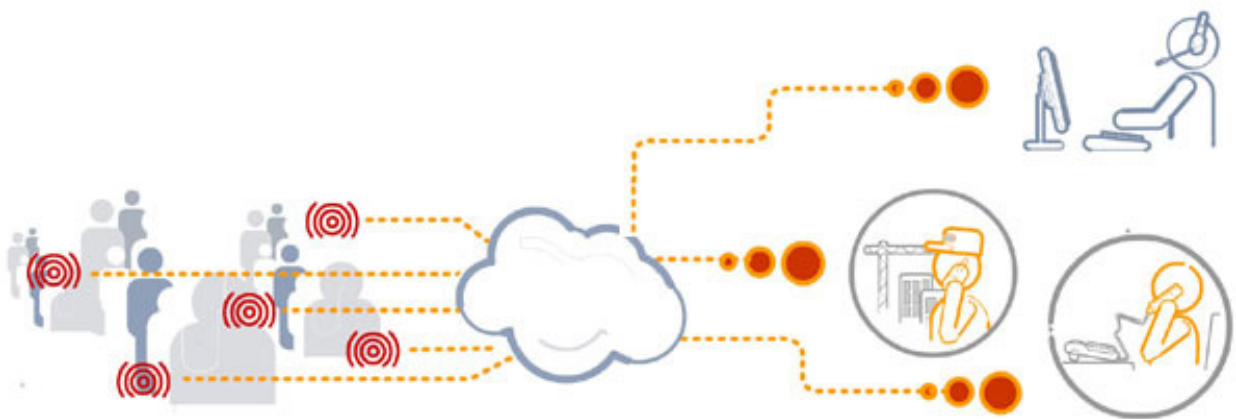


Network and Device Integration

A Gintel White Paper





White Paper

April 2010

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Executive Summary

In recent years, Centrex services have evolved to become a core offering for operators and service providers seeking to retain existing enterprise customers, and attract new ones. At the same time, there is a growing awareness that Centrex services offer a significant revenue opportunity.

This evolution creates new challenges for the deployment of IP Centrex services. First, Centrex services need to be able to interface with one or more different network technologies. Secondly, the proliferation of different types of devices now used across fixed, mobile and IP environments, means that Centrex services must be available on any device used by a potential customer. The sole concern of customers is that the service is available; not whether they have the appropriate device or not.

To succeed, any Centrex solution must allow graceful integration with current and future networks, and offer compatibility with any available device. Any solution that cannot fully leverage existing signalling, or requires costly handset upgrades, is untenable.

Gintel AS, a leading vendor of IP Centrex application solutions, has been solving network integration challenges for many years. Its Gintel Easy Virtual PaBX application, which delivers a full suite of Centrex services, has been designed from the outset to ensure compatibility with any network environment.

Specialised network gateways are used to perform interconnection with legacy signalling and media interfaces. In turn, these abstract signalling protocols present a unified interface to the higher-layer application logic. The Centrex application needs to leverage standards-based network abstraction wherever possible, while retaining the potential to incorporate specialised bespoke abstraction elements to ensure full compatibility with the required networks

The Gintel Easy Virtual PaBX provides a net-centric approach to the delivery of Centrex services. Inherently, the software assumes that all devices are dumb end-points and it has no dependency on device capabilities. This means that a Centrex service based on Easy Virtual PaBX can be delivered to any device within the network.

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

Since the Gintel Easy Virtual PaBX Centrex solution assumes dumb devices, it makes no requirements on end points, allowing any device to leverage the service. This has a significant impact on costs, allowing operators and service providers to

offer the service via pure subscription models and to avoid any CAPEX from the perspective of the customer.

The Gintel solution meets optimum targets for both business and technical considerations, while offering a rich feature set and the potential for further innovation via its unique Easy Designer service customisation suite.

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. Gintel also offers a range of complementary value added services, focused on enterprise markets, including advanced conferencing, VPN and contact centre applications.

Introduction

In recent years, Centrex services have evolved to become a core offering for operators and service providers seeking to retain existing enterprise customers, and attract new ones. At the same time, there is a growing awareness that Centrex services offer a significant revenue opportunity – with enterprise customers typically generating greater returns and higher profits than consumer subscribers. Similarly, they offer significant benefits to enterprise customers, with the potential to significantly reduce CAPEX and on-going management costs, while providing all the advantages of a premises-based PBX. In short, Centrex services, delivered on an on-going subscription model basis, provide significant revenue opportunities for operators and service providers, while offering financial and productivity benefits for their enterprise customers.

Centrex has evolved from a pure fixed-line service – delivered across traditional switched, TDM circuits – to a service offered as an IP application that can be delivered to subscribers on any network – fixed, mobile or IP. However, while this evolution provides many benefits, it also creates new challenges for the deployment of IP Centrex services. First, Centrex services need to be able to interface with one or more different network technologies. Secondly, the proliferation of different types of devices now used across fixed, mobile and IP environments, means that Centrex services must be available on any device used by a potential customer.

This last issue creates further challenges, both in terms of service deployment, and the ability to offer Centrex services to the widest possible market. The sole concern of customers is that the service is available; not whether they have the appropriate device or not.

The following white paper describes how operators and service providers can overcome these network and device integration issues, and shows how Gintel's IP Centrex services can be deployed across any network, on any device. With these challenges solved, it then allows operators and service to concentrate on

maximising potential market opportunity and attracting enterprise customers with a compelling new business case for Centrex services.

Heterogeneous Networks and CPE Device Diversity

As a rule, today's operators and service providers structure their business according to their focus on different subscriber segments. That is, they show a customer, not technology orientation. Marketing is orientated towards the customer opportunities perceived, regardless of whether they sit in consumer segments or in enterprise markets. Conversely, customers are interested in the services they purchase, not the technology that underpins them. Indeed, customers have a growing expectation that the same services should be readily available across multiple networks and technologies.

However, operators and service providers are confronted with the historical problem of heterogeneous network environments. Although it is well understood that migration towards unified IP core networks – with fixed or wireless IP access connectivity – is ongoing, the evolution towards the so-called next-generation network (NGN) will take some considerable time to complete. As a result, network heterogeneity will be the 'default' environment for the foreseeable future. Thus, operators and service providers seeking to deliver a universal service experience to the widest potential market have to consider how to integrate and deploy the chosen Centrex service application across their existing and future network infrastructure.

One way to solve this problem is to build individual service silos for different networks from scratch, but this is a costly and cumbersome exercise. Furthermore, with ongoing pressure on core voice revenues, operators and service providers need to ensure that services with the potential to stem declining ARPU, such as Centrex, are deployed rapidly in order to defend market positioning and market opportunities. Clearly, there is a pressing business need to overcome the challenges presented by network heterogeneity.

To add to this apparent complexity is the growing diversity of today's CPE equipment. Although a growing number of enterprises are migrating to IP devices, many still retain significant legacy deployments of analogue or digital station devices, particularly smaller and medium businesses. Additionally, despite the rise of the smartphone, there is still a growing diversity of mobile handsets, from 2G to 3G devices, each with different capabilities and interfaces. Indeed, the Centrex proposition is devalued if it is incompatible with this device diversity. So how can these issues be resolved to ensure that operators and service providers can reduce time to market, and reach the broadest possible range of subscribers for their Centrex service offering?

Network Integration Issues

The all-IP network vision is thriving, but remains some way from fulfilment. Currently, operators and service providers may have to manage one or more of the following network cores:

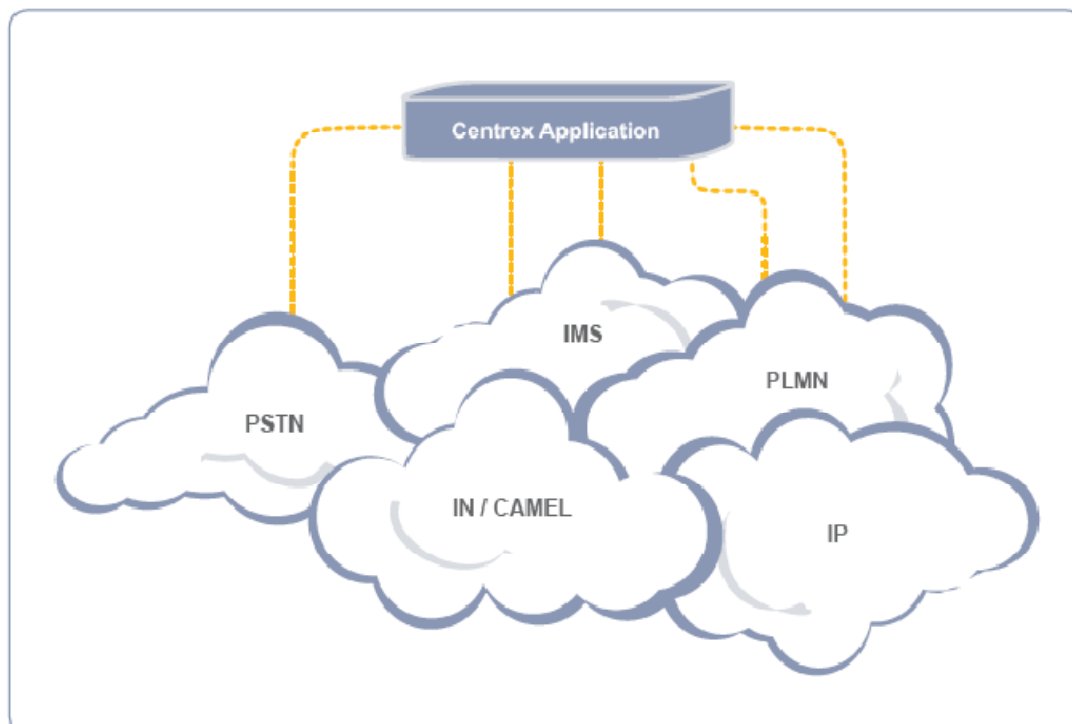
- Fixed;
- Mobile; and
- IP.

Additionally, they may have to co-ordinate different network signalling types, such as:

- SS7 Call Control, such as ISUP;
- SS7 Application Control, such as MAP;
- Intelligent Network Signalling, such as INAP, WIN or CAMEL;
- SIP;
- MGCP; and
- ISDN Primary or Basic Rate.

Figure 1 illustrates the issue of network diversity.

Figure 1: Network Diversity



IN and SS7-based networks, in particular, generate significant on-going revenue, particularly from value added services. Although many suppliers have announced end-of-life programmes for their IN products, these platforms cannot just be abandoned or switched off, as they provide valuable revenue streams, and it may

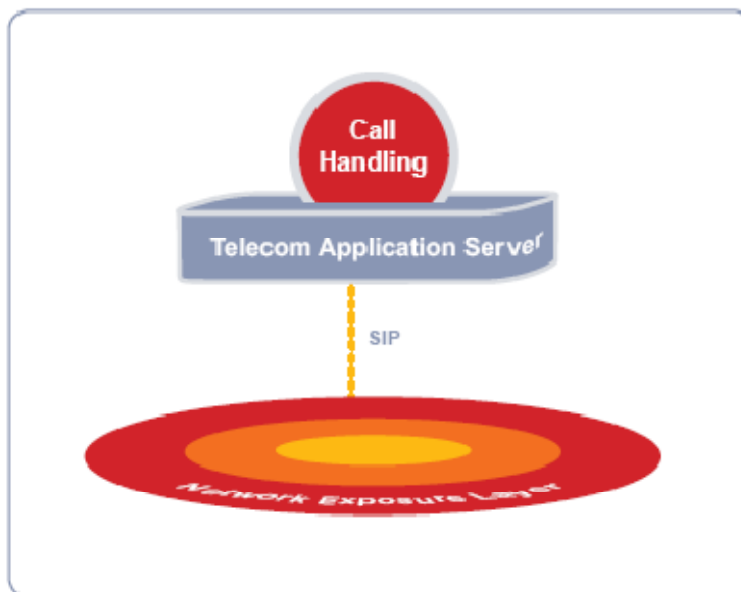
take some time before NGN IN platforms are ready for deployment. Therefore, operators and service providers need to plan for a transitional phase for their networks, ensuring that their chosen service applications integrate with the diversity of networks deployed.

The integration challenge is exacerbated by the fact that, although SS7 and IN protocols have been standardised in bodies such as the ITU and ETSI, many vendors offered proprietary implementations to solve particular challenges ahead of general standardisation efforts. These proprietary interfaces must also be considered, particularly if the operator or service provider seeks to move away from dependence on a single vendor (which presents its own set of challenges). Thus, operators and service providers must be confident that such network integration issues can be resolved by their chosen Centrex supplier. Furthermore, they need to be confident that, as networks evolve towards the all-IP vision, future integration challenges can also be met.

How Does Gintel Solve Network Integration Issues?

Gintel AS, a leading vendor of IP Centrex application solutions, has been solving network integration challenges for many years. Its Gintel Easy Virtual PaBX application, which delivers a full suite of Centrex services, has been designed from the outset to ensure compatibility with any network environment. This has been achieved by separating the application logic from the network integration layer, as illustrated in Figure 2.

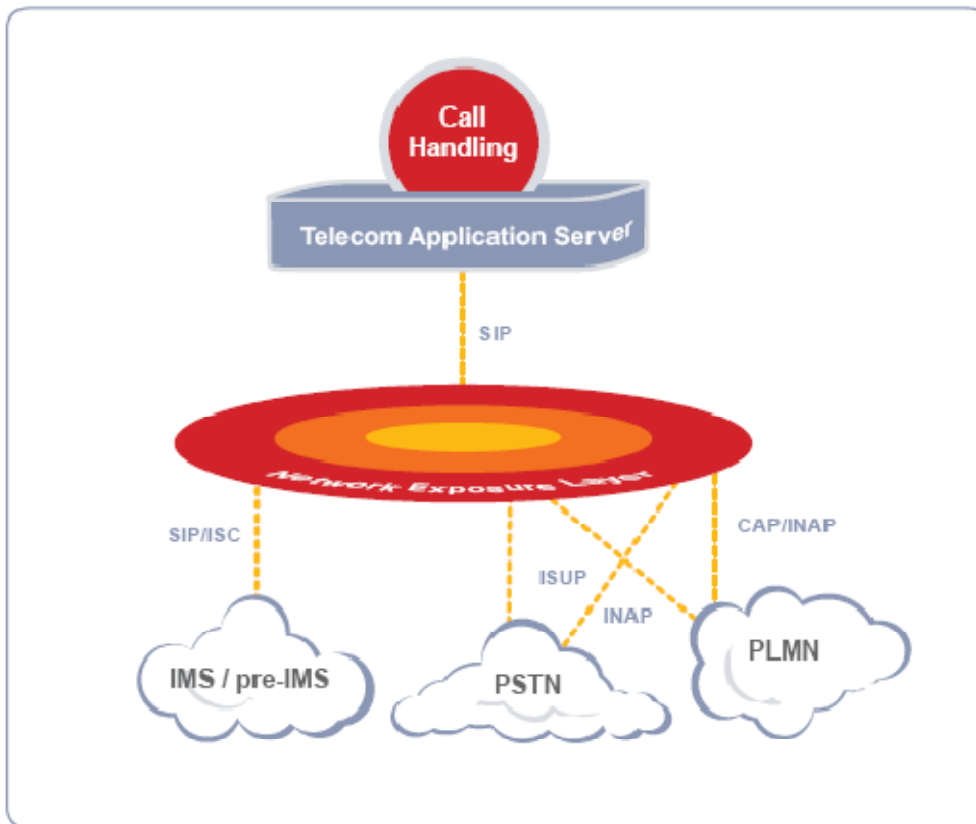
Figure 2: Application and Network Integration Separation



Specialised network gateways are used to perform interconnection with legacy signalling and media interfaces. In turn, these abstract signalling protocols present a

unified interface to the higher-layer application logic. With IP networks, SIP signalling can be managed natively, without any need for further adaptation. SIP can also be used as a common interface from off-the-shelf media and signalling gateways, ensuring rapid deployment. Figure 3 highlights network-level integration via the Gintel solution.

Figure 3: Network-Level Integration



However, with legacy signalling protocols, such as members of the SS7 family, some custom integration may need to be performed, particularly for proprietary or complex protocols such as CAMEL and MAP. CAMEL, MAP and other SS7 application layer signalling protocols are often used to signal specific service requests or to provide responses to such requests. They utilise encoded message elements to convey information relevant to the request. These elements must be presented to the serving Centrex application, but it is not sufficient to simply abstract these to a single core standard. Although efforts have been made to perform a general mapping between SIP (adopted as the core signalling protocol of NGN networks), custom mapping operations may need to be performed for specific network cases.

In such cases, fine-grained control of relevant signalling parameters is required to ensure that all information is correctly presented to the application layer. As many services depend on network triggers for their activation, it is essential to ensure that the correct presentation of triggers is possible. Acknowledging this, Gintel has invested considerable time and resources in recent years to develop the specialist integration skills to ensure that such adaptations can be performed in *any* network environment in a matter of *weeks*.

In summary, the Centrex application needs to leverage standards-based network abstraction wherever possible, while retaining the potential to incorporate specialised bespoke abstraction elements to ensure full compatibility with the required networks.

It is only through a combination of these elements that successful service deployment can be achieved.

Device Integration Issues

For subscribers to enterprise services, it is essential that the service should be available on any device selected. This may include one or more of the following:

- 2G mobile device;
- GPRS mobile device;
- 3G mobile device;
- CDMA mobile devices;
- smartphone;
- IP device;
- softphone;
- analogue extension; or
- digital PRI or BRI terminal.

Under no circumstance should activation of the Centrex service require a customer to upgrade their device(s). This means that the service needs to be compatible with a wide range of devices. Similarly, operators and service providers may wish to offer their services to subscribers on different networks. For example, many MNOs are now seeking to offer services to fixed-line customers, and fixed line operators may try to expand their addressable market by reaching out to mobile customers.

This diversity issue is applicable to customers with legacy devices, next-generation IP devices, or a mixture of the two. In the past, many enterprises have used dedicated premises-based PBX solutions. The associated handsets were usually specific to the PBX type installed and could not be reused with an alternative system. Any enterprise that migrates to a Centrex product needs to be reassured that they can continue to make use of these extensions, which may have required significant investment. The legacy platform itself may be connected to the network using an ISDN access protocol, such as PRI or BRI – the same principle applies to IP devices, as they may connect to the IP router via a proprietary protocol, but connect to the network via SIP trunking.

Device proliferation is also a common issue in mobile networks, particularly in the SME market. Recognition of this fact is vital if the operator or service provider wishes to target the Centrex service to the widest possible potential market. While, the enterprise market covers a wide spectrum of different company sizes, the SME market specifically is considered to have significant, but under-developed, potential for the deployment of Centrex services. Although smartphone use for business is increasing in developed economies, there still remains a much larger pool of older devices, and any successful Centrex service should take into consideration the legacy nature of many organisations, as it offers a more significant opportunity for Centrex services revenue. In other words, it should be available to such customers and not be exclusive to those with the appropriate handsets.

This is particularly important in small and medium businesses as it ensures that there is no CAPEX associated with the purchase of a Centrex service. Centrex services leverage the “software as a service” (SaaS) model, in which services are paid for via a subscription charge. This means that the cost can be allocated to operational expenditure (or OPEX) rather than capital expenditure. Indeed, it is a vital component of the Centrex proposition that it should not affect CAPEX budgets. A requirement to purchase specialised devices would have an impact on CAPEX and may render the offer unpalatable and uneconomic. Ensuring device compatibility is thus not just essential from the perspective of the customer, but also for the operator or service provider concerned: anything that disrupts the SaaS OPEX model will reduce the appeal of the service and significantly undermine its business case.

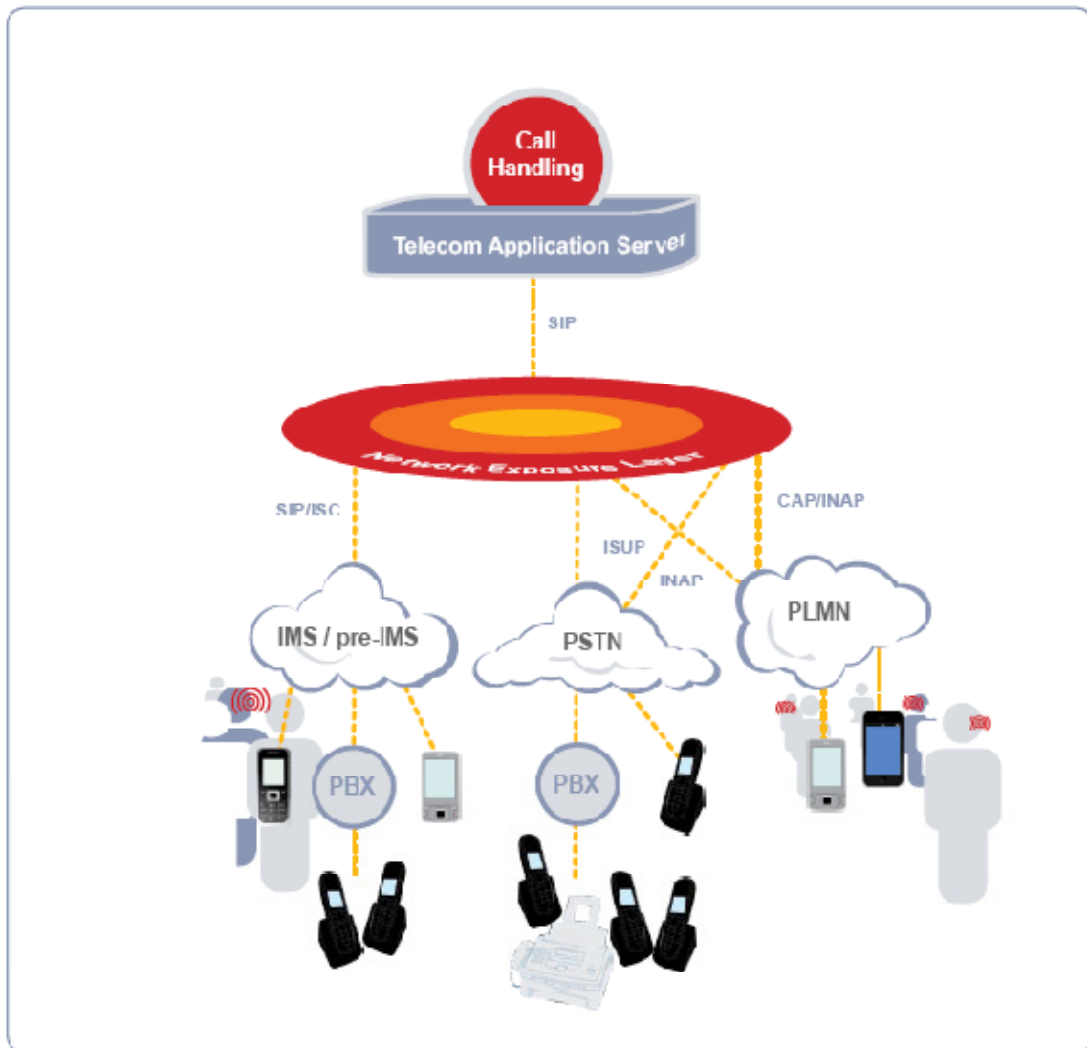
How Does Gintel Solve Device Integration Issues?

The Gintel Easy Virtual PaBX provides a net-centric approach to the delivery of Centrex services. Inherently, the software assumes that all devices are dumb end-points and it has no dependency on device capabilities. This means that a Centrex service based on Easy Virtual PaBX can be delivered to any device within the network. The service itself is maintained by the network, not by the device. No registration is required other than that the terminal identity (usually telephone number) is included within the numbering plan associated with a particular customer group. This means that no handset upgrades are required.

Removing the need for handset upgrades also significantly reduces the amount of integration required in mobile networks, and allows operators and service providers to address all mobile users within their market, not simply a subset. For operators rolling out a service across multiple operating companies and regions, this is an essential element of a successful strategy.

The situation is the same for fixed devices. The net-centric approach ensures that connectivity issues are resolved at the network edge, via Integrated Access Devices (IADs) and appropriate gateways, which can be delivered to ensure access connectivity for legacy devices. To ensure compatibility, Gintel has also launched an interoperability programme for SIP devices, as the proliferation of such products has also led to some diversity in terms of implementation. As the service is maintained by the network, not the device, this ensures that no upgrade is required to support connectivity to the Centrex application; terminal identity is used to include relevant devices within the numbering plan and so ensure that appropriate services are delivered. Figure 4 illustrates the challenge of device integration.

Figure 4: Device-Level Integration



With a Centrex service, many additional functions can be controlled via user input, for example:

- Call transfer;
- Conferencing;
- Contact centre capabilities;
- Skills-based routing;
- Call forwarding; and
- Status.

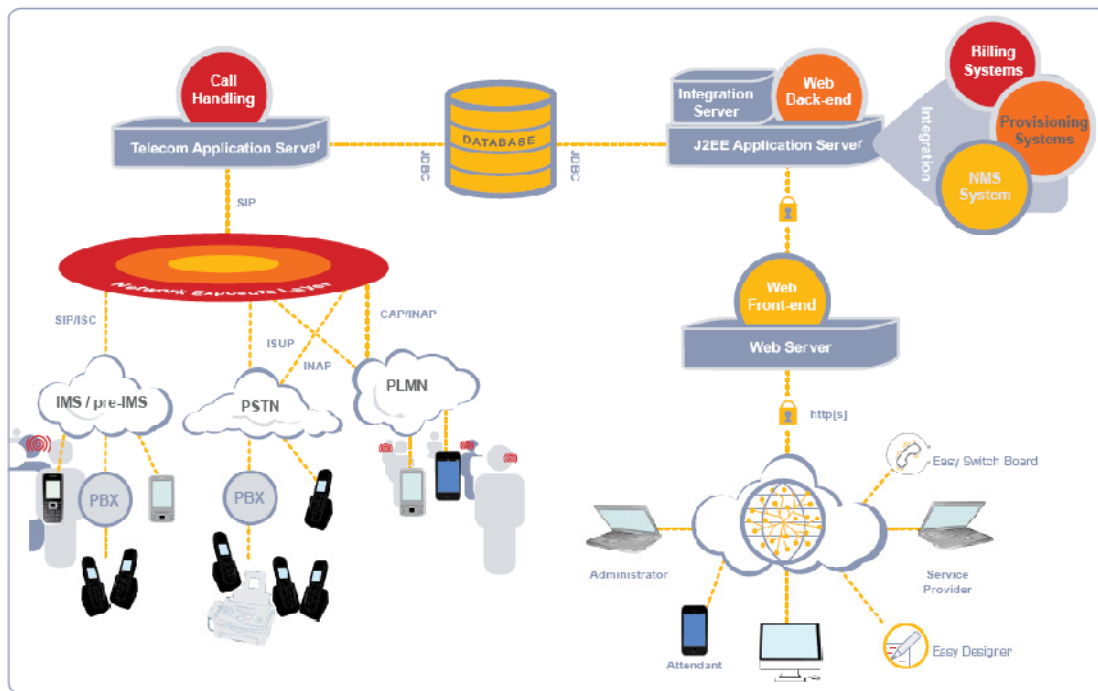
Such functions can be activated via traditional inputs, such as DTMF, via web-service portals, or can be triggered by incoming call signalling data. In the case of DTMF, gateways ensure that relevant commands are translated to the corresponding SIP signalling, allowing users in legacy and NGN domains to enjoy the same rich functionality. For users within mobile networks, the signalling can be conveyed via

gateways to media servers, ensuring that the commands are recognised and correctly implemented.

The Gintel Advantage

Gintel's Easy Virtual PaBX solution allows operators to deliver hosted telephony services to enterprise customers across any network and to any available device. As well as offering a full-suite of Centrex capabilities, which allows MNOs to deliver hosted PBX services to mobile and fixed network subscribers, Easy Virtual PaBX also supports full application-level integration with pre-paid mobile applications and charging solutions. Figure 5 illustrates the complete Gintel solution, highlighting both network and device integration.

Figure 5: Gintel Easy Virtual PaBX Solution



Gintel's Easy Virtual PaBX Solution also solves pre-paid integration problems, and arms MNOs with Centrex services to address the previously 'difficult-to-reach' SME market. Furthermore, 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 the 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.

In addition, 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 targeted at many market segments, with many thousands of customers and each with differing needs and requirements.

Conclusion

Operators and service providers now recognise that IP Centrex is a key element in their strategy to target enterprise customers. However, network integration continues to present a challenge, particularly as migration from TDM to NGN IP networks proceeds. Moreover, there has been considerable proliferation in the range of devices utilised by enterprise subscribers. To succeed, any Centrex solution must allow graceful integration with current and future networks, and offer compatibility with any available device. This latter point is essential, as operators and service providers must be able to address the whole of the market and ensure that their Centrex proposition is available to all potential customers. Any solution that cannot fully leverage existing signalling, or requires costly handset upgrades, is untenable. If the cost of acquiring the service is affected by software or handset requirements, its reach is likely to be severely limited, particularly in markets with a legacy of pre-IP terminals and basic mobile devices.

Gintel AS has resolved network integration issues for operators and service providers, by adopting a net-centric, layered architecture. Standards-based elements are leveraged where possible to perform network abstraction, but specialist resources can be deployed to support extremely granular, custom integration with more complex interfaces.

Since the Gintel Easy Virtual PaBX Centrex solution assumes dumb devices, it makes no requirements on end points, allowing any device to leverage the service. This has a significant impact on costs, allowing operators and service providers to offer the service via pure subscription models and to avoid any CAPEX from the perspective of the customer.

When considering launching Centrex services, operators and service providers must consider the ease of deployment of the solution, as well as the implications for the business case for potential subscribers. The Gintel solution meets optimum targets for both business and technical considerations, while offering a rich feature set and the potential for further innovation via its unique Easy Designer service customisation suite. Operators and service providers must be able to address all potential customers within their market, and extend their product offering to achieve further differentiation. Gintel is the ideal partner to help them to achieve this.

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 family of IP and Mobile PBX applications, 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.

Gintel also offers a range of complementary value added services, focused on enterprise markets, including advanced conferencing, VPN and contact centre applications.

Glossary

BRI:	<i>Basic Rate Interface / Basic Rate ISDN</i>
CAMEL:	<i>Custom Application for Mobile network Enhanced Logic</i>
CAPEX:	<i>Capital Expenditure</i>
CPE:	<i>Customer Premise Equipment</i>
DTMF:	<i>Dual Tone Multi Frequency</i>
ETSI:	<i>European Telecommunications Standards Institute</i>
GPRS:	<i>General Packet Radio Service</i>
IAD:	<i>Integrated Access Device</i>
IN:	<i>Intelligent Network</i>
IP:	<i>Internet Protocol</i>
ISDN:	<i>Integrated Services Digital Network</i>
ISUP:	<i>ISDN User Part</i>
ITU:	<i>International Telecommunications Union</i>
MAP:	<i>Mobile Application Part</i>
MGCP:	<i>Media Gateway Control Protocol</i>
MNO:	<i>Mobile Network Operator</i>
NGN:	<i>Next Generation Network</i>
OPEX:	<i>Operating Expenditure</i>
PBX:	<i>Private Branch Exchange</i>
PRI:	<i>Primary Rate Interface / Primary Rate ISDN</i>
SaaS:	<i>Software as a Service</i>
SIP:	<i>Session Initiation Protocol</i>
SME:	<i>Small and Medium Enterprise</i>
SS7:	<i>Signalling System Number 7</i>
TDM:	<i>Time Division Multiplex</i>
WIN:	<i>Wireless Intelligent Network</i>

