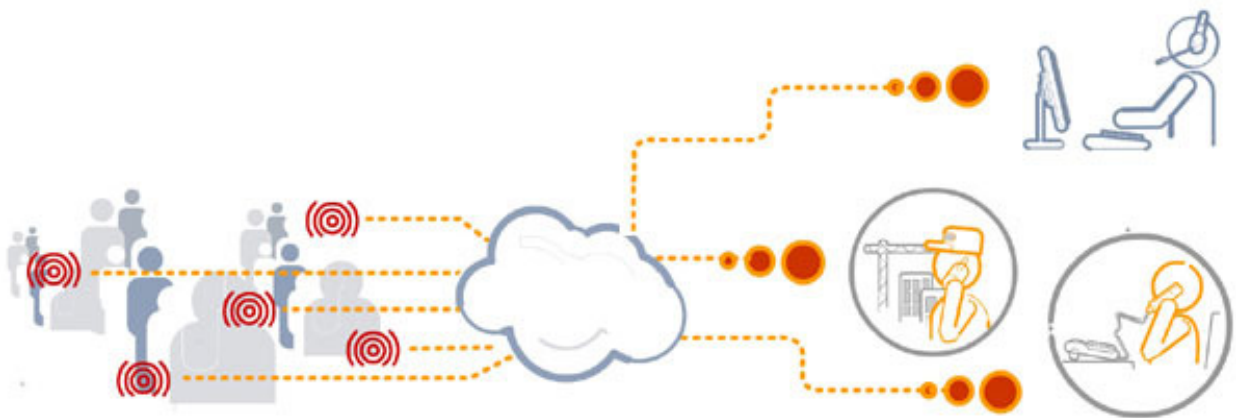


Hosted PBX, Mobile PBX and IP Centrex: Mobile Pre-paid Integration – Issues and Challenges

A Gintel White Paper





White Paper

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EXECUTIVE SUMMARY	3
INTRODUCTION	4
HOW DO PRE-PAID SOLUTIONS WORK?	5
Figure 1: Trigger conflict in pre-paid platforms.....	6
WHAT SOLUTIONS ARE AVAILABLE?	7
Network Level.....	7
Figure 2: SCIM-based solution	8
Application Level	9
Figure 3: Application level integration.....	9
BENEFITS OF AN APPLICATION LEVEL SOLUTION	10
POST-PAID INTEGRATION.....	10
THE GINTEL ADVANTAGE.....	11
CONCLUSION	11
ABOUT GINTEL.....	12
REFERENCES	14
GLOSSARY	14

Executive Summary

The pros and cons of pre-paid versus post-paid mobile subscription models have been debated for many years, but what is not in doubt is the popularity of the prepaid mobile subscription model. Surprisingly, perhaps, a significant number of business mobile users use pre-paid mobile subscriptions.

Mobile network operators (MNOs) and service providers are aware that enterprise employees represent a potentially massive target market for the provision of hosted voice services. For MNOs and service providers, enterprises also represent a higher Average Revenue Per User (ARPU) and greater Average Margin Per User (AMPU) than consumer subscribers. In other words, enterprises yield more money at greater profit.

There is compelling evidence that hosted or Centrex solutions, based on IP technology targeted at mobile and fixed customers, represent a strong business case.

However, the popularity of pre-paid subscriptions, particularly within enterprise markets, still represents a technical challenge. Hosted solutions must be able to track and manage all transactions, whether from pre- or post-paid accounts. MNOs need a Centrex solution that can integrate both pre- and post-paid subscribers into their accounting systems to ensure smooth delivery of services, regardless of the method of payment.

There are essentially two solutions to this service interaction problem: the Network-level approach; or the Application-level approach. While both have merit, there are very different cost implications. In approach, an application level solution is much simpler, and cheaper, than a network-based deployment. With reduced overall complexity, an application level solution offers the shortest path to rapid deployment of an application that can generate clear ROI and significant upside potential.

Gintel's Easy Virtual PaBX solution allows operators to deliver hosted telephony services to enterprise customers across any network. In addition to offering a full-suite of Centrex capabilities, allowing MNOs to deliver hosted PBX services to mobile and fixed network subscribers, Easy Virtual PaBX supports full application-level integration with pre-paid mobile applications and charging solutions.

This is achieved via a comprehensive Web Services interface, allowing close integration with the pre-paid application. As well as solving the pre-paid integration problem, and arming MNOs with Centrex services to address the previously 'difficult-to-reach' SME market, the Easy Virtual PaBX platform also offers MNOs significant potential for differentiation. The Easy Designer suite is a toolkit that allows service customisation and creation, and comes included with the Easy Virtual PaBX platform. In contrast to previous service creation models, Easy Designer can be used and managed by front-end staff, without the need for highly trained network engineers. The ambition of creating new services cheaply and quickly is not a new one, but the

technical reality has never matched this ambition. But that is rapidly changing as Easy Designer suite allows services to be tailored to individual customers by front-end staff, in real-time, using a simple and intuitive graphical user interface. Once finalised, the service can be deployed at the click of a mouse.

Furthermore, Gintel's solution means that the economic impact of service customisation can be reduced to such a level that MNOs can use this capability to achieve differentiation for a service with many thousands of customers, each with differing needs and requirements.

Gintel Easy Virtual PaBX for Centrex and Mobile PBX applications can provide long-term competitive advantage by helping MNOs to overcome the common strategic and technical challenges they face in today's competitive mobile subscriber environment, including issues such as that of pre-paid integration for mobile business subscribers.

Introduction

The pros and cons of pre-paid versus post-paid mobile subscription models have been debated for many years, but what is not in doubt is the popularity of the pre-paid mobile subscription model. According to recent research, around 70% of all mobile subscribers prefer 'top-up' pre-payment to 'contractual' post-payment options (Wansink, 2009). Perhaps surprisingly, pre-paid mobile – which is widely considered to be directed at consumers – is just as popular among enterprise customers.

In fact, in the enterprise world, post-paid mobile subscriptions are usually restricted to larger commercial companies or political organisations. Yet, the majority of the private sector workforce is employed by companies with fewer than 250 employees – 99.8% of the 20 million enterprises based throughout the EU have fewer than 250 employees, according to research published by EuroStat (Schmiemann, 2008). It is therefore safe to assume that a significant number of business mobile users will use pre-paid mobile subscriptions. This assumption is indeed supported by recent research which suggests that business users, particularly in the 1– 99 employee bracket are increasingly likely to turn to pre-paid mobile accounts, with 40% of business owners currently planning to issue a handset for use with pre-paid subscription to their employees (Compass Intelligence, 2009).

Naturally, mobile network operators (MNOs) and service providers are aware that enterprise employees represent a significant target market for the provision of hosted voice services. For example, market analyst company ABI Research has forecast that shipments of hosted IP PBX lines – in other words IP Centrex – will exceed those of premises-based IP PBX solutions by 2012 (ABI Research Inc, 2007). This growth is further fuelled by current replacement cycles, whereby traditional systems are gradually retired from service and replaced by newer IP-based technology. In turn, this creates additional growth opportunity for vendors.

For MNOs and service providers, enterprises also represent a higher Average Revenue Per User (ARPU) and greater Average Margin Per User (AMPU) than consumer subscribers. In other words, enterprises yield more money at greater profit. As a result, many MNOs are considering launching hosted voice services targeted at enterprise and SME customers, and which allow mobile devices to leverage PBX functionality – services traditionally restricted to premises-based deployments of PBX platforms.

There is compelling evidence that hosted or Centrex solutions, based on IP technology targeted at mobile and fixed customers, represent a strong business case and a growing market opportunity for service providers and MNOs. However, the popularity of pre-paid subscriptions, particularly within enterprise markets, still represents a technical challenge. Hosted solutions must be able to track and manage all transactions, whether from pre- or post-paid accounts. As a result, MNOs looking for a provider of hosted or mobile IP Centrex solutions, must consider issues beyond the basic functionality of managing in-bound and out-bound calls, and associated service features. MNOs need a Centrex solution that can integrate both pre- and post-paid accounts into their charging systems to ensure smooth delivery of services, regardless of the method of payment. In order to understand how MNOs can do this, it is important first to understand how pre-paid solutions work.

How do Pre-paid Solutions Work?

At the simplest level, pre-paid mobile systems work by checking the amount of credit available to a particular subscriber before processing their call request. In order to do this, pre-paid solutions leverage capabilities derived from Intelligent Network (IN) signalling systems, whereby a specific request is made from the Network and Switching Subsystem (NSS) domain of the core mobile network, to the IN control platform, which then checks account balance information held within the online charging system – this request is made using an Originating Trigger.

If the account holds sufficient funds, the platform can then authorize and process the call. The IN control platform then monitors the account balance during the call, and if it falls below a pre-set level, the platform will send a “Mid Call Operations” message to the NSS. The caller is then informed of their low balance via a warning alert and the call disconnected when credit expires.

This ‘trigger’ approach works fine for single services. However, problems arise when certain services are combined. For example, Originating Triggers are also used to signal the fact that a caller belongs to a group subscribing to a Centrex service. So if the caller is a subscriber to a Centrex service *and* a pre-paid subscriber, “trigger conflict” can result; as the two states cannot be differentiated by the NSS. This situation is illustrated in Figure 1.

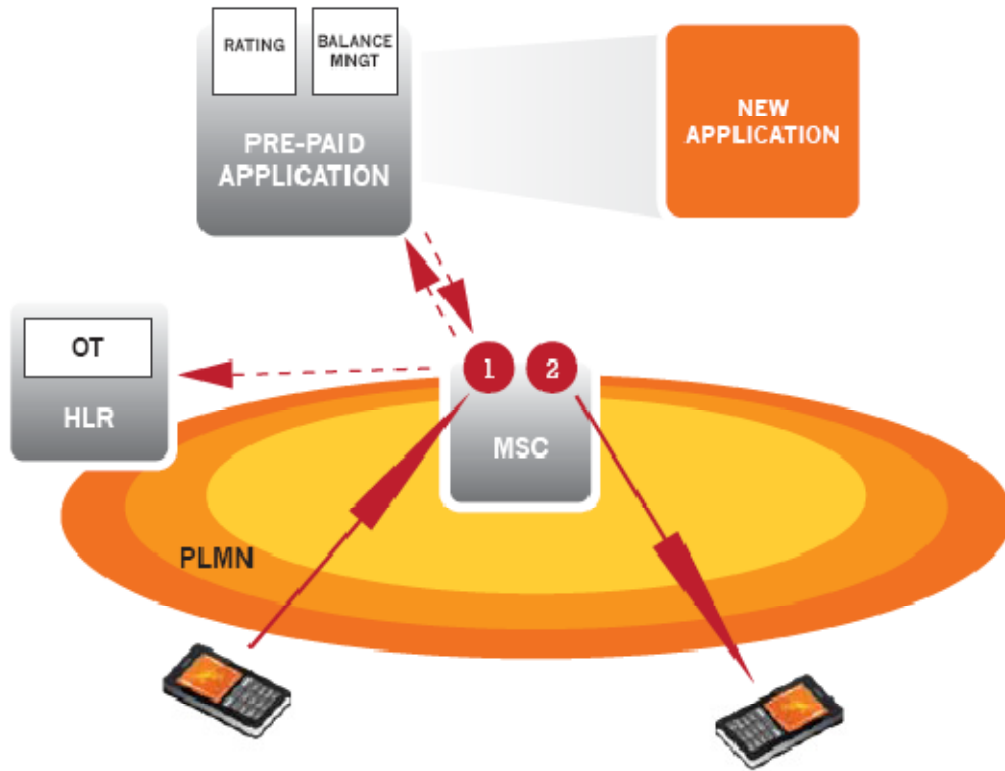


Figure 1: Trigger conflict in pre-paid platforms

Clearly, MNOs wishing to support pre-paid callers within Centrex solutions need to resolve this issue, as it can place a significant limit on their potential addressable market, and reduce return on existing investments in their IN solutions.

What Solutions are Available?

It is well known that the addition of services to a subscriber bundle can reduce the possibility of churn (Light Reading, 2008), meaning that MNOs have a strong incentive to offer additional services to their subscribers. But to do this, they need an unrestricted means of achieving this across converged IMS-based networks. It is therefore vital to solve the "trigger conflict" problem. So what solutions are available?

There are essentially two solutions to this service interaction problem: the Network-level approach; or the Application-level approaches. While both have merit, there are very different cost implications. MNOs must also consider future service evolution; that is, the ease with which additional services may be added to the network in future. The merits of each solution are outlined below.

Network Level

A network level approach typically involves a dedicated platform known as a Service Capability Interaction Manager (SCIM). The SCIM is a new network element that has recently been introduced to 3GPP IP Multimedia Sub-system (IMS) standards. Although the definition is brief, the SCIM has attracted widespread interest. At a simple level, it acts to broker service requests from underlying resources in the network and to manage multiple requests for "capabilities" that are required to implement a service. In practice, this may also refer to multiple

Triggers are fundamental to IN-based network services, but they are scarce and valuable resources. Each trigger acts as an event notification, and there are two common types. The first is the Originating Trigger. This is generated by the switching system handling the call. The Originating Trigger is routed to the control system, which provides intelligence to determine call routing and the services to be applied to that call, or user. In response, the control system generates the second trigger, known as a Terminating Trigger. This is sent to the original switching system and contains information necessary to process the call.

Not all events initiate triggers, but they are essential for the invocation of Value Added Services. However, only one trigger of each type can be created per session, which effectively means that only one service can be applied to an individual call session. The problem of single triggers effectively prevents MNOs from offering simultaneous services to the same subscriber. Hence, a pre-paid subscriber cannot subscribe to a Centrex service. This severely limits revenue potential and impairs efforts to build "sticky service" portfolios.

services themselves and not simply the individual capabilities that constitute a specific service.

Deploying a Network Level (or SCIM-based) approach results in the SCIM issuing multiple triggers to different services in a defined order, thus allowing a pre-paid service to be applied to the same user as a Centrex service, in real time. The deployment of a SCIM is highlighted in Figure 2.

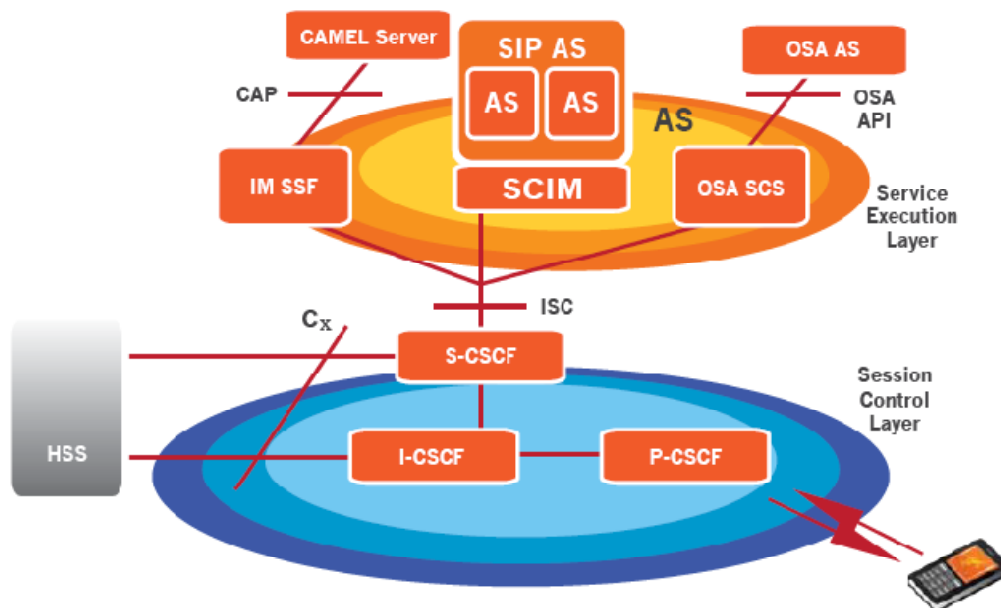


Figure 2: SCIM-based solution

These requests can originate from the legacy IN domain, as some instantiations of the SCIM functionality include legacy connectivity to IN signalling protocols. However, while this solution may solve the problem for small numbers of services, there are question marks about its scalability, as complexity multiplies with each additional service deployment.

There is also the problem of the SCIM itself. While the need for such a platform is clear, the precise definition is opaque. There are multiple interpretations of SCIM functionality and multiple products that promise to deliver each of these interpretations. As the SCIM market is in its early stages, the cost for such devices is also significant, placing an overhead on Centrex deployment that may not be justified in the near term.

Application Level

The alternative to the Network Level approach is to adopt an Application Level solution. In such a solution, the two applications, Centrex and pre-paid can be deployed in parallel. However, the Originating Trigger is routed directly to the Centrex platform by the NSS for all subscribers to the Centrex service. The Centrex application then sends an Advice of Charge (AoC) message to the pre-paid application. This can be accomplished via an open interface, such as Web Services, which requires a small level of integration activity. The pre-paid application maintains information on the status and available credit of the subscriber and, on receipt of the AoC signal, reserves credit for an appropriate interval.

The Centrex application is then able to process the call. For the duration of the call, its status is maintained by the Centrex application. When the available credit expires, the Centrex software issues a request to the pre-paid platform for additional credit. If none is available, the calling party will be informed and the call can be cleared in the normal manner. The Application Level approach is illustrated in Figure 3.

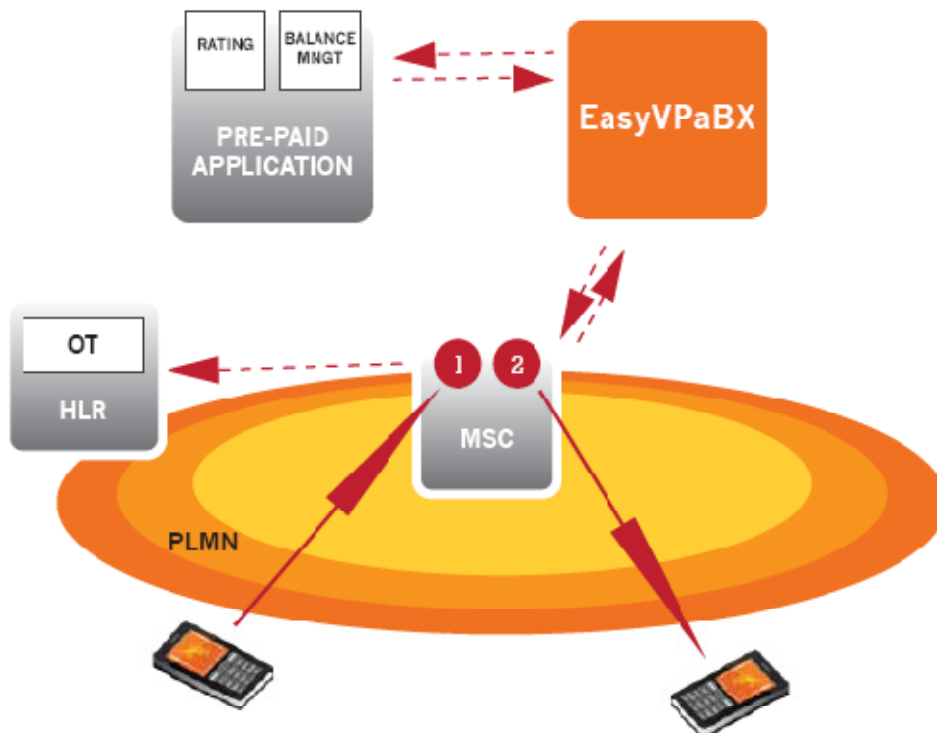


Figure 3: Application level integration

Benefits of an Application Level Solution

In approach, an application level solution is much simpler, and cheaper, than a network-based deployment. While both have the benefit of not restricting the deployment of additional services, a network level solution requires the deployment of a complex and costly device, the SCIM. Moreover, SCIM platforms have yet to be consistently defined, with a number of different approaches already brought to market. The application level solution obviates the necessity and cost associated with deploying such a platform, at least until a clear ROI can be secured. Furthermore, there is no incremental cost associated with deploying a Centrex solution that supports application level integration, which allows the MNO to focus solely on generating ROI from the Centrex application.

While both solutions enable support for legacy IN triggers and ongoing return from the investment costs with the associated IN network, an application level solution provides a much simpler means to ensure ongoing support for existing IN infrastructure.

Application level solutions essentially leverage peer-to-peer models, ensuring no increase in complexity with the addition of further services. The SCIM method implies increased complexity with multiple services, particularly in their sequencing. This creates a burden that may lead to further costs.

With reduced overall complexity, an application level solution offers the shortest path to rapid deployment of an application that can generate clear ROI and significant upside potential. MNOs, in common with all mobile operators, are faced with significant obstacles to service deployment. Recent analysis from market research company Moriana Group reported that service delivery and launch lifecycles remain challenging, with sales cycles continuing to exceed 12 months (Moriana Group, 2009). This strongly suggests that overall service deployment timescales are likely to be even longer. The addition of more complex and unproven platforms is only likely to exacerbate this situation.

Post-paid Integration

Centrex applications need to cater for both pre- and post-paid customers. As post-paid customers have pre-set credit limits for their service bundles to consume, the Centrex application must deliver accurate and timely Call Data Records (CDRs) to the offline charging system deployed for post processing and the calculation of bills. However, as this is not a real-time event, the integration of Centrex applications with post-paid, offline charging systems is a far simpler process than that required for the integration of pre-paid applications and the online charging system.

Conversely, the simplicity of the post-paid process has led many MNOs to ignore the market opportunity afforded by pre-paid mobile business subscribers, and hence fail to consider appropriate methods for catering to both subscriber groups. The

integration of Centrex and other service applications with pre-paid applications and online charging solutions is a more complex affair and requires the adoption of innovative solutions.

The Gintel Advantage

Gintel's Easy Virtual PaBX solution allows operators to deliver hosted telephony services to enterprise customers across any network. In addition to offering a full-suite of Centrex capabilities, allowing MNOs to deliver hosted PBX services to mobile and fixed network subscribers, Easy Virtual PaBX supports full application-level integration with pre-paid mobile applications and charging solutions.

This is achieved via a comprehensive Web Services interface, allowing close integration with the pre-paid application. The only requirement is that the pre-paid solution supports its own Web Services interface, to allow smooth integration and the capture of message flows. Indeed, Web Services are emerging as the dominant paradigm for application integration in the telco space, replacing earlier telco-centric approaches that had limited uptake and restricted capabilities. For example, in a recent survey, more than 50% of communications service providers (mobile, fixed, cable, ISP) stated that Web Services were essential to their business, whereas none stated any preference for well-known telco-centric legacy solutions, such as Parlay (Moriania Group, 2009).

As well as solving the pre-paid integration problem, and arming MNOs with Centrex services to address the previously 'difficult-to-reach' SME market, the Easy Virtual PaBX platform also offers MNOs significant potential for differentiation. The Easy Designer suite is a toolkit that allows service customisation and creation, and comes included with the Easy Virtual PaBX platform. In contrast to previous service creation models, Easy Designer can be used and managed by front-end staff, without the need for highly trained network engineers. The desire to create new services quickly and inexpensively is not new, but the technical reality has never matched this ambition. But that is rapidly changing as Easy Designer suite allows services to be tailored to individual customers by senior product management / enterprise sales in real-time, using a simple and intuitive graphical user interface. Once finalised, the service can be deployed at the click of a mouse.

Furthermore, with Gintel, the economic impact of service customisation can be reduced to such a level that MNOs can use this capability to achieve differentiation for a service targeted at many market segments with many thousands of customers with differing needs and requirements.

Conclusion

Pre-paid mobile subscriptions reduce long-term uncertainty and risk for enterprises, particularly those with fewer than 99 employees, and are therefore considered to be an increasingly attractive option for the growing number of enterprises with a mobile

workforce. However, this means that MNOs need to consider how to extend additional, revenue-generating services, such as Centrex, to pre-paid enterprise subscribers. This is particularly relevant when considering that enterprises with fewer than 250 employees represent the overwhelming majority of business users and a significant addressable market opportunity.

Centrex and Mobile PBX applications are emerging as a clear revenue opportunity for MNOs, particularly as they seek to encourage fixed-mobile substitution. Failure to deliver Centrex applications to the broadest possible subscriber base will severely impact revenues now and in the future. This means that pre-paid subscribers must be factored into the equation: but pre-paid integration is required to address the widest possible market.

An application level solution provides the most compelling and economical way to address pre-paid integration. Gintel provides full application level integration to pre-paid online charging systems and applications, ensuring that MNOs can gracefully address both pre- and post-paid enterprise and SME subscribers. Furthermore, the interface adopted by Gintel leverages Web Services, which are gaining widespread recognition as the preferred means of integration between different applications, compared to cumbersome or expensive legacy models. At the same time, the Gintel Easy Virtual PaBX platform allows operators to continue to leverage costly investments in their intelligent networks by making use of IN network triggers, and to enjoy ongoing revenue return.

Easy Virtual PaBX is also delivered with a fully-integrated service composition factory, the Easy Designer suite, which allows MNOs to cost-effectively deliver mass customisation of applications and features. This ensures product and brand differentiation, and helps to build a sticky portfolio of services, thus reducing the likelihood of churn. Gintel's Easy Virtual PaBX for Centrex and Mobile PBX applications can provide long-term competitive advantage by helping MNOs to overcome the common strategic and technical challenges they face in today's competitive mobile subscriber environment, and provide a solution for the problem of pre-paid integration for mobile business subscribers that also subscribe to Centrex solutions.

About Gintel

Gintel AS from Norway is an expert in the field of Centrex and Hosted Mobile PBX. Its products have been deployed by Tier One and competitive operators, helping them to differentiate their customer solutions for the business community. Gintel offers a Mobile PBX application, Easy Virtual PaBX, which can help MNOs to overcome many of the common strategic and technical challenges that they face today. The system provides full PBX functionality and, because it is a software application hosted by the operator, it allows any connected device, including mobile handsets, fixed terminals and softphone clients, to register and experience the same feature-set as a traditional fixed PBX station device. Easy Virtual PaBX also provides

full switchboard capabilities, offering both a web-based and client console that can be used to manage user mobility and status, with self-provisioning options to ensure that the system is updated at all times to reflect user preferences.

Easy Virtual PaBX provides complete transparency, allowing any user on any network to connect to the platform. It does not require any upgrade to handsets, as it is a truly network-centric solution - the only requirement is that users register for the service. Once registered, users are able to manage and change their own preferences via a web interface. Easy Virtual PaBX conforms to the emerging IMS service architecture, leveraging application servers for the execution environment, and allowing MNOs to easily incorporate it into future network architectures. Importantly, it also includes a powerful service composition tool, Easy Virtual Designer.

Easy Virtual Designer enables MNOs to customise existing services and rapidly create new offerings that enhance differentiation and increase customer stickiness. Services are assembled from a comprehensive palette of core capabilities, allowing MNOs to focus on meeting the demands of existing subscribers and supporting innovation to win new ones.

Easy Designer is revolutionary. New services can be designed and assembled “on-the-fly” within hours, not days or weeks, greatly reducing time to market and enhancing operator agility. It allows operators to innovate within their markets and respond rapidly to user demand and competitive threats. New services can be launched rapidly and at low cost, reducing the risk of service delivery. It also helps operators to develop richer customer relationships, based on co-operation and support.

Easy Designer complements Gintel’s other applications, allowing continual innovation and service differentiation. Gintel’s unique capabilities allow MNOs to launch shrink-wrapped applications, such as Easy Virtual PaBX, and to supplement these with tailor-made features and services to meet the needs of specific customers. This provides the additional differentiation that they need to carve out a niche in their market and to build a platform for growth.

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Glossary

- AMPU *Average Margin Per User*
- AoC *Advice of Charge*
- ARPU *Average Revenue Per User*
- ASP *Application Service Provider*
- CDR *Call Data Record*
- IMS *IP Multimedia Subsystem*
- IN *Intelligent Network*
- MNO *Mobile Network Operator*
- NSS *Network and Switching Subsystem*
- PBX / PaBX *Private Branch Exchange*
- SCIM *Service Capability Interaction Manager*
- SME *Small / Medium Enterprise*