provide sophisticated graphical tools to enable drag-and-drop composition and evaluation of service **rate plans**.

But there is a problem: genuine rate plan innovation requires much more than a change in service price-point. The telecom service itself may be required to change its behaviour when certain trigger conditions are reached. For example, when the account balance of a child reaches a defined threshold, certain services may be stopped, whilst others might continue, or calling 'home' or the parents may be allowed and charged to the family plan.

Genuine service and rate plan innovation is incomplete without changing the services themselves. Otherwise, rate plan innovation is reduced to simply changing the price-point – same product, same behaviour – different price.

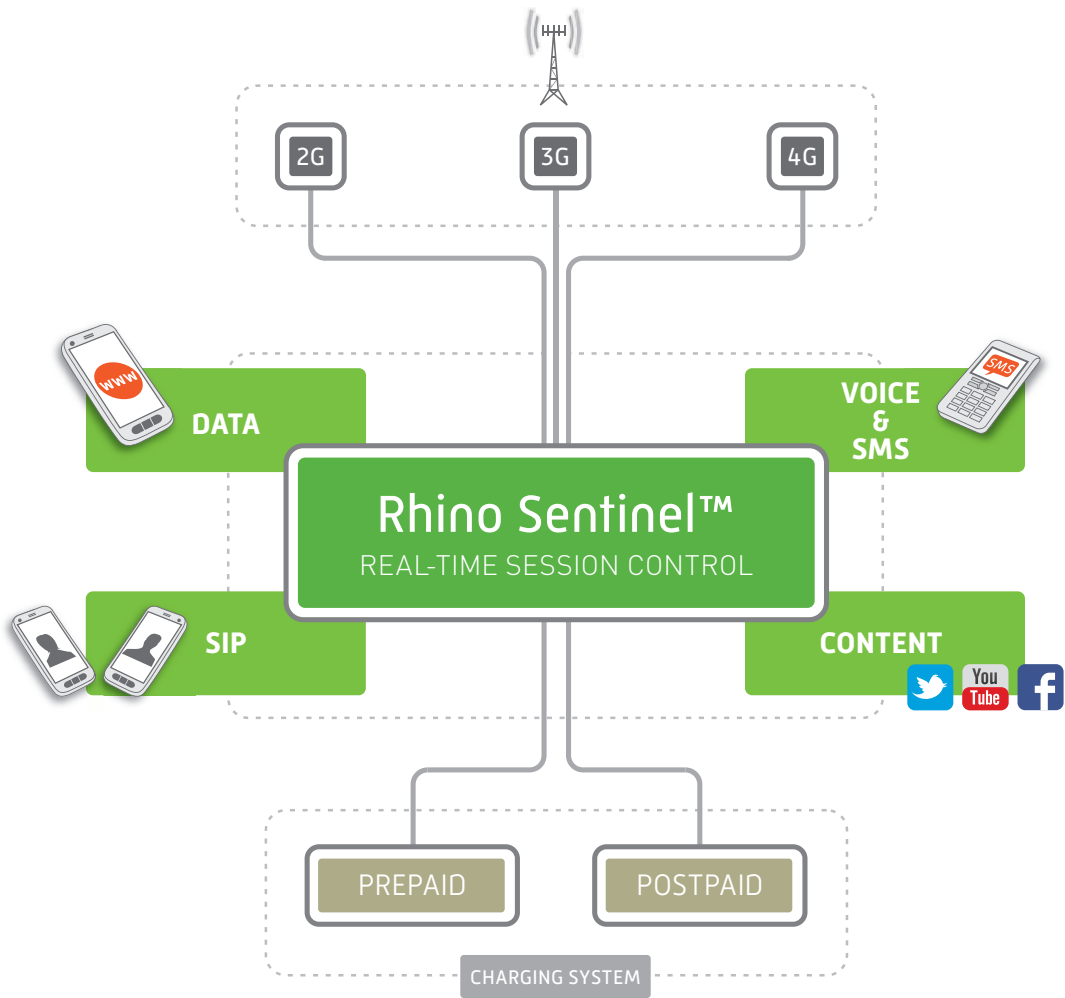
The costs, long timescales and impediments to change in today's telecom Service Layer are constraining CSPs in their endeavour to attract and retain customers by delivering service and rate plan innovations.

In summary, OpenCloud Rhino Sentinel™ enables CSPs to compete and take the initiative in today's dynamic, ultra-competitive communications market.

RHINO SENTINEL DELIVERS...

- ❖ A suite of software applications that implement Data, Voice, Messaging and Content-based telecom services. The service behaviour/ functionality is
 - » Designed to work in conjunction with a third-party charging system.
 - » Modular and designed for re-use in other services.
 - » Configurable, customisable and extendable.
- ❖ Support for all network protocols and technologies – SIP, HTTP etc on packet-switched networks and SS7 such as CAMEL, MAP and INAP protocols on circuit switched legacy networks;
- ❖ Support for both pre-paid and post-paid charging regimes;
- ❖ Connection to any Online Charging System (OCS) via Diameter, customised Diameter or proprietary charging protocol;
- ❖ Support for a connection to multiple OCSs (e.g. for MVNOs);
- ❖ A range of consumer prepaid telecom services;
- ❖ A range of charging and promotional offload applications that minimise the load on the OCS;
- ❖ A range of applications that complement and cooperate with the functionality of the OCS;
- ❖ A range of configuration options so that Sentinel may continue to authorise and control services if the OCS cannot be contacted (for example, if it is under heavy load or being upgraded)
- ❖ A design, create and test environment so Network Operators are unconstrained in their service innovation.

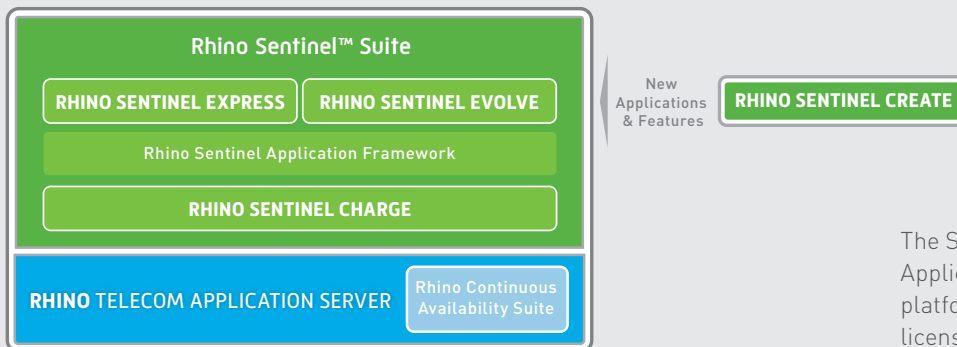
Create new services and rate plans without constraint and with lower operational cost.



RHINO SENTINEL

RHINO SENTINEL has four main parts, each of which is available independently:

- **Rhino Sentinel Express:** a set of consumer-oriented telecom applications such as mobile originated/ terminated call, short messaging (MO, MT), various supplementary services, home zone tariff etc. The applications can be charged by Call Details Record (CDR) or in real-time using the Diameter protocol to a separate Online Charging System (OCS).
- **Rhino Sentinel Evolve:** a set of applications that work with the OCS to provide an optimum real-time charging solution. For example, charging off-load to allow zero-priced voice, messaging and data charging traffic from "inclusive bundles" to be filtered out without involving the OCS.
- **Rhino Sentinel Charge:** a charging session control module (used by Sentinel Express and Evolve) to link to one or more OCSs and perform Diameter field and message handling. Sentinel Charge provides an API for use by native Rhino applications and is also an option for use by Rhino SIS to charge for Service Compositions. It also presents a REST-based web services charging API for use by other, external (i.e. non-Rhino-hosted) applications.
- **Rhino Sentinel Create:** a visual service creation environment which includes the Sentinel Application Framework and Sentinel Application Features. This allows new Sentinel Applications to be constructed from the component parts and custom features to be added.



The Sentinel Express and Evolve Applications utilise the Rhino TAS platform which is included in the licensed package, as illustrated.

Rhino Sentinel Express

Rhino Sentinel Express provides a set of consumer-oriented voice and messaging telecom applications such as:

- ❖ Mobile originated/ terminated calling
- ❖ Short messaging (MO, MT)
- ❖ Supplementary Services, such as:
 - » Call forwarding
 - » Call barring
 - » Black & white lists
 - » Calling circles etc,
- ❖ Home zone tariff etc.

The Express applications can be charged by CDR or in real-time using the Diameter protocol to a separate Online Charging System (OCS).

The Sentinel Express applications are built using the Sentinel Application Framework and use the services of Sentinel Charge to integrate and communicate with the OCS.

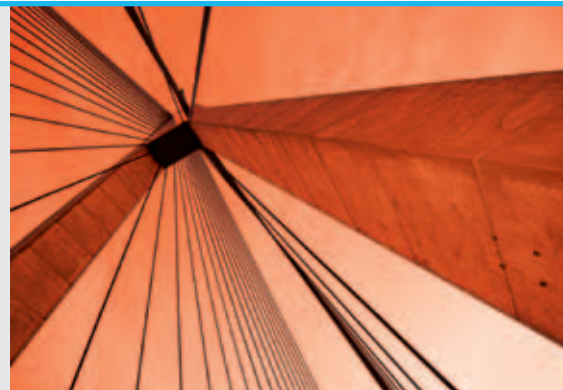
The Sentinel Express license includes all necessary run-time licenses for Sentinel Charge, the Sentinel Application Framework, the Diameter protocol and the Rhino TAS. Sentinel Express applications will function on both SS7 and IP networks and require the relevant protocols which are licensed separately.

The Sentinel Express application suite has been designed specifically to:

- ❖ Meet the dramatically lower price/ subscriber price-points for real-time charging that are required in low ARPU

markets and in an increasingly competitive telecommunications marketplace;

- ❖ Provide a carrier-grade session control component that complies with charging standards and also supports proprietary real-time charging protocols;
- ❖ Allow CSPs to choose the depth, richness and sophistication of their Online Charging System (OCS) depending upon their specific needs. The OCS may be a real-time charging system provided by an IT vendor or one supplied by a Network Equipment Provider (NEP);
- ❖ Enable all charging in a uniform manner, regardless of whether payment is in advance or in arrears;
- ❖ Support all telecommunications services, whether based on TDM SS7 bearer networks or on IP-based networks.



Rhino Sentinel Evolve

Rhino Sentinel Evolve provides a set of applications that work in cooperation with the OCS to provide an optimum real-time charging solution that minimises traffic to the OCS. Evolve provides applications for voice, messaging, data and content services, such as:

- Offload of the “inclusive use” of a service (minutes, megabytes, messages etc)
- Limited period inclusive use of a service
- Metered inclusive use up to a defined threshold
- Metered use monitoring and rewarding (X free messages/ megabytes/ minutes in reward for hitting some metered threshold)
- Diameter-Diameter mediation

The Sentinel Evolve applications are built using the Sentinel Application Framework and use the services of Sentinel Charge to integrate and communicate with the OCS.

The Sentinel Evolve license includes all necessary run-time licenses for Sentinel Charge, the Sentinel Application Framework, the Diameter protocol and the Rhino TAS. Sentinel Evolve applications will function on both SS7 and IP networks and require the relevant protocols which are licensed separately.

The Sentinel Evolve application suite has been designed specifically to work alongside post-paid charging systems to provide real-time notification capabilities which are not found in these systems. For example, Sentinel Evolve can implement real-time roaming bill-shock functions whilst retaining the extant billing system.



Rhino Sentinel Charge

Rhino Sentinel Charge provides a stand-alone charging function that integrates with one or more OCSs using the Diameter protocol. It performs mappings between network signalling protocols such as INAP, CAMEL, SIP and Diameter and the Diameter charging protocol.

It is highly configurable, allowing vendor and operator variants of Diameter to be supported. Vendor variants of SS7 protocols are also supported.

Sentinel Charge provides session and event charging and integration functions between the telecom service and the OCS delivering the balance management and charging. Sentinel Charge is used by Sentinel applications – such as Express and Evolve.

In addition, it may be used as follows:

- Additional Sentinel Applications – created using Sentinel Create – can use its charging functions;
- It presents a REST-based web services charging API for use by other, external (i.e. non-Rhino-hosted) applications;
- It provides a Rhino Sentinel API that can be used by native Rhino applications to raise charges using the OCS;
- It is also available as a “stand-alone Rhino application”. This may be used and invoked in a Service Composition by Rhino SIS to pre-pay enable existing services which have no prepaid charging capability.

The Sentinel Charge license includes all necessary run-time licenses for the Sentinel Application Framework and the Diameter protocol.

A flexible suite of tools and applications
to suit your specific needs.

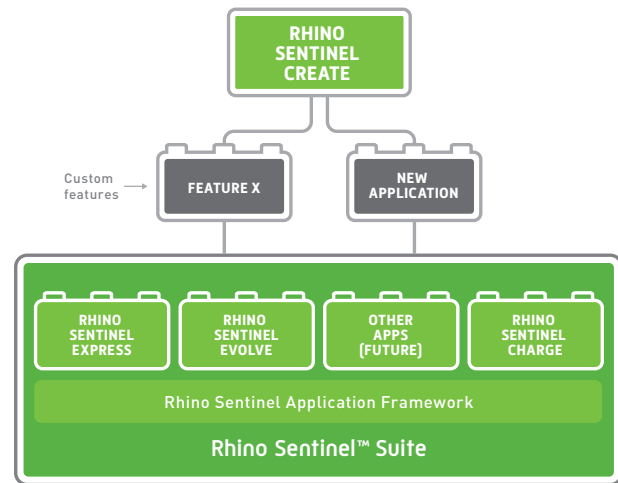
Rhino Sentinel Create

Rhino Sentinel Create provides a visual development environment for creating Sentinel applications and features. Using Sentinel Create, users can construct new Sentinel applications within the Sentinel Application Framework.

The Sentinel Application Framework provides *Sentinel Session Plans* which define how each telecom service works and the points in the *plan* where functionality can be added to enhance and change the behaviour of the service. This means, for example, it is possible to create new features that determine a subscribers' preferences profile or a subscribers' current location or their home/ work location or their presence and to add these functions into Sentinel session plans to create new services. Using Sentinel Create, users need only create the new feature or capability and then use it within the Sentinel session plan. This is hugely more productive, much less error-prone and less costly.

Sentinel Create is a productive, visual service construction environment that means new services can be built from existing building blocks according to pre-fabricated generic plans and thus vastly reduces the work required to create new services.

New Sentinel applications use the services of Sentinel Charge in order to raise charges in real-time by an OCS or via CDRs.



Rhino Sentinel Technical Overview

OpenCloud Rhino Sentinel™ is a software product that provides call and session control on a carrier-grade platform allowing a single real-time rating and billing system to be used, for both pre and post-paid subscribers. It implements the call and session control aspects of the next-generation online charging architecture defined in 3GPP TS 32.240. Meeting real-time telecom service requirements, it manages all interactions between the Online Charging System and the core network.

The OCS is abstracted by the service layer from the network and protocol-specifics of service delivery.

Real-time Charging System

3GPP: ONLINE CHARGING SENTINEL (OCS)

Any third-party OCS

The OCS is not provided by OpenCloud

IT-Grade availability sufficient
eg. Downtime for back-ups perhaps, or upgrade

- SESSION CHARGING**
- » Camel SS7 Circuits
 - » SIP Sessions
- EVENT CHARGING**
- » SMS, MMS etc
 - » Ringtones, Content etc
 - » IM, HTTP etc

Includes relevant network bearer information for display in CRM and bills etc.

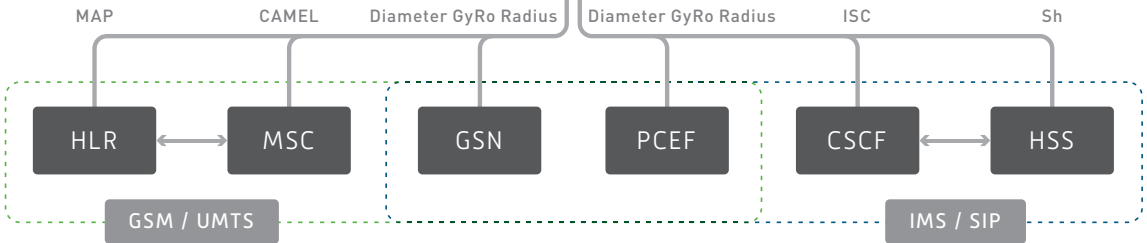
SERVICE LAYER

Rhino Sentinel™

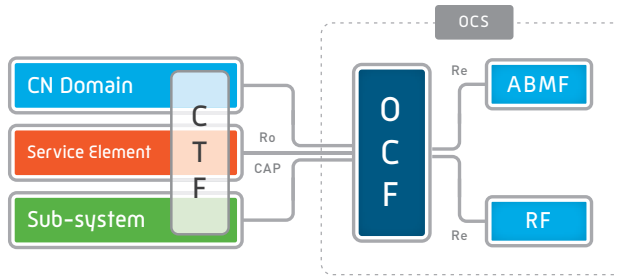
REAL-TIME SESSION CONTROL

Carrier-grade availability required
5 x 9s availability

CORE NETWORK



3GPP NETWORK



CTF: Charging Trigger Function
OCF: Online Charging Function
ABMF: Account Balance Management Function
RF: Rating Function

3GPP TS 32.240 Online Charging Architecture

By splitting the real-time session/ call control from the rating and balance management functions, the OpenCloud solution allows any capable Online Charging System (OCS) to be used for charging of both pre and post-paid offers. For any service, regardless of whether it is an SS7 service or an IP-based service.

Rhino Sentinel has been designed specifically to:

- Meet the dramatically lower price/ subscriber price-points for real-time charging that are required in low ARPU markets and in an increasingly competitive telecommunications marketplace;
- Enable Operators to innovate in their services and rate plans without constraint. Currently, rate plan innovation enabled by modern Online Charging Systems (OCS) is severely constrained by the cost and time associated with changing the charging trigger function in the service to cooperate with the OCS;
- Provide a carrier-grade session control component that complies with charging standards and also supports proprietary real-time charging protocols;
- Allow telecoms operators to choose the depth, richness and sophistication of their OCS depending upon their specific needs. The OCS may be an IT-originated real-time charging system or a NEP-originated OCS;
- Enable all charging in a uniform manner, regardless of whether payment is in advance or in arrears;
- Support all telecommunication services, whether based on TDM SS7 bearer networks or on IP-based networks.

Rhino Sentinel implements the Charging Trigger Functions (CTF) for telecom call and session control in a 3GPP next generation on-line charging architecture.

SUMMARY

ADDRESSING YOUR SERVICE AND RATE PLAN INNOVATION CHALLENGES

REGAIN CONTROL OF YOUR SERVICE AND CHARGING ROADMAP

New Service Revenue Achieve competitive differentiation by rapidly introducing smart telecom services – implemented once, for both pre and post-paid customers

New Service Behaviour Deliver Services that interact with the charging system and can exhibit account balance-aware behaviour in addition to user preferences, user location and presence, Operator policy etc.

Hybrid Services Implement services that span the web, legacy and IP networks. Implement services once and make them available to all subscribers.

True Rate Plan Innovation Out-compete your competitors with pricing and promotions that provide an enhanced user-service experience in addition to changing the price.

REDUCE THE COST AND TIMESCALE OF INNOVATION

Reduce OPEX Rapid service and rate plan innovation through configuration of Sentinel and use of Sentinel Create to construct new and variant services. New features may be created and used alongside existing Sentinel features to create new services.

Lower Cost, Faster to Market New services and features delivered by GUI-based configuration. Structured environment and auto-testing eliminate errors, costs and reduce timescales.

Open, Competitive Supply The independent developer eco-system means that new services and capabilities can be procured from a range of suppliers – delivering innovation and supplier price competition.

COTS Commercial-off-the-shelf commodity hardware and software eliminates rigidities of traditional SCPs, dramatically reducing costs, and ensuring radically lower price-points.

FLEXIBLE, FUTURE-PROOF SERVICE AND CHARGING ARCHITECTURE

Converged Charging Use a single charging system for all telecom subscribers, across pre and post-paid segments. Implement services, tariffs and rate plans once per service.

Business Intelligence Make full use of powerful OSS/BSS for all customers, regardless of their payment method. Cross-sell, up-sell and reward based on in-depth knowledge of the customer relationship – unconstrained by combined IN-based prepaid systems,

Converged Networks Full support for data, voice, video, messaging and content across legacy and IP networks. Adapt and evolve your network and services as LTE & IMS roll-out.

Offload Filter out zero-priced traffic at source to reduce unnecessary load on the OCS.

For further information

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