Converged Mobile Billing:

A status report on the development of fully integrated prepaid/postpaid billing

By Ann Swallow and Andy Bairsto

MANAGEMENT REPORT

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telecoms & media

AUTHORS

Ann Swallow (ann.swallow@informa.com)
Andy Bairsto (andy.bairsto@informa.com)

FORECASTER

Gareth Sims

REPORT STAFF

Olivia Gibney, *Managing Editor*
(olivia.gibney@informa.com)
Faiza Carter, *Production Manager*
Mike Woolfrey, *Group Portfolio Director, Technology*

HEAD OFFICE

Mortimer House
37-41 Mortimer Street
London W1T 3JH
Web site: www.informamedia.com

SALES & CUSTOMER SERVICE

UK/EUROPE
Phone: 44 (0) 20 7017 5533
Fax: 44 (0) 20 7017 4783
Email: telecoms.enquiries@informa.com

NORTH AMERICA
Phone: (1) 978 258 2500
Fax: (1) 978 258 2500
Email: colleen.barron@informa.com

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ABOUT THE AUTHORS

ANN SWALLOW is Markets Group Manager for Informa Telecoms & Media, with responsibility for the *Global Target Locator database*, a research project that analyses the business and operational support systems used by operators worldwide. She is the author of the associated series of reports *Global Trends in Telecoms BSS and BCC Market Forecasts*. She is also a regular contributor to the *Billing plus* newsletter and is author of a range of strategic reports.

Ann began her telecoms career with what is now BT, then spent a number of years in an independent telecom consultancy during and after telecom privatisation and liberalisation in the UK.

Andy Bairsto is a Principal Analyst with Informa Telecoms & Media. He is responsible for managing the BSS/OSS sector reports and publication programme. He is the author of several analytical reports, including *Minimising Churn and Building Customer Profitability*, *Competitor Analysis of the Top Global BCC Vendors* and *OSS Strategies for Achieving Revenue Assurance*. He was also a contributing author for *Global Mobile Prepaid Strategies*. Prior to this, Andy was editor of *Billing Plus*, a fortnightly newsletter that reports on and analyses business issues within the telecoms industry.

Andy holds an MSc in Information Technology from Loughborough University, with a specialism in human factors and ergonomics. He has also published work on implementing user-centred IT systems.

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1.1 Setting the scene

1.1.1 Defining convergence

The term convergence means different things to different people. In the telecom billing arena the term is generally used to refer issuing a customer with a single bill for multiple services, such as: fixed and mobile telephony, cable TV and telephony, telephony and utilities such as gas and water. At the end of the last century this was the general usage of the word.

More recently convergence has increasingly been used in relation to the bringing together of the billing of postpaid and prepaid mobile services. Prepaid mobile has been a huge success worldwide. Initially it was seen more as a service for users generating a low ARPU (average revenue per user) and the more credit-challenged, but it quickly became a payment method of choice for many.

The introduction of data services via GPRS and now 3G has introduced another element into the equation. On the one hand some prepaid service users may be deterred from using high-cost services by the need to prepay. On the other hand, postpaid users may wish to limit their risk by having pre-set limits attached to their use of data services. Both of these scenarios ideally require the ability to provide and charge for prepaid and postpaid services on a single SIM card.

Operators recognise the value of offering 'bundles' or 'plans' to both business and family users. A number of handsets, which may be a combination of prepaid and postpaid, are supplied to a company or family, but they are billed to a single point. There are also benefits in being able to apply CRM (customer relationship management) across all customers and apply certain tariffs regardless of the customer's payment method.

All flavours of convergence have an impact on an operator's billing infrastructure. This report looks at ways both operators and vendors are approaching this in relation to convergence of prepaid and postpaid mobile service, and the progress towards the development of fully integrated prepaid/postpaid billing platforms.

For the purposes of this report, we define 'true' prepaid/postpaid convergent billing as existing in a low latency/high availability environment where there is a single technology platform which carries out the authorisation, authentication and accounting for both prepaid and postpaid accounts, and where the charging, rating and balance management is carried out online in realtime.

1.1.2 Sources of data

The information in this report is drawn from both primary and secondary sources.

Primary sources

A number of key vendors were interviewed to establish their progress towards developing an integrated fully convergent mobile billing platform.

This report draws on primary research in Informa Telecoms and Media's various databases and publications, in particular *Global Target Locator* and the *World Cellular Information Service*. This information formed the basis for the forecasts included in the report.

A survey of operators was carried out in December 2004/January 2005 to try to understand more fully their drivers and the progress they have made towards convergence.

Secondary sources

The company's databases also incorporate secondary data, drawn from published matter, press releases, the Internet and similar sources.

1.2 About this report

1.3.1 Trends and issues in the mobile billing market

Chapter 2 examines the fundamental differences between postpaid and prepaid billing systems, and why there is pressure for convergence. As the nature of the mobile market has changed, in particular with the advent of data services, the risks for operators have increased. Converging billing functionality offers an opportunity to improve revenue assurance, hopefully reducing costs at the same time.

The nature of customers is also changing – there is a blurring of the boundary between the two types in many regions. Convergence allows operators to offer more flexible accounts and tariffs to customers, and to carry out CRM activity across the whole customer base.

For convergent billing to work there also needs to be a convergence of business processes, which means there must be buy-in from top management.

Both vendors and operators are taking a variety of approaches to convergence. So far most vendors are developing convergent billing systems using alliances to create integrated systems. Many operators are using adjunct systems to augment their infrastructure, rather than making major changes.

1.3.2 Vendor analysis

Chapter 3 is in two sections. The first contains a series of detailed profiles of vendors, based on interviews carried out by Chorleywood (now part of Informa Telecoms & Media). It assesses each vendor's approach to product development and to convergence in particular, including relevant partnerships and alliances. We also include summaries of the relevant installed base. It demonstrates that vendors are taking a variety of approaches to producing a convergent product. It also reveals that, at the time of writing, no single-vendor developed fully convergent system is in operation. Those that are in place are tight integrations of products from vendors from both sides of the traditional market.

The second section looks at other vendors with a significant market share of the mobile billing market. This information is drawn from secondary sources. It includes comment on relevant products and installations.

1.3.3 The mobile billing market

Chapter 4 looks at three aspects of the mobile billing market.

The first section is a snapshot of the installed base, derived from *Global Target Locator* and *World Cellular Information Service*.

The second section takes an alternative view of the market, based on publicly-announced contracts, and drawn from the Contract Table, which is also published in *Billing plus*. In this section the public announcements for convergent contracts are reviewed.

The final section is a market forecast for the mobile billing market to 2009. The forecasts are based on data derived from *Global Target Locator* and *World Cellular Information Service*. Two scenarios are forecast, based on two different assumed take up rates for convergent billing systems. Both demonstrate that the combination of a maturing market and a tendency to consolidate billing systems, partly because of convergence, will cause a gradual decline in the market.

1.3.4 Vendor requirements

In recent years we have carried out two operator surveys relating to converged billing.

The first was when we added a few relevant questions to the *Global Target Locator* interview programme for a short period in late 2003. At that stage the respondents saw little urgency to change their system. Indeed many thought that the perceived costs were not justified. However, most accepted that they would have to adopt a unified approach eventually, and that this would probably be by total system replacement.

In December 2004/January 2005 we carried out a second survey targeted at mobile operators worldwide. About 14% claimed to be using a converged system, but on closer analysis of the responses it seems that most are actually using a work round based on their prepaid and postpaid platforms to achieve converged functionality where they felt it necessary. Current converged tariffs were mainly related to community tariffs and roaming.

There was a shift from our earlier survey, in that almost half intended to upgrade by adding modules, but almost half of those that were planning to upgrade had not set a timescale.

Chapter 2

Trends and issues in the mobile billing market

2.1 A convergence of two different solution types

Historically postpaid billing has been housed in and controlled by an operator's IT department. It consists of purpose-designed software and postpaid billing systems have evolved with the development of the fixed and mobile networks. The software has been developed either in-house or by specialist software vendors.

Prepaid billing, on the other hand, has been generally a function of the network department. It is frequently an integral part of an IN (intelligent network) system controlling a variety of network functions. Solutions to manage the billing of prepaid customers have therefore largely been developed by IN vendors.

Postpaid billing systems traditionally processed customer usage information after the event, applied tariffs, discounts and so on and used this to prepare regular bills. Many also included customer management functionality.

Prepaid billing systems, on the other hand, have effectively been balance management systems, monitoring in realtime – or near realtime – whether customers had funds in their accounts to continue an event.

The development of prepaid/postpaid billing solutions has therefore begun from two polarised starting points. The development of a truly convergent solution will inevitably also mean a convergence of the billing system market. Prepaid solutions require realtime high-availability functionality and IN vendors such as Comverse, Ericsson and Siemens have a lot of experience in developing such functionality which is key to delivering converged products.

Vendors that have traditionally concentrated on postpaid products, such as Amdocs, Convergys and CSG Systems, have concentrated on developing highly scalable and flexible rating engines with back-end customer management functionality. Convergent billing systems also, ideally, need some of this functionality. However, on the whole specialist postpaid vendors have still not demonstrated that they can deliver the kind of high availability, low latency, realtime solutions that operators are looking for.

As we show in Chapters 3 and 4, many of the so-called convergent installations to date in fact draw functionality from each type of vendor. At present neither type of vendor seems able to achieve the end result of a converged solution without support of the other. Inevitably they carry 'baggage' related to their existing products.

There also needs to be a mindset switch by operators. There is still some internal departmental conflict between the IT and network department when it comes to billing investment. For convergent billing to succeed there needs to be a unified strategy, which almost certainly requires buy-in from the senior management team who are able to take a strategic view of its benefits.

2.2 What is driving convergence?

Convergence of prepaid and postpaid billing is driven by factors such as:

- customers' demand for better service and operators' desire to provide better service to help them increase or retain market share
- operators' need for greater control in the converging telephony environment
- vendors' need to innovate to continue to make sales. This might sound cynical, but in fact a vendor that listens to its customers is ideally positioned to develop new ideas to improve an operator's service to its customers. It can take on board operators' ideas and then develop systems to support them.

2.2.1 Revenue assurance and credit control

Operators are understandably reluctant to disclose revenue loss due to leakage. However, research drawn from a variety of sources suggests that it ranges from 1-15% of total revenue. (See also the Informa Telecoms & Media report *OSS Strategies for Achieving Revenue Assurance*).

Prepaid services have now become just another payment mechanism and are not restricted to the low value customers. Prepaid customers increasingly expect the same services as contract customers, for example roaming, GPRS and 3G functionality. The same services enable postpaid customers to run up potentially much larger bills. The risk to operators will increase further as content and data services develop – and an increasing number of partners will be involved. The operator, as the body closest to the end-user, is likely to suffer most if effective revenue assurance and credit control functionality is not in place.

Functionality more traditionally associated with prepaid system will assist. Session supervision constantly monitors all service deliveries and ensures that no credit overruns take place – either in terms of funds available for prepaid customers or creditworthiness of postpaid customers. Session supervision can deduct funds from the account or measure against a credit limit and then prevent or terminate access.

2.2.2 Increased cost efficiency

In theory at least convergence of billing should reduce both capex and opex (capital and operational expenditure). In the simplest scenario an operator will be buying one system instead of two. Only one system will have to be maintained, reducing training and ongoing costs. When tariff and other changes are made, they only have to be carried out once – reducing both the time involved and the risk of error.

In practice it is difficult to determine the cost of an IN platform or a billing system – too many variables are involved, both in terms of system size and functionality and 'softer' commercial elements. Mobile networks have evolved rapidly over a short period and operators have had to grow their billing structure to match. Pragmatic solutions, such as separating billing for business and residential customers, adding on a system to handle GPRS or 3G, augmenting the IN to bill for MMS, adding another IN to cope with subscriber growth, have evolved over the years. Converting to a converged solution provides an opportunity to draw the disparate services onto a single platform, or offer the same services to disparate groups, but it is inevitably going to be costly in the short term.

Greenfield operators are in a much better position, as they do not have the baggage of legacy systems. There is evidence that some are launching with a convergent billing environment, albeit based on a tight integration of their IN platform with a system from a postpaid vendor. For example, according to the World Cellular Information Service, 3 in Italy is using Intec Singl.eView for postpaid billing, integrated with prepaid functionality from ADC (ADC owned the Singl.eView product at the time of the purchase) and Alcatel. This type of operator could be a good testing ground for a new vendor trying to enter the convergent mobile billing market.

2.2.3 Customer management of spending

When early GPRS services were introduced analysts were concerned that lack of transparency of service costs would inhibit growth. Consumerisation of mobile data services means that users want to have control over what they spend and when. They want to know what a service costs before agreeing to purchase it. AoC (advice of charge) enables an operator to present a user with a price, so that the user can decide whether the service is worth it before finally committing to take it. At the same time the operator can determine whether the customer is creditworthy or has enough funds in their account to pay for the service.

By the very nature of the mechanism prepaid customers have had a form of spending control since the outset of the service. There is a now a demand from postpaid customers for a similar level of control. Examples include:

- a postpaid customer may wish to set up separate balances for family members, where children can have prepaid accounts that can be topped up from the parents' postpaid account (possibly to ensure that they can always call home in an emergency)
- a business user might want to use the same telephone number for business and personal use, using postpaid for business calls between certain hours, and prepaid for the remaining time
- a corporate customer may want to 'cap' employees' permitted level of call charges.

2.2.4 A changing approach to customers

When prepaid services were introduced these customers were regarded as a completely different entity from postpaid customers. Now the boundaries are blurring and operators want to be able to apply CRM activity across, and offer similar services to, all customers. This is much easier to achieve if all their customers are part of a single database on a converged system.

Turkcell offers a tariff that it claims would not have been viable without the convergent approach offered by the rating functionality of its LHS BSCS billing system. It introduced a 'calling group' tariff, KampusCell, aimed at groups of university students. This tariff was offered initially only to postpaid customers, but take up was limited. Once Turkcell had converged its billing functionality it was able to extend this offering to prepaid customers and so reach a large enough user group to make the tariff worthwhile. (see Billing plus, issue 12, 2004)

2.3 Changing attitudes

In Chapters 3 and 4 we examine operators' and vendors' attitudes to and progress towards convergence. However, here we examine the topic more generally.

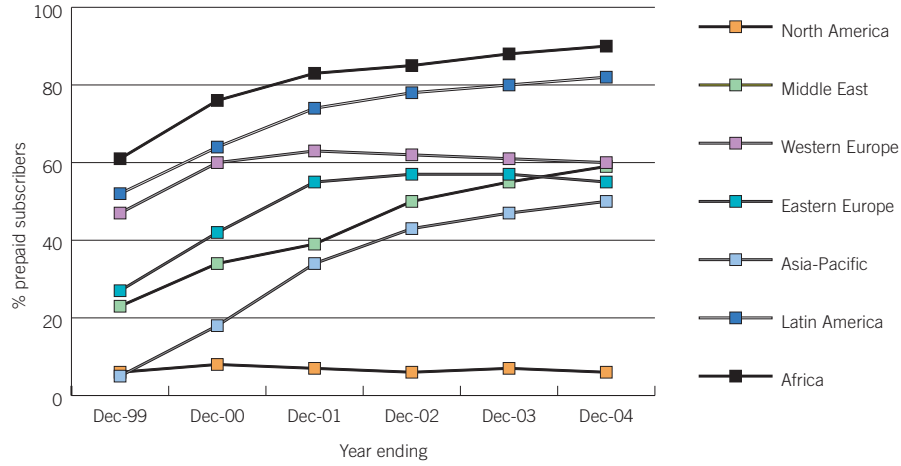
2.3.1 Prepaid is just another payment method

Prepaid mobile take up has developed in many areas very differently from original expectations. It was originally expected to be a service used by 'lesser' subscribers – the unbanked, those who wanted to preserve their anonymity and low volume users.

The rate of prepaid take-up and its percentage of the total market varies considerably, as shown in Figure 2.1.

Although ARPU from prepaid subscribers is, according to the *World Cellular Information Service*, less than one third of that from postpaid subscribers, by their sheer volume they represent a significant percentage of many operators' income. Also, the acquisition costs are only about one tenth of those for postpaid subscribers. Prepaid subscribers are becoming more demanding in their expectations. There is increasing pressure and desire to offer the same services to all users, regardless of their payment method.

Figure 2.1 Growth in prepaid subscribers by region



Source: World Cellular Information Service

Even North America, historically a desert for prepaid mobile services, is showing a visible shift among carriers' perceptions of prepaid customers, particularly as GSM becomes more widespread. Cingular Wireless has gone through a process of streamlining and updating its prepaid billing functionality because it recognised that it was missing opportunities to market premium services to prepaid customers.

Therefore, although prepaid customers deliver lower revenues than postpaid, this is offset by prepaid's lower acquisition costs, so this customer group can no longer be disregarded. There is a paradigm shift from regarding prepaid and postpaid as customer types to regarding them as payment methods.

As markets mature, churn and customer retention becomes more of an issue. It is recognised that focusing on the customer is one way to minimise churn and maximise retention of the right customer. Offerings need to be simple, clear and intuitive and designed to meet customer expectation and need, not the requirements of the payment technology. Convergent mobile billing has a big part to play in this.

2.3.2 It requires change from the top

Legacy organisational factors are an issue affecting the move towards convergence. For the historical reasons described above, many operators are still organised in business 'silos' according to the customer type. This was highlighted in a review carried out by Accipia and reported in a feature by its technical director, Andy Humphries, in *Billing plus* in September 2004. Accipia suggests that senior management needs to drive the move to a technical convergence that sits across legacy business and technical groups. It is only when operators have such an infrastructure in place that they will be able to respond effectively to competition from the newer entrants – particularly in the field of 3G.

But, as Humphries comments, and our research indicates (see Chapter 3), in practice there are few truly convergent solutions on the market – and most that do exist are in fact a marriage between offerings from traditional postpaid and IN vendors. Operators can move towards technical convergence by gradually modifying their system, but it is more imperative – perhaps an essential prerequisite – to move towards organisational convergence.

2.4 The market today

The convergent postpaid and prepaid mobile billing market is still a 'work in progress'. Our research shows that both vendors and operators are taking a variety of approaches to the challenge.

Most vendors, whether historically prepaid, historically postpaid, or new entrants, are developing systems by forming partnerships and alliances. We expect, over time, that at least some of these relationships will turn into marriages – we expect to see mergers and take-overs in the vendor market.

Our research indicates that some greenfield operators are opting for a converged solution, albeit based on a tight integration of postpaid and prepaid functionality from the outset. Some analysts suggest that there is not really a need for established operators to completely converge their systems – that for the short to medium term at least their current arrangements are satisfactory for a significant percentage of both customer groups. Where they are not, for example for data, operators are already taking pragmatic action to handle the situation, by adjunct systems and/or upgrading mediation.

Chapter 3
Vendor analysis

3.1 Overview of the players

As discussed in Chapter 2, billing solutions for postpaid services have, on the whole, been developed by software vendors, whilst billing solutions for prepaid services have, on the whole, been developed by IN vendors. So far, as far as we are aware, no vendor in either category has developed a fully convergent system independently. However, a number are addressing the market via alliances, which involve either joint installations or effectively integrating one system with the other.

The remainder of this chapter is in two sections. Section 3.2 is based on interviews carried out with certain vendors during 2004. We selected these vendors as we feel they represent a cross-section of key players from the two historical market sectors.

Section 3.3 is drawn mainly from secondary sources and reviews other vendors with a significant mobile billing market share.

Inclusion in either section is not intended to reflect the value of either group.

3.2 Detailed profiles

3.2.1 Amdocs

Background

Amdocs is traditionally a supplier of postpaid billing software.

Amdocs was founded in Israel in 1982. Its initial operations were in the directory services field, and this still contributes significantly to the company's revenue. It became a publicly listed company on the New York stock exchange in 1998 and is now headquartered in North America. Amdocs provides billing and CRM software products and services for integrated customer management to telecom operators in over 40 countries.

The company employs 8,000 people across its organisation, and has 25 offices located across the globe. Market pressures have led Amdocs to reduce its workforce by 1,400 in the last two years. To make itself more profitable, Amdocs has also made itself more product-centric in its business approach and has re-aligned the organisation accordingly.

Amdocs has made some key acquisitions to help it to develop its product offering, such as Clarify (CRM) from Nortel in late 2001 and Xacct (mediation) at the end of 2003. The Clarify purchase has added significantly to Amdocs' revenues.

Product development strategy

Amdocs has developed 'specialist interest groups' that enable customers to provide input into product roadmaps and to discuss the company's future strategies relating to products and technology. In addition to the input from customers, Amdocs has a strategic vision team (which looks at market issues 18 months to three years ahead), product marketing functions, and a Board of Advisors (senior executives) – all of whom contribute to deciding how future investment into software should be made.

Money invested in R&D is broken into two broad areas: market demand and keeping up to speed with new technology. Amdocs' R&D budget approach reflects its financial condition. However, spend has increased in the last three years, whilst revenue has decreased. So the investment decision must have been based on its improved net income per annum monies in fiscal 2003. For example, its annual R&D spend for 2001, 2002, 2003 has increased by 6.9%, 7.7% and 8.0% of revenue respectively, although total revenues dropped. In comparison with the other top global vendors studied in this report, Amdocs invests the least in terms of revenue percentage for R&D.

Some of its development has been via acquisition rather than internal. IP billing functionality was introduced via the purchase of Solect, and the Xacct purchase is reinforcing Amdocs' ability to handle realtime billing.

The development of Amdocs Enabler convergent billing product (see below) has been driven by:

- customer requirements – Amdocs has adopted a strong vendor-client relationship programme, under the umbrella name 'In Touch'. It holds two annual 'In Touch' forums – one in Europe and the other in the US – which include keynote speeches from industry gurus and key customers, and address billing and CRM issues. Currently, the forums are dominated by feature and function questions and debates that address the tactical level requirements, such as technical problems; how to make the systems easier to operate; and so on. Amdocs is hoping in future to include more business and strategic level input for C-level executives.
- the development of various industry standards such as 3GPP.

Partners and alliances

The majority of Amdocs' implementations have been carried out with systems integrators and the company expects this to continue to be the case. However, Amdocs has seen a shift in its relationship with SIs in relation to the selection process. In the past the systems integrator was chosen first, and the BCC product deployed reflected the relationship the SI had with the vendors. Now the BCC product is now chosen first, and the systems integrator is chosen second based on its deployment reputation in particular countries.

Amdocs cites a large number of alliances and partners, with whom it works to deliver solutions to telecom operators. This is representative of its acquisition approach and strategy – to build through others rather than invest in-house at the catalyst stage. Where Amdocs does not have a solution, instead of building one, it tends to work with an external partner or alliance, hence its emphasised importance on third party relationships.

For prepaid, Amdocs cooperates with the following IN vendors:

- **HP** – for prepaid voice cooperation, integration of Enabler OLC with HP OpenCall
- **Alcatel** – for prepaid voice cooperation. Alcatel IN has been integrated with Enabler OLC at FarEasTone in Taiwan
- **eServGlobal** – for prepaid voice cooperation. eSG UAS has been integrated with Enabler OLC at Excelcom.

For billing in general Amdocs has the following infrastructure partners: HP, Sun, IBM, BEA and Oracle.

The product – Enabler

Amdocs' current billing offering is called Enabler. It is a convergent (fixed and mobile) product, pre-integrated with Clarify CRM. It is, essentially, one system with interfaces to the various network elements and is based on a single customer database.

Amdocs believes that the only difference between the online (prepaid) and offline (postpaid) charging is in the way that an event is handled:

- an online event is dealt with in request/response mode: get the event from session control, format the event, send to pricing engine. For online charging the balance is updated using the balance manager and sent back to the session control.
- an offline event is often received in a file containing large volume of events. Once the file is opened and event has been formatted it is passed to the pricing engine where, once processed, instead of being returned, as would be the case with an online event, the result goes to the usage repository (dispatcher) and then onto the billing engine.

In both instances, after formatting, the event is 'guided to a customer' (assigned to a customer by looking it up in the in-memory database) and moved to the charging component – where the process varies slightly, depending on whether the event requires online or offline charging:

- the first stage for all events is to be 'guided to a service'. In other words, after the customer has been identified, the system also needs to find out the payment method they are using and what pricing scheme they may be on

- the event is then sent to the pricing engine which puts a price on the event and then increments 'counters' such as the customer's allowance (inclusive minutes, for example) – this is to make sure that the user needs to be charged for the event
- if the customer needs to be charged the event moves to the balance management component and this is the point at which the pricing engine determines that the balance needs to be changed
- finally, if the event is online it is returned to network and if it is offline the charging process has ended.

The authorisation functionality resides in the Amdocs Online Charging (OLC) component. The call/session authorisation is performed according to the subscriber status, subscribed services and offers status, and balance status. Amdocs OLC also supports Advice of Charge (AoC) capability. Services can be pre-rated as required by the rating engine for display purposes.

Amdocs OLC supports both realtime and offline transactions (hot billing). For hot billing, a 'negative balance' policy configuration is supported. It enables the operator either to allow or disallow a negative balance. If it reaches the balance 'bottom' threshold, OLC bars the relevant service/s. The OLC supports both online mediation and offline mediation functionality.

The balance allocation for all sessions and services is performed according to quotas, where only a portion of the available balance amount is allocated to each session. This method enables the support of multiple sessions or multiple services being consumed concurrently from the same prepaid balance in realtime.

The Amdocs architecture also includes EJB (Enterprise JavaBeans) APIs (Application Programming Interface) – the business processes for maintaining customers, charges and so on are all available as open APIs. This means that any external system, such as the EAI (Enterprise Application Integration), CRM, order management system and so on, can either call on these Amdocs APIs directly or via the asynchronous TRB (an internal integration mechanism passing data between the modules. It is based on the Publish & Subscribe methodology) in order to communicate with the convergent platform.

Creating a bill – which is usually associated with postpaid activities – will, in a converged system offer the capability to detail charges made from both prepaid and postpaid transactions.

The level of flexibility of configuration is dependent on several factors including:

- depending on the customer's configuration, the master balance can either be stored within the Amdocs platform (described above) or it can be stored elsewhere, for example the IN
- Amdocs can provide mechanisms to build interfaces to the IN or in the case of postpaid, to other network elements such as switch controls.

Amdocs is also investigating the possibility of establishing alliances in the IN space to achieve something similar to the Convergys IN-hosted rating solution (see Section 3.2.3). It has found that some customers prefer to work primarily with more network-oriented vendors – in these cases Amdocs will potentially then be able to implement the pricing engine. Currently Amdocs is working with Siemens from an IN standpoint and also has an agreement with HP but has no exclusive arrangements.

There is also discussion about whether a converged charging solution should be an IT-based system or a network-based system within the operator. This can create quite a 'political' battle which will drive the operator to make the decision either to choose the type of solution proposed above or a network solution that embeds a rating engine – it can be a case of which department shouts the loudest!

According to Amdocs, the main disadvantage in placing the rating engine within the IN is that the operator is then fairly limited in the level of convergence that is achievable. This is because the IN platform is more concerned with prepaid – and event information may come from a number of other sources such as switches or content-related systems. Opting for such a solution also raises questions of accessibility for non-network departments – such as can marketing get at the product catalogue so easily if it is in the IN?

Installed base

Amdocs has many installations worldwide for Enabler and its preceding product, Ensemble. Its customer base includes both fixed and mobile operators.

So far Amdocs has disclosed that Excelcom (Indonesia), FarEasTone (Taiwan), SFR (France) and Connex (the Vodafone affiliate in Romania) have all implemented Amdocs' flavour of pre/postpaid convergence. The company also claims other customers that it is not authorised to talk about.

For Excelcom it appears the main driver was to extend value added services (VAS) to its prepaid customer base – the operator had almost 3.5 million subscribers at the end of 2005, 98% of which are prepaid. The operator had started out with two systems and quickly realised that it would make sense to consolidate on to single platform – new services could then be offered to any type of customer irrespective of payment method. Customers in that particular market like small value transactions. For example, about a year ago Excelcom had a US$5 recharge voucher (much smaller than typical recharge environment) but the operator also saw the value of introducing a US$1 top-up. This would mean that the volume of transactions going through the system from replenishment activity became much higher on a per customer basis than is typical anywhere else – other operators would normally look to increase the minimum transaction in order to reduce number of transactions. This serves to demonstrate the capability of the system in dealing with a high volume of transactions.

Excelcom has reportedly achieved capex and opex savings as a result of the implementation, by reducing two billing systems down to one – many operators throughout the world have a lot more than two!

Indonesia is at the early stages in terms of the uptake of data services and so it is difficult to judge how beneficial the Amdocs solution has been in addressing what was reported to be a key driver (introducing VAS to prepaid users).

3.2.2 Comverse

Background

Comverse is traditionally a supplier of IN platforms incorporating prepaid functionality.

Comverse is owned by Comverse Technology, which is listed on the NASDAQ exchange and whose other subsidiaries include Verint, Ulticom, Startel and Starhome. The company derives the majority of its revenue from the telecommunications industry.

As of January 31 2004 Comverse Technology employed 4,663 staff. Of these, 80% are what the company terms as scientists, engineers and technicians that are engaged in research and development, marketing, support and operations activities.

Comverse falls into the Network Services Division of its parent company.

Product development strategy

As of January 2004 Comverse Technology employed around 1,900 scientists, engineers and technicians in its research and development sites located mainly in the US and Israel. The company is able to benefit from some financial incentives provided by the Israeli government in order to promote R&D activities in Israel.

Net research and development expenses for fiscal 2003 fell by around US$16 million (7%) compared with the previous year. The company attributed this to decreased personnel-related costs which itself resulted from a general reduction in workforce, other cost reduction efforts and fewer R&D projects.

The company also claims to have 100 people working on prepaid at its R&D centre in New Jersey.

Partners and alliances

The company's products and services are marketed throughout the world using its own direct sales force, supplemented by partnerships with local distributors and cooperation with international vendors of telecoms infrastructure equipment.

In order to achieve a convergent prepaid/postpaid solution Comverse has partnered with Israel-based Formula Telecom Solutions (FTS) to provide the postpaid billing side of the equation.

In addition, Comverse forms alliances with infrastructure vendors, systems integrators, technology vendors, application developers and content developers: they include Ericsson, Nortel Networks, Qualcomm, Siemens and Texas Instruments.

The product – Real-time Billing and Prepaid Solutions

Comverse has a portfolio of products it calls 'Real-time Billing and Prepaid Solutions' – this incorporates four products:

- Prepaid Services Billing
- Real-time Converged Billing
- Real-time Intelligence
- Real-time Data Billing (RTDB)

Comverse's definition of convergence is that the authorisation of a service, rating and charging of a service and balance management should all be carried out in realtime – everything else can be offline. The company compares the two types of service with debit cards and credit cards. A debit card is associated with a bank account – the user can only spend what is in the bank account, once it hits zero he or she cannot spend more. With a credit card, the customer is a 'managed risk' based on their credit rating and previous payments – which the lender translates into a credit limit. Both cards can look the same and can be used to buy exactly the same products/services. But essentially one is a prepaid account (debit card) and the other is a postpaid account (credit card).

As more services, such as gambling, become available managing the risk becomes imperative for operators. Voice, data, m-payments, SMS and so on, must all be authorised and rated in realtime, and the balance has to be accurate at the moment the charge is applied – irrespective of whether the user is using prepaid or postpaid.

Comverse delivers the complete converged system (and has done so in every implementation so far). In greenfield situations (where there is no incumbent billing system) the company will work with its technology partners – Formula Telecom is one of those. This is not an exclusive arrangement, it is seen more as a preferred partner. Comverse has been able to achieve a good level of integration with the FT solution.

When it comes to managing the credit risk associated with tariffing and discounting Comverse says fairly complex scenarios can, on the whole, be handled online in realtime. Where this

becomes more complex (for example, tiered rating), transactions are handled offline using the postpaid system and then the balance is updated at the next opportunity. In order to minimise the risk, the online rating will charge at the higher rate and the discount that is applied when a threshold is reached is applied back to the account.

The Comverse solution can also support multiple users to one account – prepaid and postpaid.

Installed base

Comverse claims to have systems deployed in more than 100 sites worldwide, operating in every type of network with all major switch types and every major IN signalling standard.

It also claims to be one of the first companies to deploy a converged billing system and has now got several implementations including Mobile 8 in Indonesia and VoxMobile in Luxembourg. There are up to 10 others across other regions that the company has not been able to announce. As far as we are aware these are all tight integrations of the Comverse prepaid product with a postpaid product – presumably from FT.

Comverse claims to have prepaid implementations handling millions of subscribers (sometimes 10 million and growing). It says that fundamentally the same numbers could be reached for converged billing.

3.2.3 Convergys

Background

Convergys is traditionally a supplier of postpaid billing software.

Convergys is listed on the New York Stock Exchange. It was formed in April 1998 when Cincinnati Bell divested and merged two divisions – billing provider CBIS and customer care provider Matrixx. Convergys provides billing and customer care across a wide range of industries – serving the telecoms, technology, government and financial services sectors – and provides outsourced human resources services to companies across an array of industries.

The IMG division, effectively former CBIS, provides billing and information services for all segments of the communications industry: mobile, fixed, cable, cable telephony, broadband, direct broadband satellite and xSP. It provides software via three models, licence, build-operate-transfer (BOT) and outsourced or managed services.

Convergys states that it has over 50 offices and/or contact centres in 27 countries. There are 25 offices/ contact centres in USA; 6 in Canada; and the rest are based in Belgium, France, Germany, Italy, Netherlands, Portugal, Spain, Switzerland, UK, Israel, Russia, China, India, Indonesia, Japan, Korea, Philippines, Singapore, Taiwan, Thailand, Australia, Argentina, Brazil, and Mexico.

As a whole, the company employs 44,000 people. In the 2002 annual report, it was cited that 3,700 people worked in the IMG division. However Convergys also stated that there would be head count reduction throughout 2003 across both the IMG and CMG divisions, so the exact number of staff is not in these divisions is not known.

Convergys has grown its portfolio by acquisition. The most significant was its acquisition of Geneva Technologies in 2001. It gave the company a strong European footprint and a robust piece of software, which is now the core of most of its offerings.

Product development strategy

Convergys either develops its product range through acquisition or by research. Recently, Convergys has invested heavily in its Infinys portfolio, and is in the process of drawing its disparate systems into a more consolidated offering to meet the growing needs of a convergent market. It has recently spent US$100 million on this initiative, which is represents 31% of total revenues made on selling billing and support platforms in 2003 in the IMG division (this figure does not include data processing R&D). However, it amounts to a much smaller 4.4% of Convergys' total business revenue for the year. The high percentage of investment versus sale of a particular product range implies that Convergys is looking to push this solution to the market place in the long term and increase its attractiveness to the operator community.

Partnerships and alliances

Although Convergys still relies on partnerships with systems integrators, it is gradually building up its own services portfolio and is carrying out more of the implementation and integration projects itself. Convergys cites the top four systems integrators that it now tends to work with at a global level as Accenture, Cap Gemini Ernst & Young, IBM and LogicaCMG.

Convergys believes Accenture to be the strongest and IBM the second strongest systems integrator to work with in the developing markets. In the Asia-Pacific region it finds LogicaCMG to be particularly powerful and Cap Gemini & Ernst Young to be the most influential in the EMEA (Europe, Middle East and Africa) market.

The product – Infinys portfolio with Geneva rating engine

Convergys has adopted a two-pronged approach to its product portfolio. It has three end-to-end products targeted at specific sectors – Atlys for mobile, ICOMS for cable and broadband, and Wizard for cable, broadband and broadcasting services. However, its flagship product is its Infinys portfolio. This consists of a selection of modules that can be used to replace all or part of an operator's BSS. It has the Geneva rating and billing module at its core. Convergys describes Infinys as a convergent solution or set of solutions.

The Convergys ideology with respect to convergence is based around the concept of bridging the gap between IT-based and network-based solutions. Therefore, solving problems such as latency and availability are of paramount importance in its strategy.

In addressing this, Convergys has, at present, two approaches:

- the primary approach is the hosted rating option which means taking the Geneva rating engine and hosting it inside an IN platform. The Geneva rating engine is supported within the Common Application Framework (CAF) layer of Siemens' charge@once IN. Convergys has been working with Siemens to achieve this over the last two years
- the secondary approach uses a 'highly available, low-latency interface mechanism' to provide off-board rating capability and which sits alongside the IN platform. Convergys believes that this approach is adequate to support the needs of operators in certain situations. But, it says, in order to provide a more convergent solution that is as good as the prepaid solutions in place today, the best results are achieved via the hosted solution and then integrating this at the back end with the same rating engine in the postpaid environment.

The hosted solution is supplied as a product, with the interfaces between the online and offline systems supplied as part of that product. The system splits its work into online (dealing with all prepaid) and hybrid customers. Balances for both types of customers are mastered for charging within the online server. The offline server deals with postpaid customers. All realtime charging is dealt with via the online server which houses the master balance for these transactions. Actual billing does not need an instant update, hence it can lag a few minutes behind. Convergys uses advanced queuing technology to transfer changes between the servers in a secure manner. This is not an open interface to the customer, as it is an internal part of the product. What is important in this interface is that no deltas are lost, and they are transferred in the correct order. This is achieved through persistent queuing. The transfer occurs in both directions: charged amounts for hybrids are sent to the offline charging server; periodic discounts, periodic payments from the offline go to the online server if billing has calculated that any monies are owed.

Convergys has in place a two-phased approach to achieving fully convergent prepaid and postpaid services:

- what it calls an 'enhanced prepay' solution, extends services that are typically offered for postpaid subscribers to the prepaid accounts
- where the postpaid Geneva solution and the charge@once platform are connected, allowing the sharing of services between both prepaid and postpaid accounts, thereby allowing fully convergent prepaid and postpaid services.

The hosted approach allows the operator the flexibility to choose when to rate online and when to rate offline – some subscribers/services need to be dealt with online, others can be

dealt with offline – allowing the operator to control the cost. It also allows for hybrid accounts and promotes the easy migration of customers from one payment method to the other.

In addressing situations where event information may come from offline sources, Convergys relies on the Siemens platform to form the central interface. Siemens' charge@once IN platform, used in this hosted solution, is a convergent platform and has connectors for other protocols, apart from INAP for SS7. These include an SGSN monitor for APN (GPRS) traffic, an SSG (service selection gateway) for service destination addresses over IP (also for GPRS), a packet inspector for sniffing up to layer 7 traffic, a web proxy to detect HTTP traffic, and an OMIP (Open Mobile Internet Platform) gateway for control of third party applications. The combination of these, plus compliance with LDAP and Radius, allows applications to be interfaced to the Siemens system, and for the balance to be held within the convergent solution. This, says Convergys, is a useful approach to both the on-net (operator sponsored/supplied traffic), and off-net approaches (outside the walled garden).

Regarding online information, Convergys takes the view that any mediation, by definition, will not be realtime. The use of INAP and Camel for CS voice and the use of SIP, GTP etc for data, are preferred in the online world. Mediation still has a use for terminated events, TAP and so on, but is not seen as a suitable solution for online charging because of its 'delaying' characteristics – it would be an extra unnecessary box in between the network and service logic/charging.

The Convergys strategy has always been to use the rating capabilities of its Geneva rating engine to support both prepaid and postpaid subscribers – using the same product and price plans and so on. The physical way in which this strategy is being implemented with Siemens may be different from the way it was implemented in the past.

By working with Siemens, and in physically hosting the Geneva engine on the IN, Convergys has essentially replaced the existing Siemens IN rating capabilities in such implementations. In a distributed environment where there may be three or four instances of the rating capability across the IN implementation there is a configuration host capability that allows the operator to configure only once – that is it does not have to repeat this at each physical instance of the rating engine.

According to Convergys, Siemens just happens to be the first option and in fact it can form partnerships with other IN partners in order to expand the market for the hosted IN approach to convergence.

In terms of delivery, responsibility for providing the solution is split, but primarily Siemens will have primed the contract and Convergys' professional services team is likely to configure and implement the Geneva part of the equation.

Convergys also identifies another option of overcoming the latency/availability problems using a traditional IP approach, where there is an interface to the network but where all the rating occurs off-board. This is something that Convergys has not entirely ruled out for the future.

Installed base

Convergys has a large customer base worldwide for its various billing solutions, both outsourced and licensed.

The first implementation of a convergent prepaid/postpaid solution for Convergys is at Telkomsel in Indonesia, based on the Siemens platform. The Siemens IN platform was already in place at Telkomsel. Convergys has stressed that this solution has not been developed solely for this customer and that it intends to productise it.

Convergys has identified a need (demonstrated in the Far East markets) to apply the sort of credit control traditionally associated with the prepaid segment for corporate customers and postpaid services.

It sees two scenarios of potential custom:

- where the IN platform is coming to end of its life and the operator is looking for a replacement IN – although these will be few in numbers
- where an operator wants to upgrade its existing installation. In this instance there may not be the business case to upgrade the entire network to do convergent charging, but instead it may identify that there is such a requirement for, say, 20% of the customer base – where this segment is likely to generate the types of margins needed to justify the investment. It may be that an adjunct approach is taken where the majority of the INs will be the basic model and a few nodes will be convergent. It is very unlikely that operators will want to upgrade their entire subscriber base to be convergent.

Convergys has customers with both Geneva and a Siemens IN in place. Those operators are therefore looking closely at this hosted solution as a way of upgrading. There is also the potential to work with existing Siemens IN platform customers who may want to upgrade their rating capability with Geneva.

Convergys has seen demand across all geographic markets for convergent billing. The particular driver from Telkomsel was partly based on being able to support value added services for its prepaid subscribers. There was also a corporate issue regarding the management of credit limits – postpaid subscribers want to manage how much they pay in a month. Telkomsel would also like to be able to authorise high value services in realtime – although this appears to be more of a long-term vision according to Convergys.

Convergys believes that the hosted solution is the right approach at the moment – particularly when the focus for its customers is risk management. Longer term, Convergys says it is looking to solve IN issues itself and to build technology around that. 'Not everyone will want to have a relationship with two vendors.'

3.2.4 CSG Systems

Background

CSG Systems is traditionally a supplier of postpaid billing software.

CSG Systems was formed in 1982 as First Data Corporation. Following a buy-out of the Cable Services Group by Neal Hansen (currently CEO of CSG Systems, but due to retire in mid-2005), and a team of investors in 1994, the company was re-branded CSG Systems. It provided outsourced and standalone transaction processing services predominantly to the cable industry and other communications providers in the USA.

CSG Systems branched out internationally in 1996 when it acquired UK-based Bytel, later rebranded as CSG International. A major milestone in its history was the acquisition of Kenan billing and customer care products from Lucent Technologies in December 2001, which gave CSG a springboard into the software licensing business for all communications verticals. It has since consolidated this by purchasing the IBM ICMS product. Today, CSG Systems is a global provider of outsourced and licensed customer care and billing solutions to the communications market across cable television, direct broadcast satellite, mobile, fixed and IP services.

CSG employs 2,700 staff in 40 locations, across three regions (the Americas, EMEA [Europe, Middle East and Africa], and Asia-Pacific), for both the Broadband and GSS divisions. The company's global headquarters is based in Colorado in the US, with regional offices in the US, Canada, Mexico, Argentina, Brazil, the UK, France, Spain, Portugal, Italy, Germany, Switzerland, Japan, South Korea, China, India, Singapore, Malaysia, and Australia.

CSG has entered into a series of strategic partnerships to enhance its range, including one with Mind CTI for IP billing and Azure (via its acquisition of Connexn) for revenue assurance.

Over the last two years CSG has worked to expand its senior management team outside the traditional roles. Most notably it has recruited regional CTOs to help with customer requirements and to push new technology out to prospects. Additionally, a Delivery division has been set up under Al Michels, which includes professional services. The division has two new units – account management and project management – so the customer experiences a smooth transaction from implementation of the service, through to handover at the Project Management stage, to Account Management, ensuring that a check is kept on the customer's services and welfare.

Product development strategy

CSG's research and development investment is consistent year-on-year with just over 10% of total annual revenues being spent on software development. However, in 2003 US$62.9 million (just over 10% of 2002 revenues) was spent on designing and developing the new Kenan FX product range, in addition to the annually committed R&D spend.

CSG has development centres worldwide, and has recently set up sites in India and China in support of the expected explosive growth in the emerging markets in Asia-Pacific.

CSG bases its research and development approach on competitive analysis, industry opinion from analysts, product architectural evolution and its customers. After the purchase of the Kenan product suite, CSG found that integration with other vendor products and cost were two major issues for its existing customers. Hence, the drive behind re-inventing the product line to Kenan FX, so it could be fully vendor-independent, and upgraded in a granular manner, rather than having to upgrade all components once a new initiative was required. Through the development process, CSG builds in roughly 1,000 product enhancements per year, and has one major and one minor release per year for main products.

Partnerships and alliances

CSG has a strategy of working closely with its system integration partners and alliances during the selection and implementation stages. It believes that there is no 'One-Size Fits All' approach, and that a combination of global level and local partners is the most successful strategy to breaking into newer markets. Its global partners have the proven expertise, whilst the local systems integrators have the blend of expertise and knowledge of the culture, and alliances, to make deployments. CSG has dedicated Partner Programme Managers and holds partner conferences to maintain its relationship with these key contacts

CSG cites some of its global partners as:

- **Bearing Point** – specialist in implementing cost-effective billing systems
- **IBM** – developer and manufacturer of IT; also offers consulting, systems integration and professional service solutions
- **Cap Gemini Ernst & Young** – designs and develops new systems, and installs new processes

CSG cites some of its local partners as:

- **Legend (China)** – CSG worked with Legend on an implementation at Beijing Telecom
- **TCS (India)** – an Indian company that provides strategy consulting and system integration services to offshore development centres for software development

- **Telematics (Thailand)** – CSG worked with Telematics on an implementation project at Telecom Thailand.

Convergence partners include:

- **Tango Telecom (Ireland)** – provides network technology solutions to aid convergent charging and messaging
- **Megisto Systems** – delivers subscriber service switches to mobile operators to help create, control, and charge for personalised value-added data services. CSG uses the company for its IP experience
- **HP** – provides its OpenCall IN offering for prepaid billing
- **eServGlobal** – provider of Server Control Points.

Partnerships are driven partly by customer requirement. Partners are primarily on the OSS side of the equation and help provide the call control functionality.

The product – Kenan FX

CSG uses the same subscriber model for postpaid and prepaid. It has developed a triple-A framework (authentication, authorisation and accounting), which addresses the low latency/high availability issues and has also developed the ability to handle complex balance management.

The architecture, through its servers and aided by partners such as eServe, delivers a high level of scalability, resilience and availability to carriers. Thus it has been key for CSG to partner with companies that have the necessary network technology, experience and proven track record of delivering these types of solutions.

The balance management, charge management and rating management would sit, in most cases, on the CSG platform. Call control and session management remain in the IN. There is some overlap because the IN does do some rating and balance management. CSG can create a hybrid architecture, which can use the balance from the IN but believes this will not be the long-term requirement from operators.

CSG is using a realtime in-memory database, developed at Bell Labs, and designed from a switching standpoint to facilitate customer look-up, rating and tariffing look-up and so on. The protocol used is Parlay.

CSG has an independent rating server, which it can house within an IN, but it is not pursuing this approach as vigorously as, for example, Convergys.

CSG historically has a strong position in the postpaid mediation market, having leveraged its billing contracts in the past to supply customers with its Data Mediation product (formerly BILLDATS data manager). It has been used to supporting high-volume, voice, data and VoIP services.

CSG recently launched a new version of its mediation product, which further opens its architecture to go beyond traditional event and network traffic management to more active communication with applications throughout the enterprise using new APIs. Users will be able to populate records with realtime information from sources throughout the enterprise before they are passed downstream. For example, the solution can pre-rate records, populate records with customer-specific information or apply specific rules to a record based on the content of the transaction.

Installed base

CSG has a large installed base of billing installations worldwide, predominantly outsourced in North America and licensed in the rest of the world.

CSG has proof-of-concept trials with a number of customers for its convergent solution where it carries out the authentication, authorisation and accounting (AAA). It appears to be a matter of proving to the network department within the operator that CSG can deliver on this.

The company sees Europe as its number one market, with a demand for convergence for particular customer segments, and Africa as its number two market, with a demand to consolidate billing onto one system.

Its key route to market is by pushing into its existing customer base where it has a close understanding of the operators' business drivers. It has proof-of-concepts in western Europe at operators that are in the top three in their country and in Latin America both within the large regional operators and independents. CSG is also working with customers in the Asia Pacific region. Furthermore, it is seeing demand (RFPs) from operators that want to use its solution to supplement an existing platform. In emerging markets in particular, the demand is more for a replacement for postpaid and prepaid to achieve a one-system environment. CSG expects to see a number of deployments in western Europe over the next couple of years [2005-07].

However, the trend before then is likely to be the creation of a class of convergent customers.

The replacement of large 'anonymous' prepaid systems in Europe will take longer, particularly in countries like Italy where prepaid customers make up around 80% of the total customer base – those operators will not readily shut down those systems.

CSG has in place a prepaid/postpaid solution implemented in the Africa region (which country is undisclosed, but it is probably referring to South Africa).

3.2.5 Ericsson

Background

Ericsson has supplied both IN platforms incorporating prepaid functionality and postpaid billing software.

In 1992 it formed a joint venture company with Hewlett-Packard, known as EHPT (Ericsson Hewlett Packard Telecoms) and this was the outlet for its software applications, including BSS/OSS products, while Ericsson continued providing infrastructure/IN. These activities were consolidated back into Ericsson in September 2001 – although Hewlett-Packard remains a reseller of Ericsson software.

Ericsson claims to be leading the market in realtime charging solutions having sold over 105 charging systems and 360 multi mediation systems. It also claims that over 130 million prepaid subscribers are supported by its solutions.

Ericsson has not been acquisitive – we are not aware of any recent acquisitions in the BCC field, other than the absorption of EHPT mentioned above. In fact it has divested its Settler interconnect product to Intec.

Product development strategy

The company has consolidated its overall research and development activities from 85 development centres down to 25 and reduced the number of technology platforms it uses. These measures, together with more effective management of working capital, have also resulted in a dramatic improvement in cash flow.

The spending in relation to sales has been stable and the reductions in absolute amounts have been achieved through a focus on a narrower core product portfolio and through increased efficiency as an effect of restructuring efforts and have not had a major negative impact on the key R&D programs (see Figure 3.1).

Figure 3.1: R&D expenditure excluding restructuring costs and capitalisation

	2003	2002	2001
R&D (SEK bn)	23.2	29.3	43.1
As percent of sales	20%	20%	19%
Number of R&D sites	25	30	70
Employees in R&D	16,500	20,500	25,200

Source: Ericsson

The product – charging range

Ericsson has a strong market position when it comes to prepaid (it currently has over 100 prepaid customers) and thus will be one of the key players in the convergent charging market given that the prepaid platform forms the base of its realtime charging solution. Ericsson believes that realtime charging/online protocols form a starting point for convergence. However, it does not maintain that all services or all subscribers need to be charged in realtime: there are benefits to be gained from offline technology – for example batch-based mediation of CDRs.

The company places emphasis on the benefits of taking an account-centric approach over an invoice-centric approach and says that charging needs to be part of service delivery. In practice this means that every time an MMS is sent or a phone call is made, for example, the serving element gets confirmation of the account balance in order to make sure there is sufficient funds.

Ericsson sees convergent charging as being based on a two-layer system architecture consisting of the charging control layer and what it refers to as the business horizontal, which refers to the business processes that incorporate such functionality as CRM and ERP.

Ericsson is taking a stepped approach to convergence. Its vision is being developed into what it calls *Convergent Charging and Business Support*. This is concerned with connecting the realtime technology with the business support processes. The company has initiated a partner strategy when it comes to supporting some of the business processes and is currently in discussion with many of the big name players – for example it has a proof of concept with Oracle. The company will not work exclusively with any one partner and subsequent partners will depend on customer needs.

The Ericsson solution supports the entire process to enable realtime charging including relevant network interfaces, rating and accounting functionality. In addition the company is able to supply online mediation, called Multi-mediation, which combines two former products, Billing Gateway and Billing Mediation Platform (BMP, former EHPT). These have been joined with a third product called Online Gateway which together form the online mediation software module.

The Ericsson solution uses IN technology for part of the voice charging process but the overall charging system is not based purely on IN. There is a separate rating engine and account database. IN technology has been the base of prepaid systems since the explosion of prepaid (proven to be better than hot-billing and service nodes etc), particularly when handling large capacity, but in order to handle complex accounting and tariffs the rating needs to be separate. Realtime charging does not necessarily equal IN any more and thus Ericsson is developing, and has already on the market, new standards for IP-based realtime charging – for example charging for MMS/content services/streaming and so on – using Diameter.

Historically, the rating and tariff management functionalities in prepaid systems were not comparable with those in postpaid. Ericsson believes it has the capability (based on customer experience) to equal many traditional postpaid billing players when it comes to rating and account hierarchies.

It should be noted that Ericsson has some history in the postpaid billing technology space as it previously sold a product via its EHPT subsidiary. The product, called Progressor, still features in a number of installations but Ericsson no longer invests in that solution and is now concentrating its efforts on realtime charging. It is our understanding that Progressor is still being used by at least three operators to support postpaid billing: LanNet (Greece), Setel Cellular (Curacao) and Suomen 2G (Finland).

Installed base

At the time of our research Ericsson did not have a live implementation of *Convergent Charging and Business Support*. However it is in close discussions with a number of operators that want this type of solution.

There are a lot of customers starting to look into hybrid and postpaid solutions based on Ericsson's prepaid system – for example Vodafone Egypt and MTN South Africa. Wind in Italy also has very advanced rating plans for prepaid. At Vodafone Egypt, customers are active both in the charging system and billing system.

Ericsson talks of having over 105 installations for its charging systems/prepaid systems globally which include: Algerie Telecom (Algeria), Batelco (Bahrain), Bharti (India), Cingular Wireless (US), Claro (Brazil), Globe Telecom (Philippines), MTN (South Africa), MTN Cameroon, Nitel (Nigeria), Saudi Telecom, Telcel (Mexico), Turkcell (Turkey), Vodafone (Japan and Egypt) and Wind (Italy).

3.2.6 Huawei

Background

Huawei supplies both IN platforms incorporating prepaid functionality and postpaid billing software.

The company, founded in 1988, provides communications equipment and customised network solutions for operators in fixed, mobile, optical and data networks. Contracted sales in 2003 reached US$3.8 billion – an increase of 42% on the previous year.

The company has 32 branches worldwide and research institutes in the US, India, Sweden, Russia as well as in China. Around 46% of its 22,000 employees are engaged in R&D activities and the company invests 10% of its revenues each year to this task.

Partners and alliances

Key partners include Texas Instruments, Motorola, Microsoft, Intel, and Sun Microsystems.

The product – TELLIN

Huawei has a number of network-related products relevant to the prepaid/postpaid charging arena – some of these products are described below.

Huawei's TELLIN intelligent network system forms the core of its convergent offering. The company claims it is suitable for fixed and IP as well as mobile networks. Its functions include:

- triggering of intelligent services
- realtime billing
- call status monitoring
- inter-operable with SCP (service control point) to accomplish the whole calling flow.

Its key performance features are:

- trunk capacity of up to 92,160
- the access capability of the signalling link reaches 2048
- all the MTP, SCCP, TCAP and C-INAP pass relevant tests
- plentiful IP resources – each module offers 512 voice channels with a total of 65,536
- accepts realtime, on-line loading of dynamic voices
- hard disks can be used as storage media of voices. The memory capacity of hard disks is very large: each 1G hard disk can store 70 hours of voices
- provides tools for analysis and tracing of No.7 signalling
- special treatment of billing errors to avoid inconsistency between SSP billing and SCP billing.

In addition the integrated operation supporting system of Huawei's U-SYS network access layer provides unified management of all the devices in the network and provides support to the operation and management of the NGN. It can perform billing and operation management for all NGN services as well as gateway settlement management.

The iBill CBS supports the billing of the various NGN services, gateway charging settlement and the billing management of the whole network.

Huawei WCDMA CG9812 (Charging Gateway) provides a standard interface for transmitting CDRs generated by the GSN to the billing centre. On this basis, the gateway can also

consolidate and backup CDRs. It is a dual-server system and is mainly composed of two servers and a disk array. The CG server runs Solaris on Windows 2000 Server and the maintenance terminal (for example the bill console) can be a PC operating on Windows 98.

According to Huawei, some of the key features of the product are:

- high processing capability, supporting up to 3,000 CDRs per second
- RAID technique and highly reliable dual-server structure, featuring large storage capacity and high security and reliability of CDR
- compatible with five types of standard CDRs: S-CDR, G-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR.

SmartAX MA5200F is an IP-based Broadband Remote Access Server (B-RAS) which is located at the access layer of broadband IP networks. It provides Ethernet access solutions of user management, service management, network safety assurance, and charging. The solution:

- provides enhanced user charging strategies including a remote charging agent supported by RADIUS and local charging in case of instant charging
- provides flexible modes of users' charging, by duration and by flow
- supports charging by destination IP address
- working with the RADIUS server, it provides prepaid charging and instant charging modes and supports automatic port forbiddance of default-on-purpose users. It automatically examines user off-line status and automatically interrupts idle accesses.

Huawei also has a postpaid billing system – TopEng Billing System

Installed base

Huawei claims billing installations at operators in China, Hong Kong, Russia, Thailand and the Yemen. It claims to be supporting both postpaid and prepaid CDMA services at Yemen Telecom. A system to support both postpaid and prepaid 3G services at Sunday in Hong Kong was due to go live at the end of 2004.

3.2.7 Intec

Background

Intec is traditionally a supplier of interconnect billing software, but has moved into the postpaid field via acquisition, in particular of ADC's Singl.eView product range.

Intec was originally set up in 1997 and floated as a public company in 2000, initially concentrating on interconnect billing. It has grown quickly by acquisition, as shown in Figure 3.2. By the beginning of 2004 it had the major share of the world's interconnect market and made a significant impact on the mediation market. It then turned its attention to the retail billing sector with its acquisitions of first Digiquant and then the Singl.eView assets of ADC. The latter is its largest acquisition to date and will undoubtedly take some time to settle down. However, it places Intec in the same league as the other major retail billing system vendors.

Figure 3.2: Intec's acquisitions

Date	Acquisition	Product
7/11/00	i2i	Interconnect
21/11/00	Computer Generation Inc	Mediation
17/1/01	CHA	Intercarrier (US)
31/5/01	Dataphone	Revenue assurance
29/1/02	ICL's SIMS	Interconnect
29/1/02	ICL's Prospero	Mediation
20/11/02	Ericsson's Settler	Interconnect
11/9/03	Digiquant	IP billing
31/8/04	ADC's Singl.eView	Retail billing
1/11/04	Telmate (investment)	Routing optimisation

Source: Intec website

Product development strategy

At the time we carried out this research the Singl.eView acquisition was just being finalised. It is unclear just how research and development for the former ADC billing products will be apportioned under the new ownership of Intec. What follows is an appraisal of Intec's current approach to product development.

Intec's R&D strategy is executed through a mixture of acquisition and research in the laboratories. It has a policy of acquiring BSS/OSS vendors with a focused expertise in a particular field, or well-established products from vendors shifting their core strategy. This strategy has enabled it to steadily increase its domination of the interconnect market and make inroads into other BSS/OSS areas. The fate of these products has varied so far – some have been integrated into existing Intec product roadmaps and others re-branded as standalone products. For example, Intec retained CompGen's mediation solution but re-branded it as Inter-mediatE, and then developed the product to meet today's demands for a convergent mediation.

In 2002, Intec invested US$13 million in product R&D, approximately 20.3% of its annual revenues. Intec does not have a fixed amount percentage that it agrees to invest in R&D on an annual basis, but considers future market requirements and product positioning as a deciding factor in the investment decision.

Intec maintains detailed product roadmaps for existing and future products that extend out to five years from the present time. For Intec's two core products – InterconnecT and InterconnecT – 24-month detailed product roadmaps are produced, which define full and stage introductions of next-generation platforms. They address criteria such as current system wind-down and retirement, development, new platform definition, introduction and marketing, and customer migration between old and new versions. It is Intec's goal to ensure customer retention by developing the high quality products and services, which improve operating performance and market responsiveness.

Intec has a very interactive attitude towards developing product roadmaps, new products and updates with customers. It wants to utilise the knowledge and experience of the operators to ensure the products meet their needs. For example, in one of its earlier acquisitions the existing client base had such a long list of problems and issues with the product, it was impossible to address them all immediately. Therefore, to solve the problem and not alienate customers, Intec brought them together and asked the service providers to define their requirements for the platform, and prioritise the top three. These three issues were immediately dealt with and the rest were then incorporated into the future roadmap.

Partnerships and alliances

Intec has a wide range of partnerships and alliances. In addition, ADC had established several, the following describes those that were relevant to the Singl.eView product.

ADC partnered with HP to develop a joint solution. The solution brought together HP's Opencall Service Control Point (SCP) and its Internet Usage Manager (IUM) platform with ADC's then capabilities.

The joint solution was marketed as having realtime instantaneous rating capability as well as having high availability, low latency and near-linear scalability. Additionally the solution enabled operators to:

- bill and rate voice services in realtime using the HP Opencall SCP
- authenticate customer access in realtime. Singl.eView provides charging touch-points. In turn, HP Opencall provides network touch-points
- interface with m-commerce, banking, gaming, gambling, streaming and universal messaging services using Singl.eView's OSA-compatible charging services API.

ADC had also partnered with PwC Consulting to develop a joint solution for balance management. Called Balance and Payment Management, the solution provides operators with the ability to maintain a realtime view of a customer balance and enable credit management within prepaid and postpaid. The Commerce Engine allows for a portion of an overall balance

to be reserved for individual transactions and it can reserve fixed amounts for 'atomic' and 'non-atomic' events. It can operate for individual transactions simultaneously across multiple services and reconciles the amounts reserved to the actual charges generated: the partnership has used this to integrate PwC's e-Wallet application to house payment preferences.

The product – Singl.eView

Singl.eView was first developed as a rules-based convergent (fixed and mobile) billing engine in 1997 and is now on its fifth release. It has a modular architecture and can be delivered either as an integrated solution or as standalone modules.

The key concept behind the design of Singl.eView is the division of core functionality and configuration. Core functionality is a separate, scaleable, upgradeable billing platform and transaction engine, which is implemented using BEA Tuxedo. The configuration layer is made up of configurable business rules that have the power to tailor Singl.eView to individual operator's needs.

Singl.eView's core software contains the critical functions for customer care, rating, billing and workflow. The core is upgradeable without the loss or rework of current business configuration, resulting in a completely manageable and configurable application that easily keeps the client on the latest version of software. Singl.eView's core is optimised for performance and scalability. Business rule changes do not touch core code hence performance is not compromised. This allows modification of products and services supporting evolution to new business models and processes without impacting revenues and operations.

The Transaction Rating Engine (TRE) layer resides on the server, forming the central point of coordination, access and functionality, to ensure processing speed and data integrity. It also provides fundamental scalability advantages as the operator can replicate and distribute incrementally across ever-increasing hardware and software infrastructures. Open, published APIs create comprehensive and extensible points of access for third party applications.

The Commerce Engine element of the product is the key part of Singl.eView's postpay/prepaid convergent solution. It enables both multiple and concurrent sessions from a single device (for example, data, voice and content) and multiple concurrent users all accessing a single pool of funds in real time. It uses reservations to authorise multiple requests for any available funds. The Commerce Engine also includes the following functionality:

- support for fixed-line, mobile and broadband applications
- voice, data, content and commerce services
- authentication, authorisation, accounting (AAA) and credit policy control
- concurrent reservations to a single account

- customers can modify payment options on the fly
- commerce triggers and rules for loyalty and discount models and so on.

Installed base

Singl.eView is in use at over 70 sites worldwide, by both fixed and mobile operators. Key mobile users include:

- Virgin Mobile – in the UK and Australia. Virgin Mobile is using the platform to bill both postpaid and prepaid customers, but it has a very simple tariff structure. In the UK Virgin Mobile is hosted on T-Systems' network – which provides the call data used by Singl.eView.
- Hutchison 3 – in the UK, Italy, Sweden and Austria
- Reliance – India.

3.2.8 LHS

Background

LHS is traditionally a supplier of postpaid billing software, although it did acquire a prepaid system vendor, Priority Call, in the 1990s.

LHS, which was set up in 1990, originally developed and marketed the BSCS billing system. In March 2000 it announced a merger with the then Sema Group (it had both BSS software and outsourcing interests), which was completed later in the same year, taking the latter's name. The new company quickly ran into trouble and was itself acquired the following year by oil giant Schlumberger and formed into a unit known as SchlumbergerSema. The unit never sat comfortably with the rest of the conglomerate and at the end of 2003/beginning of 2004 was divested. Effectively the former Sema interests – mainly systems integration and other IT activity – were sold to Atos Origin, and the software interests to a reformed LHS. The company is now trading under that brand and continues to use the BSCS product name.

General Atlantic Partners, a leading direct investment firm, which specialises in investing in IT and technology software companies, has financially backed the 'new' LHS. Two of its partners, Bill Grabe and Rene Kern have been appointed to the board. A point to note is that General Atlantic Partners has an investment in Intec Telecom Systems. For General Atlantic partners to have the confidence to provide such high levels of financial backing in a particular market segment is a positive sign for the BCC domain.

Headquartered in Frankfurt, Germany, LHS now has just over 300 staff with off-shore development centres in Kuala Lumpur, Malaysia and San Paulo, Brazil. The organisation is split into six key departments: professional services, research and development, sales and marketing,

innovation and technology, finance and personnel. Despite the number of acquisitions that the company has witnessed, the senior management team has remained consistent and is made up of personnel who have managed the company since its formation.

LHS focuses on building and supporting software products for business support systems for telecoms operators. Focused on convergence, LHS products support the complete range and the mix of prepaid and postpaid services that communication providers want to offer across fixed-line, mobile and IP telecoms markets.

Partners and alliances

LHS takes a partner approach with sales and customer management processes, which explains the small number of staff LHS employs versus number of clients and installed sites it has. Partner sales managers are aligned to specific regions and LHS works with channel partners, which have a solid global infrastructure to meet the needs of prospects and customers. LHS finds that partnering with systems integrators and infrastructure vendors helps it to tap into the potential operator base and understand the nature and culture of the telecoms business within a particular region.

90% of the contracts that are awarded to LHS are currently achieved through its long-standing partnership and relationship with Atos Origin, which was bought the IT and Systems Integrator business of SchlumbergerSema, hence the connection (see above).

In 2002 SchlumbergerSema introduced a Software Validation Program with its partners as the final stage in the validation process of new BSS product releases. Partners participate in a test session where they are introduced to the new architecture and the main features of the product, and work with the product by executing prepared test cases and their own cases for two weeks. Throughout the exercise LHS BSS experts from the development and test team support the partners. The partners then provide feedback on the products they have trialled and for the product to become commercial it must pass the testing sessions – this is a prerequisite.

LHS also provides its partners with an on-line community, called PartnerNet, so they can interact. With a personal log-in the partners can download information such as interface guides, technical descriptions and white papers.

Product development strategy

LHS's business model is to fund its R&D investment through the revenues it makes from maintenance fees, which are accumulated through the charges it makes on services.

The company's current intent is to plough its funds and efforts into the development of solutions for the billing and customer care of convergent services. Its products now fully

support fixed and mobile convergence, voice and data convergence and prepaid and postpaid convergence. LHS cites that 20% of its customer base is made up of fixed customers (including pure fixed, or fixed and mobile convergent services). It is the company's intention to work with this base and its existing mobile customers to discuss, review and develop existing and new products to serve the convergent market.

80% of the product and its features and functionality are scoped and defined by the LHS product management team and the remaining 20% is through input by its customers. The launch customer for each product helps to develop particular features for its own operational purposes – these are included in the product's roadmap.

Moving forwards, LHS intends to differentiate and strengthen its prepaid and postpaid convergence solution, whilst leveraging and expanding on the core competency of its staff. LHS wants to be able to deliver new technology and offerings to meet sector demand, and is in the process of doing so by developing a new web application framework for Order Management workflow; a 3G prepaid solution with postpaid service sophistication; open and packaged rating and billing solutions that offer adjunct solution and partial migration options; and stable and controlled interfaces with full functionality coverage. The company's main R&D objective is to provide technical innovation that maximises customer value, defines a clear value chain and reduces the total cost of ownership.

The product – BSCS

To date, LHS appears to have taken a variety of approaches in delivering 'flavours' of convergence – depending largely on customer demand. The latest version of its BSCS billing and customer care product (version 8) is described by the company as being prepaid/postpaid convergent – in fact this has been the case since release 7 – but version 8 also includes fully convergent rating and balance management. Additionally, it offers on-line authorisation and charging for content transactions for prepaid and postpaid users as well as support for IPDR 2.5.

The BSCS product development centres around the company's '6 degrees of convergence' methodology, which is as follows:

- **Single Customer Care and Self Care, Partner Management** – resulting in enhanced customer care efficiency and extending CRM to partner management
- **Single Marketing View** – reducing churn, and improving marketing by having no replication between the prepaid and postpaid databases
- **Unified Services and Tariffs** – all services are available to all subscribers, it is just a payment choice at the service level

- **Integrated Balance Management** – realtime balances maintained centrally with balance control at the service level
- **Integrated Payments and Recharge** – lowering costs and increasing revenue and customer service levels
- **Consolidated Platforms and Technology** – resulting in more efficient hardware, skills and maintenance costs.

The company has also forged a strategic technology partnership with Ireland-based Tango Telecom, which provides network technology solutions to aid convergent charging and messaging. A formal partnership between the two companies was announced in January 2005 – to pre-integrate Tango's CCN (see below) into BSCS to provide a convergent solution.

Tango has developed a convergent charging node (CCN) – a network element that is very similar to a traditional service control SCP but which also deals with GPRS in a IP environment. The CCN also interfaces with the SMSC, MMSC and so on.

The Tango/LHS combined solution is able to offer service convergences across voice, SMS, MMS, GPRS and 3G as well as payment convergence for realtime prepaid and postpaid services.

For its part LHS has specified an interface to the Tango platform, which allows its engine to carry out the rating. In essence the Tango platform will be concerned with such functions as call control whereas LHS will carry out rating and balance management.

In order to maintain a single master balance (normally stored in the IN platform) LHS addresses balance management at the service level – as opposed to the subscriber level. This essentially allows an operator to have smaller balances side-by-side. A service will get requested on the CCN, which then issues a transaction request to the LHS rating engine, which itself determines the price and checks the balance before sending a reply back to the charging node.

The problem of synchronising the IN platform balance (master balance for all services for the particular subscriber) with the individual balances held by the LHS platform is addressed by the CCN. It is able to simulate a simple voice transaction which is sent to the IN platform which deducts balance amounts as requested by the LHS rating platform. In essence the CCN gets back balance information, attaches it to the simulated voice call (where the operator has set up a very simple rate plan on the IN platform) and uses a translation table to allow the CCN to map the LHS prices to something the IN platform understands (simulated using SS7 protocol). This approach is a way of achieving the goal without intruding into the IN platform – which means less of a requirement to upgrade the IN platform – and fulfils part of what LHS would refer to as the first degree of convergence.

The second degree of convergence is to take the voice rating element away from the IN

platform. The idea is to keep the main balance for the subscriber in the IN as well as the recharge mechanisms, IVRs etc but expand the rating capability. This approach can be technically realised in a very similar way to above according to LHS.

As an operator moves up the various levels of convergence, the idea is to take more and more functionality away from the IN (see Figure 3.3) so that by the fourth step, for example, the CCN takes over the balance management and recharge completely to achieve a fully convergent system. Steps four and five have yet to be achieved.

LHS is also looking at the viability of installing its rating engine within the IN (in a similar vein to the Convergys/Siemens approach), which, it says, is politically an easier solution to sell to operators.

Figure 3.3: Summary of Tango/LHS evolutionary approach to convergence

	Existing platform	Tango CCN	LHS Rating Package
Step 1 Adjunct solution to handle new services	Voice: service control, rating and balance management Data: Balance management	Data service control	Data rating
Step 2 Adjunct solution with convergent rating	Voice: service control and balance management	Data service control	Voice and data rating
Step 3 Adjunct solution with multi-balance capabilities	Voice service control	Data service control	Voice: rating and balance management Data: rating and balance management
Step 4 Fully convergent replacement solution		Voice and data service	Voice: rating and balance management Data: rating and balance management control

Source: Based on LHS chart

Installed base

At present LHS does not have a reference for an implementation where it has partnered with Tango Telecom. The Tango solution itself can scale up to six million subscribers and the company has reference sites for this. The biggest pressure in this kind of converged implementation is on the rating. LHS says that on a mid-class server it could support two million prepaid subscribers and scale up from this as hardware specification increases. At Turkcell, for instance, LHS has 2.5 million subscribers – a number which is growing all the time.

At the Turkcell implementation, which doesn't use the Tango Telecom technology, LHS is using an unpublished API for the Ericsson platform. However, Ericsson would not say that it is integrating with LHS – using an API that is not supposed to be there. Turkcell would be at number four on the '6 degrees of convergence' scale: point 6 to be achieved by 2005 – in general.

In November 2004 LHS announced that Azercell in Azerbaijan had launched BSCS to support the rollout of its new GPRS service – we understand with the intention of supporting both postpaid and prepaid customers. In January 2005 LHS announced that T-Mobile Austria had added LHS's new standalone rating package to its BSCS installation to rate content services for both prepaid and postpaid customers. This does not use the Tango CCN.

In essence, LHS does not handle the call control function in any implementation. Historically it has taken the decision to move away from batch processing to single call processing, mainly due to the onset of 2.5G-type services and in order to support AoC requests. It then introduced realtime middleware along with the shared memory concept – enabling operators to enhance their capability towards in-call control rating. So, when interfacing with the CCN or SCP, what is handed between the network element (SCP or CCN) towards the rating is not actually a CDR any more, it is simply a messaging request. LHS is basically carrying out the role of the SDP (service data point) – that is balance checking.

To date, the company has mostly leveraged existing BSCS customers. LHS sees prepaid/postpaid convergence as being the highest priority for operators at the moment and that the demand is more regionally dependent than size dependent. For example the Asia/Latin America markets have taken off, whereas Europe is still catching up.

3.2.9 Orga Systems

Background

Orga Systems is traditionally a supplier of prepaid billing functionality.

ORGA Systems, founded in January 2003, is a 100% owned subsidiary of ORGA Kartensystem GmbH, a privately-held company based in Germany. The company has over 250 staff and has regional offices in Italy, Brazil, Spain and Turkey, which are primarily geared around the support of local clients.

The company's main geographic markets are western and eastern Europe, Latin America, the Middle East and north Africa. Its core operations are the development, marketing and sale of platform products in the areas of billing, mobile services as well as card and device management. The portfolio is to be characterised by modular designs, open programming standards and flexibility.

Partners

For the purposes of achieving a fully convergent prepaid/postpaid charging solution Orga has partnered with UK-based Martin Dawes Systems (MDS), which supplies customer management and billing solutions to the postpaid mobile sector (see below for further details of the partnership).

MDS's flagship billing product, DISE, covers all aspects of subscription-based management including billing, CRM, self-care, revenue assurance, and order management. Current customers include O2 UK, Vodafone, Orange France, Carphone Warehouse and BT.

Product – Convergent Billing

The process of designing and building a converged solution was started in 1999/2000 when the company decided on a partnership approach – based on the idea that no single company could provide the complete solution, although Orga recognises that this may change in future. Rather than opting for a merger/acquisition approach (Orga believes it is very difficult to swallow a company and achieve necessary integration quickly) it partnered with MDS which it saw as an expert in postpaid billing. In MDS Orga also saw a company that offered an end-to-end solution, not just modules which had synergy with the Orga strategy.

The relationship with MDS is not an exclusive partnership. It is viewed as a preferred partner. However, Orga says it would be difficult to achieve this solution with other vendors on an ad-hoc basis, not least in terms of the merging of customer databases.

The Orga convergent billing system is made up of three constituent parts:

- the OSS which provides realtime interfaces into the sources of network data usage
- the realtime rating environment which is used to rate all services regardless of payment method
- single customer management and CRM system for all customers. The vendor has not divided postpaid and prepaid subscribers inside the architecture.

The realtime element of the solution offers service control points that carry out the call control. It has a service data point in the IN that performs the realtime rating. The solution also offers a configurable lifecycle manager which provisions subscribers in the network for services as required.

Orga has separated out the SCP from the SDP and is able to scale by deploying the SCP on hardware independent from the SDP. The IN feeds come into the SCP, which then carries out the call control and communicates using LAN technology to the SDP, which in turn manages the account balances and carries out realtime rating.

Installed base/approach to customers

Orga Systems had not, at the time of writing, announced any completed convergent implementations, but says it has a number of ongoing projects.

So far Orga has found that operators have often wanted to retain existing postpaid systems and add something on top – Orga refers to this as 'loose' integration. It has disadvantages compared with the fully integrated solution but nevertheless there is market demand for it and Orga provides such a solution based on the same principles – that is having a single point of rating and charging. With a loose integration the operator is essentially running two systems (one prepaid, one postpaid) which exchange information. Shared bundles or cross-product promotions are not achievable.

The main route to market for both companies is to approach their existing customers with this integrated solution. Orga is also answering tenders from operators who are specifically asking for pre/postpaid billing.

The two main sectors of demand are:

- western European operators that are looking for high-end convergent systems to offer new services
- other regions (emerging markets) that want a single billing system.

For some operators it appears to be a matter of cost saving (in other words they want one billing system to do both postpaid and prepaid) and for advanced operators it may be seen more as a requirement for introducing advanced services.

3.2.10 Portal Software

Background

Launched on the Nasdaq stock exchange in May 1999, the California-based company provides billing and customer management solutions mainly for the telecoms industry. Historically the company's key area of focus was to support the Internet service provider community and related IP-based services – the former of which, at the time of the company's launch, was riding a financial high. Portal responded to the change in market dynamics and has now established itself in the wider telecoms market and has key installations across the globe at companies such as China Mobile, AOL, France Telecom, Vodafone (affiliates of which accounted for 31% of total revenues in fiscal 2004), Sprint Canada and Telstra. However, many of these installations are for adjunct rating systems and the company has appeared to struggle financially in comparison with its competitors.

As of February 2004 Portal employed some 609 people across its organisation. This breaks down into 274 in professional services/customer service and support, 146 in sales and marketing, 100 in engineering and 89 in finance/admin/operations roles. Additionally the

company has approximately 400 contractors. Staff headcount has fallen by about 200 in the last two years but Portal says it has plans to significantly increase the number of employees and contractors in its India operations, for one, during 2005.

The company has 27 offices located across the globe in the following locations: US (California and North Carolina), Brazil, Chile, Mexico, UK, Bahrain, France, Germany (three offices), Italy, Poland, South Africa, Spain, Sweden, Hong Kong, Australia (two offices), China (two offices), India, Japan, Korea, Malaysia, Singapore and Taiwan.

Partners and alliances

Portal has also partnered with enterprise software companies to deliver integrated solutions for CRM, finance, and web services. Leveraging joint engineering strategy and development, these integrated solutions are designed to save implementation costs while speeding time to market for communications and information service providers. So far they include:

- Siebel – the TelcoOne solution aims to increase call centre efficiency and flexibility for service providers and enable them to introduce new services at a lower cost.
- SAP – the work with SAP aims to help service providers with revenue management as well as to control revenue leakage during new-service roll out.

Product development approach

In August 2002 Portal opened a new development centre in Bangalore, India. The centre is staffed partially by direct Portal employees as well as personnel provided through a third-party organisation, Ness Global Services. The company significantly increased the number of personnel at the Bangalore centre during fiscal 2004 and is expanding the scope of the operations conducted in India to include technical support and customer solutions services.

Research and development expenses totalled approximately US$30.2 million in fiscal 2004, down from US$35.7 million, and US$58.8 million for fiscal 2003 and 2002, respectively. R&D expenses consist primarily of personnel and related costs for continued development and certain technical support efforts.

The decrease in R&D expenses in fiscal 2004 from fiscal 2003 was primarily due to a shift of its engineering workforce from higher cost US locations to lower cost operations in Bangalore. In addition, facility costs decreased as a result of Portal's restructuring programs initiated in fiscal 2002 and 2003. The decrease in R&D fiscal 2003 from fiscal 2002 was primarily due to a reduction in workforce as a result of restructuring programmes.

As of February 2004, Portal had approximately 100 employees engaged in R&D activities. This excludes approximately 280 contractors provided by Ness Global Services.

Product – Infranet

Portal has taken the approach of complementing the operator's existing network platform, which handles call control and session management, with a realtime rating system for data and content. This approach, it says, allows the operator to carry on utilising the core functionality of the network prepaid platform while gaining the benefits of a realtime interactive platform: it promotes a rapid time to market and delivers a migration path toward complete convergence.

Portal's Infranet platform supports realtime AoC, balance reservation and performs realtime authentication, authorisation and accounting (AAA), which includes a 'calculation-only mode' rating capability. This capability means that the rating engine not only checks for available funds, but also returns the actual cost of the service based upon the event information gained from the network elements.

The Portal platform is capable of processing network events in realtime or near realtime mode. If the network component is not able to operate in realtime at all and can only provide files in batch, then Infranet can process files as they arrive in batch or near realtime mode, which would include such functions as duplicate detection, suspense management, and so on.

The system is able to provide some degree of online mediation by providing 'managers' which integrate the Infranet platform to the network element. For example, it can fully support AAA for sessions and events as they are handled by network elements, as well as duplicate session detection capabilities. However, the platform is not intended to carry out packet inspection functions, like intelligent routers, enhanced GGSNs, and so on but instead would work with these components.

Installed base

Whilst Portal has a very large number of installations, it has yet to announce any implementations for its convergent solution. It is currently carrying out trials which are focused on proving performance and reliability and which, the company says, are going 'extremely well' with the platform exhibiting 'excellent performance characteristics'.

3.2.11 Siemens

Background

Siemens is traditionally a supplier of IN platforms incorporating prepaid functionality.

Siemens' Information and Communications is just one business area of the multi-national company that has business interests across various industry sectors, it comprises three groups: Information and Communication Mobile (ICM), Information and Communication Networks,

and Siemens Business Services. For the purposes of our analysis, the following section will look only at the ICM business.

The company's ICM division has R&D locations in Germany, Belgium, Austria, Poland, South Africa, China and India. It claims to be the number one vendor of prepaid systems in terms of end users supported – it has 160 million customers using prepaid. It claims 126 mobile network customers in 90 countries globally.

Product – Convergent Charging

Historically, Siemens has held a strong position in developing realtime charging mechanisms for prepaid customers – most recently with its @vantage technology. The company has leveraged this experience with a gradual shift of focus onto the demands of the convergent charging market.

Siemens bases its proposition to network operators on the following:

- to have a unified environment for rating, account management and customer loyalty/bonus schemes
- time to market for new services
- revenue assurance – as an example Siemens cites a South American operator that, by using a hot billing approach, was able to increase its revenues by 15% after the introduction of realtime charging (in other words it was suffering 15% leakage). This was based on voice services alone
- future proof solution
- cost reduction – the cost of maintaining two or more systems is not workable. By way of example, one of Siemens' customers has installed six instances of the converged charging platform across its subsidiaries in eight countries, replacing 45 prepaid platforms alone. It is reported to have achieved huge capex/opex savings.

The company addresses convergence from a functional hierarchical level – that is, **interface layer, functional layer** and **data storage**.

- **Interface layer**: based around the IN, which, says Siemens, is the only way to have realtime network control capability. The interface layer is also necessary to provide an interrupt to the service being delivered, for example if the credit limit is reached and the session needs to be ended to prevent revenue loss. Essentially it provides a bi-directional means of communicating with the network. It needs to be based on realtime and the only current protocol for this is CAMEL. In fact Siemens does not refer to this as a 'classical' view of an IN – instead, the company takes the approach that the interface layer provides the functionality to communicate with the other network elements that will actually incur the

charges. Is it still IN? According to Siemens, 'no', in the sense that it is not a classical SCP; 'yes', in the sense that a large part of the network input (voice) will be CAMEL based.

- **Functional layer**: has three main tasks: rating, balance management and providing service logic. The company has tried to find a neat separation between rating and balance management but has concluded that this is not achievable – for the balance management an operator needs a realtime database and for rating it needs realtime knowledge of the account status which, in turn, necessitates realtime access to a database. The service logic essentially queries whether a particular customer can have access to the requested service at that particular time – in prepaid this may equate to a warning that the account balance is running low. In order to do this the operator needs a means of reverse rating. Each of the three tasks within the functional layer necessitates a realtime approach.
- **Data storage**: in order to carry out more complicated rating processes the operator needs knowledge of the account status, which means having realtime access to the database. This has to be 100% available and the account has to be up to date – this really becomes important when the kind of services being offered move beyond a situation where the customer has just one service at a time and may have multiple services running in parallel.

The ongoing development by Siemens into convergent charging has resulted in a system, based on 3GPP standards, that enables operators to charge online for transport/access services as well as content and events in both packet networks and circuit switched networks. The solution supports ticket-based charging (hot billing) for network elements that do not offer realtime capability.

The core of the solution comprises four parts:

- **service logic** – network elements address the service logic via a #7, an IP or a ticket interface. Components perform various functions that are dependent on the interface.
- **convergent charging service logic** – monitors and controls transactions using internal and external components for account balance and profile management, rating or CRM.
- **a common database** – manages internal accounts for prepaid and postpaid users in realtime. Uses defined thresholds to prevent overspend on accounts. Supports multiple and shared accounts based on currency or other units.
- **rating logic** – the solution offers realtime rating for both online and offline charging.

The company provides four product packages to achieve convergent online charging:

- **charge@once** – provides an integrated architecture which provides online charging and rating for any type of subscriber, using any type of service based on any type of network.
- **prepaid@vantage** – seen an intermediate step for operators that are aiming at the kind of

functionality and level of convergence achieved by the charge@once solution. Intended for SS7 online charging in 2G and 3G networks.

- **charging@vantage** – again, offers an intermediate step toward full convergence, providing existing prepaid systems with additional functionality for IP session and event charging (prepaid accounts remaining on the existing system). Acts as a gateway and transaction controller for IP network elements.
- **pay@once** – intended for operators that want to develop charging for third party application and content providers by providing a secure connection to financial institutions for additional payment methods such as bank or credit card payment.

The Siemens solutions described above can be integrated with existing BSS infrastructure using open interfaces.

In addressing online mediation the vendor recognises that some network elements do not support realtime. In these instances Siemens uses hot billing (there is no way around this as long as 'less intelligent' network elements remain in play). This becomes much less of a problem where that particular network element can be 'overruled' by another – for example, in, stopping a service while there is no balance remaining and preventing potential revenue leakage.

Installed base

So far, Siemens has not named any customers that have implemented its convergent charging solution. However, it claims at least one installation. This customer currently has in place an in-house developed rating and billing platform for its postpaid customer base which it will continue to use in the short term: it bought in the Siemens solution to support its prepaid customers and intends to deploy it across its subsidiaries. Siemens expects the client to continue towards further convergence using the solution.

The client has chosen a definite phased approach largely because of the large amount of investment required – this, after all remains an unproven solution. There may also be a concern that centres on the different purchasing points from within the operator itself – that is prepaid is controlled from the networking department and postpaid is controlled by IT. As is suspected to be the case in the majority of today's operators, just who gets the budgetary go ahead for further investment can often be a case of who shouts the loudest. In fact there are two very conflicting sets of priorities: IT will have optimised at being quick to market with new services and products, while the network department has optimised at achieving 99.999% availability.

In December 2004 Siemens announced that Oman Mobile, the OmanTel mobile subsidiary, had placed a contract for charge@once. Oman Mobile intends to use the product to manage charging for both postpaid and prepaid customers.

3.2.12 Tecnomen

Background

Tecnomen is traditionally a supplier of IN platforms incorporating prepaid functionality.

The company is based in Finland and was founded in 1978. It provides messaging and charging solutions to operators and has a strong position in the prepaid space as a provider of IN-type technology.

Tecnomen has 10 offices located across nine countries: Brazil, Ireland, Germany, Malaysia, the Netherlands, Spain, Taiwan, Thailand and the United Arab Emirates. To date it has supplied solutions to more than 50 customers. The main geographical market for its prepaid systems is Latin America.

Partners and alliances

Tecnomen's partnership network is divided into three types: sales and marketing, technology, and research and development:

- **marketing and sales**: Tecnomen's strategy is to strengthen and expand its marketing and sales network and to make partnership agreements with international system suppliers. The company's marketing and sales partners at present include Siemens, Nortel Networks and Nokia.
- **product partners**: Tecnomen's strategy is to acquire know-how in core areas for the Group and to use the best resources and partners outside the company in non-core areas. Potential new partners and technology experts are evaluated systematically. At present these partners include Sun, Sybase, Scansoft and First Hop.
- **research and development**: R&D is based on open standards and on applying Internet and wireless technologies. Tecnomen belongs to several organisations that are responsible for developing open standards, such as Open Mobile Alliance, 3GPP, 3GPP2 and ETSI.

Product development strategy

In 2003 R&D spend was EUR 9.4 million (US$12.3 million), compared with EUR 11.2 million (US$14.6 million) in the previous year. This corresponds to 20.8% of net sales. R&D efforts during 2003 focused on developing key products and on bringing new system features onto the market. The company continued development work on next generation messaging (NGM) platform, MMSC (multimedia messaging centre) and prepaid systems.

Product – Tecnomen Prepaid

As well as focussing on the development of prepaid systems, Tecnomen Prepaid's product selection also includes other separate IN components.

Tecnomen Prepaid systems use IN technology which, says the company, have proved to be the best way to implement this service on the market. The main products, which are based on the Tecnomen eZONER service platform, are:

- **Prepaid Voice**: realtime charging for voice services
- **Prepaid Data**: realtime charging for data (charging for SMS, usage of GPRS network and contents)
- **Prepaid Calling Card**: prepayment for fixed networks
- **EAIP (Enhanced Assisting Intelligent Peripheral)**: an IN component that manages an interactive user interface for IN services

Tecnomen's system does not set restrictions on SIM cards or mobile phones. It supports different standards simultaneously (such as TDMA, GSM, CDMA), which has been important in markets where operators use several network standards, such as in many Latin American countries.

In October 2003 Tecnomen also launched its Realtime Prepaid SMS Charging solution. Account checking and SM blocking take place in realtime, which safeguards revenues by eliminating the threat of fraud.

Tecnomen does not classify itself as a supplier of turnkey convergent charging solutions. However, it has worked with partners, following customer demand, to deliver such solutions.

The company has been charging realtime for voice and non-realtime for SMS and data. It has provided a CORBA-based interface to its payment platform allowing third parties to charge for any kind of data transaction.

Tecnomen has also developed a platform for TAP3 data charging and has some realtime SMS charging platforms too – essentially standardised on an IN-based platform but it can also be used in a convergent environment. The only problem in advertising this fact from Tecnomen's point of view is that it has not developed particular partnerships with postpaid billing vendors.

Tecnomen says that it has exceptionally complex tariffing on its prepaid platform. It also offers combined tariffing (postpaid and prepaid) where postpaid charging is handled by automatically crediting a user's account, for example once every month, to offset the charge that might have arisen on that account – what it refers to as a hybrid solution.

Installed base

Tecnomen has deployed a number of prepaid systems in South America and has addressed postpaid through ad-hoc integration with third party platforms such as Amdocs. In practice this has meant little more than allowing them access to the Tecnomen platform via a secure API. As yet, Tecnomen does not hold a combined prepaid/postpaid account on its platform. To date it has worked with two other vendors besides Amdocs – this has tended to be as a result of whatever legacy platform the customer had in place at the time.

In implementations where Amdocs is being used as the postpaid billing system, Tecnomen says that the operator has, essentially, two systems in place – that is not true convergence. The company has a charging gateway in place which does rating and charging – it can create CDRs for postpaid or carry out very complex realtime rating for prepaid data and voice. These implementations do not have much more than three million subscribers but Tecnomen says it is about to deploy other platforms supporting 5-10 million. In fact each of the layers in the solution – the signalling layer, the service logic layer and the backend database layer – is independently scalable.

Where it is developing existing relationships with customers, the company says that where the customer has an older Tecnomen legacy platform, which is only supporting voice/SMS, they will tend to buy and add on the charging gateway to give TAP3 and data charging capability using the same database backend.

According to Tecnomen most of its new business is expected to stem from the data arena. In terms of convergence, customers request such functionality quite a lot, but in reality they are quite a way from achieving it. From Tecnomen's experience it appears that it is not so important for customers to have a convergent system based on a single platform – and in fact operators appear not to mind integrating two solutions. However, the company is basing this on experience gained in the South American market and admits this is likely to be very different in Europe.

In terms of future strategy, Tecnomen sees its rating engine as being used for either prepaid or postpaid and becoming more service agnostic. From a signalling and rating perspective it would be fully compliant with both postpaid and prepaid. It is the billing platform (reporting and so on) which is missing from its solution at the moment and for this Tecnomen expects to look more at forming strategic partnerships.

3.2.13 Telcordia Technologies

Background

Telcordia is traditionally a supplier of IN platforms incorporating prepaid functionality.

Telcordia Technologies was part of Science Applications International Corporation (SAIC) since 1997 – an employee-owned company which generated US$6.7 billion in revenues in 2003 and a net income of US$351 million. However, SAIC sold Telcordia Providence Equity Partners and Warburg Pincus in November 2004.

Telcordia provides a variety of products and services to the telecommunications industry including operational support systems (OSS) and network components.

The US company is based in New Jersey with an additional office in New Hampshire. Sales offices outside the US include: Brazil, Mexico, UK, France, Germany, Italy, Spain, Australia and Taiwan.

Product – Wireless Prepaid

The company has been providing prepaid solutions for about six years – its first customer was BASE in Belgium. Other customers include Swisscom Mobile.

The Telcordia convergent charging solution is based upon its ISCP Compact product, which is based on its previous ISCP IN system but delivered in a smaller, more easily scalable format and aimed at smaller carriers: it was recently implemented by Teleglobe in Canada.

The realtime control of voice calls, GPRS sessions and so on is kept within the IN system. However, the company has also formed a partnership with Ireland-based Openet, which has integrated its FusionWorks technology to provide the realtime control element for those services that do not require SS7 protocols (primarily content services). The Openet technology runs alongside the IN (in other words it is not hosted on the IN) but Telcordia stresses the importance of the two technologies being pre-integrated.

Telcordia has also introduced a new rules-based rater into its IN which is flexible enough to cope with complex bundling and discounting and which can be run multiple times to get the required scalability using a common balance.

Telcordia works with the client's existing billing system in order to provide backend postpaid functionality such as statement production. It has not partnered with any traditional postpaid vendors for backend functionality to date. It is able to generate rated CDRs for prepaid or postpaid transactions and feed them into the traditional mediation infrastructure/billing system.

Telcordia's existing prepaid solution currently supports 6-10 million subscribers – based on customers such as Oi in Brazil or Orange UK – and the company see no problem with similar numbers being supported for converged deployments.

Installed base

As yet, and given the product's relative newness, there is no live deployment of the convergent solution, although the company says it is in discussion with a number of customers: it says a lot of operators are at the RFI stage.

Interestingly, Telcordia is talking to some potential new customers that have trialled some of the solutions from the billing companies and are unhappy with lack of reliability of those solutions as well as their lack of realtime capability.

Telcordia says its existing customers are very interested in converged charging – many have projects underway to introduce realtime rating across prepaid/postpaid. The company believes it has good relationships with the network departments within the operators and says it is working on building relationships with IT departments.

Currently, Telcordia's strongest markets for prepaid are in Europe while it is also seeing some traction in India and Latin America. Its most recent customer has been Virgin Mobile USA. Telcordia, as a whole, is generally strong in North America and it therefore hopes to leverage this presence.

Telcordia was of the opinion that it was the more developed markets where convergent charging would take off. But, in recent months it has seen interest from all markets, notably Eastern Europe and Asia (particularly Thailand and Singapore). South American operators are looking to leverage existing prepaid systems first before investing further money.

The company says it has a strong partnership with IBM and an agreement in place with Nokia. It believes its strongest competition will come from the infrastructure vendors such as Alcatel, Ericsson and Lucent although it recognises that there is much more openness from operators to pursue multi-vendor strategies.

In relatively new markets, like India, Telcordia is seeing movement among greenfield operators to deploy new convergent solutions rather than separate prepaid and postpaid systems.

Unlike many of the other vendors profiled, Telcordia does not see hybrid accounts (the idea of prepaid and postpaid balances for the same subscriber) as a huge driver simply because it is very hard to put a business case for this. Therefore the strongest business case is based on cost reduction and simplifying the architecture for charging.

3.3 Summary profiles

This section contains brief comments, mainly from secondary sources, about vendors appearing in Chapter 4 in Figures 4.2 to 4.5 that are not assessed in detail elsewhere in this report, with the exception of SchlumbergerSema and Atos Origin. We have not been able to clarify the position of the former Sema and SchlumbergerSema prepaid installed base, and many of the postpaid sites in the dataset are for older, former Sema Group CABS installations.

3.3.1 Alcatel

Alcatel supplies IN platforms incorporating prepaid functionality and but has in the past also supplied postpaid billing software.

Alcatel, headquartered in France, with offices worldwide, has a significant installed base of prepaid systems. It is a well-established infrastructure vendor, claiming to provide infrastructure to 25% of mobile operators, with a worldwide customer base and a Chinese subsidiary, Alcatel Shanghai Bell.

It offers a prepaid solution as part of its IN platform. Part of this is the Alcatel 8610 prepaid/postpaid convergent payment suite. We have reproduced Alcatel's description below.

The **Alcatel Prepaid/Postpaid Convergent Suite** is an integrated suite for voice and data services, prepaid and postpaid subscribers. Usually payment mechanisms for prepaid and postpaid subscribers are handled by two different systems: (a) real-time charging for prepaid and (b) CDR collection for postpaid. But today operators want to promote "hybrid" services for both prepaid and postpaid customers. Additionally, the cost and management efficiency afforded by one payment system, with the same customer database and rating engine, is crucial for service providers to be competitive.

Key features

- integration of postpaid functionality in Alcatel's widely deployed prepaid technology
- downward compatible modular system to expand features at any time the customer wants
- significant saving especially for tier 3 operators.

Key benefits

- maximizes efficiency while minimizing operational costs
- provides traditional postpaid users with all the advantage of the real-time charging (such as cost control, online consultation) and a secure way for the operator to reduce post-paid bad debt and fraud.

Alcatel also offers LHS's BSCS (see Section 3.2.8) as part of its solution suite.

3.3.2 AsiaInfo

AsiaInfo is traditionally a supplier of postpaid billing software.

AsiaInfo is a China-based vendor of both infrastructure and OSS. It has a significant postpaid mobile, fixed and IP customer base in China, but so far has not ventured further afield.

It offers a range of billing systems under the umbrella AIOpenBOSS. These include a convergent (fixed/mobile) system, a mobile system and an integrated settlement system. It has no published information relating to a prepaid/postpaid convergent mobile system.

3.3.3 Basset

Basset, headquartered in Sweden, with offices in the US and Asia Pacific, is part of the Kinnevik group. The company was primarily a roaming and fraud/revenue assurance system supplier, but it has now absorbed 4T Solutions, another group member. This has given it a customer base of prepaid and postpaid (the latter primarily not mobile) installations worldwide. Most of its recent contracts have been for its fraud and roaming products.

Basset currently offers its Intelligent Network Platform based on Microsoft Windows that works with products such as the Basset BeanCounter billing system (not currently described on the company's website). It offers 'tailor made' prepaid and postpaid billing solution.

3.3.4 Boston Communications Group (BCGI)

BCGI is a niche player with a well-established customer base, almost exclusively in the US where it is based. It offers both licensed and outsourced services – the latter used by a number of smaller US operators. Its major customers include Verizon, Cingular, Boost Mobile, Alltel and Dobson Communications, and it also has many customers amongst the smaller operators in the US. It has acquired Infotech, whose Voyager product provided a postpaid solution. The company claims that this is now a converged solution capable of provisioning and managing prepaid and postpaid accounts on a single platform.

It claims that:

> "BCGI's transaction processing solutions for real-time wireless subscriber management, payment services, billing and customer care can be deployed separately or in combination, giving wireless operators maximum flexibility in how BCGI solutions are integrated to legacy environments. BCGI solutions provide carriers and Mobile Virtual Network Operators (MVNO) with a distinct competitive advantage by empowering them to attract, retain and maximize the value of subscribers, while lowering the cost of customer care, payment processing and churn. The result: profitable growth."

BCGI also claims to be able to provide a convergent solution by integrating its Voyager and prepaid systems.

It has recently announced a contract to continue supporting Cincinnati Bell's prepaid services.

3.3.5 CBOSS (SoftPro)

This Russia-headquartered company initially had its footprint mainly in the former CIS states. It has now expanded its reach through its acquisition Fujitsu Finland.

Its IN-based convergent mobile platform CBOSSrtb is installed at companies such as Singtel Optus in Australia, One Austria, an unnamed Canadian operator, Colombia Movil, O2 UK and Xpress Telecommunications Jordan. CBOSS claims that the system is in use in Colombia for convergent billing – specifically managing hybrid accounts and closed user groups.

3.3.6 Cerillion Technologies

Cerillion was founded by a management buy-out of the former Logica-owned Frost BCC product. The company has a niche market amongst smaller convergent operators. Its product billed one of the first commercial 3G services at Manx Telecom. It does not at present offer a prepaid solution, but has developed a balance management solution that will interface with an IN platform to enable purchase of services not provided by the platform such as handset insurance.

3.3.7 Domital

Domital has offices in the US and Chile. Primarily a systems integration and consulting company, it is active in the prepaid and fraud detection areas. It has also developed a prepay platform that has, it claims, been installed in Latin America, Eastern Europe, Africa and Asia.

We are not aware of any involvement in the postpaid area.

3.3.8 Ferma

Ferma is based in France, with offices elsewhere in Europe, Asia Pacific, Latin America and Africa. It offers a range of prepaid, messaging, back office and IN solutions. It claims to have customers in 40 countries in Africa, Latin America, Asia Pacific, Europe and the Middle East, with its prepaid solution, VoMS, deployed in over 35 countries – by both fixed and mobile operators.

Mobile prepaid customers include Telkomsel Indonesia, Sabafon Yemen, Orange Réunion, Mobitel Bulgaria and HT Mobile Croatia

3.3.10 Homisco

Homisco is based in the US. It claims customers in Africa, Middle East, Asia Pacific, Europe and Latin America. It offers a range of products for both telecom operators and enterprises.

Homisco has separate prepaid and postpaid systems and claims that the two can be integrated. The company also claims that its products have a low cost of entry. The products are in use by fixed and mobile operators and large enterprises.

3.3.11 InterVoice

Intervoice is headquartered in the US. Its origins are in interactive voice response (IVR) systems and its products are used in a wide range of industries.

It offers an IN platform under the Omvia label which includes a prepaid solution. Many operators use InterVoice's IVR technology to support their prepaid customers. Operators using InterVoice's prepaid platform include OmniTel and Safaricom

3.3.12 Lightbridge

Lightbridge is headquartered in the US. Its product offerings fall into four categories:

- decision and analytics – fraud prevention and other risk management products
- payment processing – IP-based e-commerce solutions
- billing and intelligent networks – realtime solutions including PrePay IN and a realtime rating engine
- enhanced voice and data services – enhanced voice and data applications.

In August 2004 it sold its fraud product, Centurion, to Subex Systems of India.

It describes itself as a transaction processing company and delivers much of its service through the outsourced model. It claims to process transactions for over 40% of US mobile subscribers and to process over 100 million online payment annually. It works with some of the largest mobile operators in the US, as well as having partnerships with vendors such as Ericsson, Nortel, Motorola and LogicaCMG. In July 2004 it announced an agreement for LogicaCMG to include the Lightbridge IN platform in its billing portfolio.

3.3.13 LogicaCMG

LogicaCMG's postpaid customer base is largely derived from the former Computer Answers customer base (the company was acquired by CMG, which then merged with Logica). Some years ago Logica acquired a prepaid platform provider, Aethos.

Logica, and now LogicaCMG, has been one of the market leaders in the messaging and payments areas for some time. It also acts as a systems integrator, supplying best-of-breed solutions working with a number of partners.

LogicaCMG's prepaid offering is based on its Intelligent Network Platform. It has add-on modules to manage prepaid customer accounts and support recharge. The company also offers a Lightbridge product, Inspire, as part of its prepaid portfolio.

3.3.14 Mind

Mind is based in Israel. It has products for telecom operators and enterprises and claims customers in some 40 countries.

Its iPhonEX range is a convergent fixed/mobile/Internet system, often used to supplement other systems for IP-based services such as GPRS and 3G. The system can handle both postpaid and prepaid IP services. The company has announced convergent postpaid/prepaid VoIP installations. The company claims that the system is widely used by China Unicom for prepaid mobile.

3.3.15 Nokia

Infrastructure supplier Nokia has a well-established mobile prepaid customer base worldwide. The company describes its prepaid offerings as follows:

- **Prepaid Access Charging**

Nokia offers two alternatives for prepaid packet-switched access charging: IN-based and CDR-based. The Nokia 3G prepaid solution can provide all the components necessary for implementing both alternatives. However, if necessary, it can also be integrated with an existing GSM prepaid solution, based either on a service node or an IN platform.

- **IN-Based Prepaid Access**

IN-based prepaid allows the operator to charge for packet-switched access in real-time and without any credit risk. Every chargeable Packet Data Protocol (PDP) context in both 3G and 2G is monitored in real-time by the IN platform, where the main account usually resides. The protocol used in the interface between the IN platform and the Serving GPRS Support Node (SGSN) is the packed-switched specific subset of the CAP3.

3.3.16 Peter-Service

Peter-Service is a Russian company, which claims a customer base of over 30 installations, almost entirely mobile operators in the CIS region.

In September 2004 Peter-Service announced that it had developed a prepaid/postpaid convergent billing solution – Peter-Service BISrt. This integrates a range of its products: Peter-Service BIS (postpaid billing), Peter-Service HRS (high performance rating server), Peter-Service BRT (realtime billing) and a third party platform that supports Camel gateway functionality.

The company claims that Peter-Service BISrt is a platform for prepaid services provisioning, including the real-time balance amount monitoring and payments registration. For 'postpaid' subscribers the system provides a high-safety credit management due to the service inactivation and activation in the realtime mode depending on the loyalty and account balance of the customer. It was due to be put into trial operation at Russian operator MegaFon in November 2004.

3.3.17 Sentori

Sentori is based in the US and offers a postpaid BCC solution targeted at tier 2 and 3 mobile and fixed operators, including MVNOs, either on a licensed basis or as a managed service.

The company announced the latest version of its system in May 2004, but this made no mention of any prepaid functionality. It has a partnership with Comverse and has recently worked with Orga, Intec and Ace*Comm to implement best-of-breed solutions.

3.3.18 Sofrecom

Sofrecom is a subsidiary of France Telecom, based in France with offices in South Africa and Indonesia and subsidiaries in Argentina, Morocco, Poland, Thailand and Algeria. It provides a wide range of products and services including consultancy, systems integration, network planning and a range of BSS/OSS software. Many, but not all, of its clients are current or former France Telecom subsidiaries or in former French colonies.

It supplies a fixed/mobile postpaid billing solution called Gaia. We are not aware of any activity in the prepaid mobile area.

3.3.19 Tango Telecom

Tango Telecom is based in Ireland. It is a provider of charging and messaging solutions.

Its products include the CCN (Converged Charging Node) range which allow operators to augment their IN to handle data traffic (SMS, GPRS and so on) without changing their IN. It does not require Camel functionality.

Tango has partnerships with Comptel, CSG Systems and LHS amongst others.

See the LHS profile, Section 3.2.8, for more information about the Tango product and the relationship between the two companies

3.3.20 T-Systems

T-Systems, based in Germany, is a major supplier of outsourced billing services, mainly for European mobile operators and based on systems supplied by vendors such as Amdocs. It can handle the entire process from data capture from the switch to revenue collection. As far as we are aware it is currently only handling postpaid mobile billing.

3.3.21 UshaComm

UshaComm is now headquartered in the UK, with R&D facilities in India. It claims a total of over 35 installations.

It claims that its Unicorn 6 BCC platform is capable of supporting all types of telecom operation, including prepaid. The company describes three implementation scenarios for prepaid or prepaid/postpaid convergent billing:

- **application programming interface (API) approach** – implemented in the Service Node or IN infrastructure platforms, Unicorn is interfaced to stand-alone prepaid applications through the API
- **dedicated platform approach** – through technology partnerships, UshaComm delivers a cost effective, deeper level of prepaid/postpaid convergence ideal for tier 2 and 3 operators
- **fully integrated pre-post paid approach** – UshaComm's highly scalable Unicorn solution, with an in-built convergent real-time rating engine supports both prepaid and postpaid simultaneously.

In June 2004 UshaComm announced that it has been awarded a contract to supply a postpaid/prepaid convergent billing solution to Ghanatel. Although the company originally announced a prepaid/postpaid convergent solution in 2000, this is the first contract that we have been able to identify.

3.3.22 Verisign

Verisign is based in the US. Much of its activity is in the Internet domain name management and security fields.

The Verisign Communications division offers a range of products for mobile operators, some based on products acquired with its takeover of HO Systems. SpeedSuite is a postpaid solution supporting a range of mobile technologies. It also offers a prepaid customer management system, SmartPay and iRoam to support prepaid roaming.

3.3.23 Viziqor

US-based Daleen announced in May 2004 that it was to acquire the UK-based company, Protek. The transaction was completed in October 2004 and at the same time the company re-branded to Viziqor.

Former Daleen's customer base is almost exclusively in the US. It offers postpaid licensed and outsource services targeted at CLECs – the offerings are fixed/mobile/Internet convergent.

Much of the former Protek customer base came via its acquisition of Flagship. This company originated in Russia and had a number of mobile customers in the region. Protek has won contracts in Africa – a region with some similarities to Eastern Europe in terms of business challenges.

There is no indication of either company having a prepaid product offering.

Chapter 4

The mobile billing market

4.1 Installed base – overview

4.1.1 Source of information

The data in this section is a snapshot based on information held in the *Global Target Locator* database and *World Cellular Information Service*. These databases are populated from interviews with operators and publicly announced contract wins.

The data is an indicator of the relative strengths of the various vendors, not a definitive statement.

4.1.2 Operators and systems included in the analysis

The analysis includes operators that, according to our records, at the time of last interview/announcement offered mobile telecom services, either exclusively or in conjunction with other services.

It includes billing systems used by those operators to bill end users for mobile services, either exclusively or in conjunction with other services. It does not include systems we understand to be used exclusively for interconnect/inter-carrier/wholesale billing, EBPP, or systems in use at multi-service operators that we understand are not used for billing mobile services.

Figure 4.1: Dataset used for analysis of installed base

Region	Africa	Europe	Middle East	N. America	Latin America	Asia Pacific	Total
Total operators in dataset	155	372	32	205	173	293	1,230
Total billing systems in dataset	207	463	53	183	282	374	1,562
Operators with systems	119	265	28	115	282	374	863
Prepaid systems	76	117	19	19	100	88	419
Postpaid (including postpaid/ prepaid convergent)	131	346	34	164	182	286	1,143

Source: Informa Telecoms & Media

4.2 Installed base – analysis

4.2.1 Installed base of all systems worldwide

Figure 4.2 summarises the installed base of vendors with 10 or more systems recorded in our sample. These account for 1,152 systems, about 74% of our sample.

Figure 4.2: Vendors with 10 or more systems recorded

Vendor	Africa	Europe	Middle East	North America	Latin America	Asia Pacific	Total
In-house	18	54	5	25	21	30	153
LHS	20	34	3	7	27	27	118
SchlumbergerSema	6	13	1	1	25	39	85
Convergys	2	38	4	22	4	12	82
Ericsson	13	26	7		15	14	75
Amdocs		24	2	16	9	9	60
LogicaCMG	21	15	4		5	10	55
CSG Systems		18	2	7	10	13	50
Mind CTI	3	4		1	5	31	44
Comverse	10	7	1		9	14	41
Alcatel	16	4	3	1	4	12	40
Portal	1	18		5	3	9	36
Viziqor	8	15	2	5	3	1	34
Intec Telecom Systems	2	11		2	1	13	29
Boston Communications	1	1		16	10		28
Siemens	3	5	5		1	9	23
InterVoice	6	5		1	4	5	21
Orga		11			5	5	21
Tecnomen	1	1	2		9	2	15
Usha Communications	6	2			2	5	15
CBOSS (SoftPro)		10			1	3	14
Ferma	5	7	1			1	14
Homisco	10				1	2	13
Cerillion Technologies	2	6		1	1	2	12
Sofrecom	5		3		2	2	12
Peter Service		10				1	11
Sentori	1			3	6	1	11
AMS		5		2	1	2	10
AsiaInfo						10	10
Domital	1	2			5	2	10
Nokia		5			1	4	10

Source: Informa Telecoms & Media

The highest number of systems had been developed in-house – 153 systems, representing almost 10% of the sample. Figure 4.2 includes 32 vendors – in total our sample includes over 180 vendors, the majority with only one installation recorded. The 32 in the table represent about two thirds of the total sample.

The reborn LHS has the largest single installed base with about 8% of the total. This represents only BSCS systems used for postpaid mobile billing.

Our sample includes 85 systems attributed to SchlumbergerSema – these include the following:

- prepaid platforms attributed to SchlumbergerSema and Sema Group in the *World Cellular Information Service*

- prepaid platforms attributed to former LHS and Priority Call Management (purchased by LHS before it was acquired by Sema Group)
- a number of SchlumbergerSema installations at China Unicom recorded in the *World Cellular Information Service*.

Both LogicaCMG's and Ericsson's installed base include a significant percentage of prepaid installations, the remainder of the top 10 vendors by installed base in our sample are predominantly or exclusively for postpaid installations.

4.2.2 Installed base of prepaid systems

Figure 4.3 summarises the installed base of vendors with seven or more prepaid installations recorded in our database: these account for almost 80% of the total.

Figure 4.3: Installed base of seven or more prepaid systems worldwide

Prepaid

Vendor	Africa	Europe	Middle East	North America	Latin America	Asia Pacific	Total
Ericsson	11	21	5		9	11	57
Comverse	10	6	1		8	14	39
Alcatel	15	4	3	1	3	12	38
LogicaCMG		11	1		3	8	23
SchlumbergerSema	4	4			14	1	23
Orga		11			5	5	21
InterVoice	5	5		1	4	4	19
Siemens	1	5	5		1	7	19
Boston Communications	1	1		7	8		17
Ferma	5	7	1			1	14
Tecnomen	1	1	2		7	2	13
Nokia		5			1	3	9
Basset	4	4					8
Domital		2			4	2	8
Homisco	4				1	2	7
Lightbridge		1			6		7

Source: Informa Telecoms & Media

The market leader in our sample is Ericsson followed by Comverse and Alcatel. Our sample includes a total of over 60 vendors, but these 15 represent about 75% of the total market. Only six systems in our sample were reported as developed in-house.

4.2.3 Installed base of postpaid systems

Figure 4.4 shows the installed base of vendors with eight or more systems in our sample: these represent about 75% of the total.

Figure 4.4: Installed base of eight or more postpaid systems worldwide

Vendor	Africa	Europe	Middle East	North America	Latin America	Asia Pacific	Total
In-house	17	52	5	24	20	29	147
LHS Systems	20	34	3	7	26	27	117
Convergys	2	38	4	22	4	12	82
SchlumbergerSema	2	9	1	1	11	38	62
Amdocs		23	2	16	9	9	59
CSG Systems		18	2	7	10	13	50
Mind CTI	3	3		1	5	31	43
Portal	1	18		5	3	9	36
Viziqor	8	15	2	5	3	1	34
LogicaCMG	21	4	3		2	2	32
Intec Telecom Systems	2	11		2	1	13	29
Ericsson	2	5	2		6	3	18
Usha Communications	6	2			2	5	15
Cable & Wireless			1		11	1	13
CBOSS (SoftPro)		9			1	3	13
Cerillion Technologies	2	6		1	1	2	12
Sofrecom	5		3		2	2	12
Boston Communications				9	2		11
Peter Service		10				1	11
Sentori	1			3	6	1	11
AsiaInfo						10	10
AMS		4		2	1	2	9
CSC	3	1		2		3	9
TelesensKSCL		5				4	9
T-Systems		9					9
Verisign				8			8

Source: Informa Telecoms & Media

The largest single group was in-house developed systems, accounting for 147 installations. The 28 vendors in the list share over 75% of the total installed base. We have over 150 vendors recorded in our database.

4.2.4 Regional variations

LHS has installations across all regions, but is weakest in North America. It is the leading vendor in our sample of postpaid installations. See Section 3.2.8 for a profile of LHS.

Convergys has only two installations, in our dataset, in Africa, but is represented in all regions. Outside North America about half of its installations are of the Geneva product, either standalone or in its new application as the core of Convergys's Infinys BCC platform. The non-Geneva installations outside North America are primarily for cable services or the Jupiter sites acquired from TelesensKSCL. Many of the Convergys US installations are providing outsourced billing for some of the major US mobile operators, although Geneva/Infinys is now making an impact.

Ericsson, which dominates the prepaid market, has largely withdrawn from the postpaid market since its acquisition of the whole of the EHPT joint venture from HP. It has no representation, in our dataset, in North America, but a relatively evenly spread base across the remaining regions. See Section 3.2.5 for the profile of Ericsson.

LogicaCMG is particularly strong in EMEA: Computers Answers, now part of LogicaCMG, established a strong market presence in the African mobile market in particular with its EPPIX product. However, we believe this is gradually being eroded as the new company concentrates more on prepaid and messaging solutions. Its prepaid presence is largely split between Europe and Asia Pacific/Latin America.

Comverse has a prepaid presence in our sample in all regions except North America, Alcatel has one entry in North America. See Section 3.2.2 for more information about Comverse.

Boston Communications Group's (BCGI) customer base is primarily in North and Latin America.

Ferma and Basset are niche players, with installations mainly in Europe and Africa.

Amdocs has a strong postpaid presence in all regions except the Middle East and Africa. See Section 3.2.1 for comment about Amdocs.

CSG Systems' installed base is composed of two elements:

- mainly outsourced contracts in North America, where it has a large share of the cable billing market in particular
- postpaid installations in most of the rest of the world gained via its acquisition of the former Kenan products from Lucent and IBM's ICMS sites.

See Section 3.2.4 for the CSG Systems profile.

Portal's market share is almost exclusively postpaid, and in many cases is as an adjunct system for handling Internet-based services. See Section 3.2.10 for Portal profile.

Viziqor's figures include the former Daleen and Protek installations. The non-US sites are almost exclusively former Protek installations. Protek gained a slice of the Russian market with its acquisition of Flagship and has had significant success in Africa.

Teconomen's market share is largely Latin American prepaid systems. See Section 3.2.12 for the Tecnomen profile.

Orga's installations are all prepaid and mainly in Europe and Asia Pacific/Latin America. See Section 3.2.9 for the Orga Systems profile.

4.2.5 Prepaid/postpaid convergent installations

Only 22 installations in our sample claimed to be postpaid/prepaid convergent. This information was gathered from either interview or vendor press releases. As shown in Figure 4.5, they are shared between 15 vendors of which the majority (nine) are in Europe.

Figure 4.5: Claimed postpaid/prepaid convergent installations

Vendor	Africa	Europe	Middle East	North America	Latin America	Asia Pacific	Total
Amdocs		1			1	1	3
Boston Communications				2			2
CBOSS					1		1
Convergys		1					1
CSG Systems		1					1
Intec						1	1
ITS	1						1
LHS	1						1
Lifetree Convergence						1	1
LogicaCMG	1						1
Openet		1					1
Peter-Service		1					1
Portal		3				1	4
SchlumbergerSema		1					1
Viziqor	1		1				2
Grand Total	4	9	1	2	2	3	22

Source: Informa Telecoms & Media

Some of the installations included in Figure 4.5 are relatively old and our records do not show precisely how the operator defines convergence. However, the source of some of the data is from press releases:

Portal – from press release 9 December 2003

"Orange UK has implemented Portal's convergent content billing solution to drive increased revenue from content, data, and messaging services … Orange UK is using Portal's solution to generate additional revenue by rapidly supporting value-based pricing for a wide variety of prepaid and postpaid services as well as quickly increasing the number of third-party partner relationships."

The Portal system is being used in conjunction Orange's legacy billing structure solely to handle convergent content services.

Amdocs – from press release 12 March 2003

"BCP, a leading Brazilian mobile communications provider operated by BellSouth and Grupo Safra, and Amdocs, the world's leading provider of billing and CRM, announced today that BCP has selected Amdocs Mobile to support advanced next generation voice, data, content and

commerce services. Amdocs will provide BCP with a single integrated platform for convergent end-to-end billing and customer management for all their current and future voice and data services, enabling a unified view of the customer across all services and pay channels.

The Amdocs Mobile upgrade will enable BCP to offer its more than 1.5 million subscribers access to cross-product bundling and flexible pricing packages. The product's real-time rating capabilities will enable prepaid, nowpaid and postpaid payment options for BCP's customers. Amdocs Mobile also supports unlimited levels of hierarchies to provide BCP with unmatched corporate support."

This announcement was of a contract award – we do not know how far the implementation has progressed.

Amdocs – from press release dated 29 July 2002

"PT Excelcomindo Pratama (Excelcom), a leading Indonesian mobile provider, has selected Amdocs solutions for end-to-end customer care and billing including real-time prepaid, postpaid, Partner Relationship Management (PRM) and CRM. Amdocs will provide Excelcom with a single billing and CRM platform for all GSM, GPRS and next generation mobile services. Excelcom will generate a unified customer view across all front and back office systems, providing flexible prices and service packages for over one million business and consumer subscribers."

In February 2003 Amdocs announced that the prepaid balance management element of this contract had been implemented.

CBOSS – from press release 24 February 2004

"Colombia Movil has successfully deployed rtBilling, a real-time billing solution developed by CBOSS, for its voice and data communications services. By using CBOSS rtBilling, Colombia Movil is not only able to create innovative and competitive price plans; it is also the first operator in the Colombian market to offer convergent pre- and post-paid services to its customers.

CBOSS rtBilling provides Colombia Movil with a full range of features for its voice, SMS and MMS messaging, and data services, including convergent pre- and post-paid billing, targeted promotions and bonus plans, m-commerce rating, and Camel-based roaming."

Lifetree – from press release 24 June 2004

"DST is using the ZipRate application to rate MMS calls and GPRS calls in addition to differentially rated content (URLs) being accessed through the GPRS service.

In July 2003, DataStream Technologies (DST), Brunei's leading GSM operator, awarded Lifetree the global contract to design and deliver an Integrated Customer Care and Billing System for

its pre-paid and post-paid customers. The implementation of this solution will result in a single bill for all nine DST Group subsidiaries and lines of business."

It is not clear from this announcement whether the system is already billing for convergent services, although the intention is clearly to do so.

Openet – from press release 4 October 2002 (by Sepro, which is now part of Openet

"Eurotel Praha … has selected Sepro's award winning rating software, e-Rate Rating. The solution will enable Eurotel to capture value and generate revenues from the range of mobile data that Eurotel will offer its pre and postpaid subscribers over next generation networks."

This is another example of a system is used as an adjunct to provide an element of prepaid/postpaid convergence.

Boston Communications Group (BCGI) – from press release 5 February 2003

"Boston Communications Group, Inc. (BCGI), a leading provider of transaction processing solutions for real-time wireless subscriber management, payment services, billing and customer care, today announced that two GSM wireless carriers, NPI Wireless of Traverse City, Mich., and Westlink Communications of Hays, Kans., have signed multi-year contracts to implement BCGI Voyager Billing and Customer Care. The signing of these customers represents continued execution of BCGI's plan to offer postpaid, prepaid and hybrid subscriber management solutions.

BCGI Voyager Billing and Customer Care will provide these two GSM carriers with an end-to-end solution for customer management, including retail operations, inventory management, network provisioning, inter-carrier relations, billing, invoicing, and customer care, within one system."

These are outsourced deals offering converged customer management.

SchlumbergerSema – from press release 4 December 2002

"SchlumbergerSema announced today that it had successfully concluded the implementation of a real time advanced GPRS contents costing solution on the Optimus network. With the implementation of this solution, Optimus became the first mobile telecommunications operator in Portugal capable of costing and billing advanced content of the GPRS/UMTS systems in real time for prepaid and invoiced customers.

In partnership with Optimus, SchlumbergerSema designed, developed and implemented this solution, which was installed in Optimus without the need to carry out any updating of the existing infrastructure. The installed solution analyses the traffic, filters and records content, in order to permit the real time costing of advanced data content. It is a service that is becoming increasingly important with the proliferation of data services, since it gives the operator the

capacity to check the balance of a prepaid subscriber to confirm the existence of enough credit to complete a transaction before the same is carried out. In roaming, this function is likewise available, allowing the real time charging of GPRS/UMTS traffic to prepaid customers when abroad. This solution was created on a flexible platform to permit the easy use of GPRS and UMTS value added services."

This announcement is for an adjunct system to support convergent costing.

Viziqor – from press release 16 March 2001 (released by Protek, which is now part of Viziqor)

"SabaFon has introduced its GSM-900 service segments in Yemen and called on Protek ... to supply its customer care and billing platform ... Following the launch of its GSM network, SabaFon's customer care and billing platform will accommodate prepaid and post paid, national and international wireless services to 60,000 commercial and residential subscribers."

This announcement infers convergent billing, but we have no confirmation that it is in fact doing so.

Intec – from press release 30 September 2003 (announcement from ADC, Singl.eView product now owned by Intec)

"Telecom New Zealand has selected ADC's Singl.eView convergent billing platform for their next-generation billing solutions.

Telecom New Zealand chose ADC's Singl.eView because it believes the platform is capable of dealing with all current and future billing requirements, which include convergent pre- and post-paid billing.

'Telecom will deploy the new platform based on consumer demand,' said Sharon Bradley, billing delivery manager for Telecom New Zealand. 'We chose Singl.eView because its flexibility and responsiveness matched our drive to provide more integration for customers – not just in terms of features and service but in all their contact with Telecom, with streamlined billing a vital part.'"

Although the system was chosen for its convergent capability, we have no confirmation that it is currently being used in this way. However, users in our survey (see Chapter 5) claim to be using Singl.eView as a convergent system.

Convergys – from press release 22 July 2002

"TMN (Telecomunicações Móveis Nacionais SA), the leading mobile operator in Portugal ... will use the award-winning Geneva rating and billing software to support next-generation services for both pre- and post-paid customers."

A supplementary announcement in July 2004 indicated that TMN is using Geneva, but did not indicate whether it is in use for both prepaid and postpaid subscribers.

4.3 Contracts

Chorleywood (now part of Informa Telecoms and Media) has maintained a database of publicly announced OSS contracts since January 2000. The data in this section is drawn from that database. Please note that it may not directly correlate with data drawn from *Global Target Locator* or the *World Cellular Information Service*. All vendor names are those that were in use at the time of the announcement.

4.3.1 Mobile contracts by year 2000-2004 – total

Figure 4.6 summarises all mobile, or convergent including mobile, contract announcements recorded for vendors with five or more announcements in the table.

Figure 4.6: Summary of mobile contracts announced 2000-2004 – all systems

Vendor	2000	2001	2002	2003	2004	Grand Total
Amdocs	13	9	11	9	5	47
Convergys	3	12	14	7	9	45
Boston Communications Group (BCGI)	3	13	8	13	4	41
Portal Software	1	8	14	7	5	35
SoftPro (CBOSS)		1	7	1	9	18
Protek	2	6	4	2	2	16
Comverse	4	3	1	3	4	15
SchlumbergerSema		2	1	11		14
Tecnomen			2	6	6	14
AsiaInfo		3	7	2	1	13
Cerillion Technologies	1	2	1	6	3	13
Sema Group	7	6				13
CSG Systems			6	2	4	12
Telebilling	3	3	1	3	2	12
Sentori		4	2	2	3	11
ADC	3	3	2	1	1	10
Lucent		7		3		10
VeriSign				9		9
Peter-Service	1	6			1	8
Aris		3	2	2		7
Logica		1	6			7
UshaComm	2	1	2	1	1	7
Bercut				2	4	6
Tango Telecom			1	1	4	6
Tecore				1	5	6
TelesensKSCL	1	4	1			6
Computer Answers	5					5
Info Directions		1	3	1		5
Mind CTI		1	1	2	1	5

Source: Informa Telecoms & Media

Issues relating specifically to postpaid and prepaid vendors are discussed in Sections 4.3.2 and 4.3.3.

The figure for BCGI is significantly higher than the installed base recorded in Section 4.2.2. This is because some of the early contracts are with operators that have since been absorbed into their larger parents and others are with operators too small to be included in the *Global Target Locator* database.

4.3.2 Contracts by year – prepaid mobile

Figure 4.7 summarises all contract announcements recorded for vendors with two or more prepaid announcements in the table.

Figure 4.7: Summary of contracts announced 2000-2004 – prepaid mobile systems

Vendor	2000	2001	2002	2003	2004	Grand Total
Boston Communications Group (BCGI)	3	13	8	12	4	38
Tecnomen			2	6	6	14
Comverse	4	3	1	2	3	13
Logica		1	5			6
Bercut				2	4	6
Tango Telecom			1	1	4	6
Tecore				1	4	5
Lucent		1		3		4
Intervoice				2	2	4
SoftPro (CBOSS)			1	1	1	3
InterVoice-Brite		3				3
Orga			1		2	3
Symsoft				1	2	3
VoluBill				2	1	3
Sema Group	2					2
Alcatel				2		2
Huawei				1	1	2
VoiceCue				2		2
Corsair	2					2
iSoftel				1	1	2
Telcordia			1	1		2
Unibill					2	2

Source: Informa Telecoms & Media

The market leader is BCGI, followed by Tecnomen and Comverse. However, we feel that this is an under-representation of prepaid system sales. Most prepaid systems are supplied as part an IN contract. Vendors such as Ericsson, Siemens and Alcatel either do not make such announcements, or do not specify in their announcements that prepaid is part of the contract.

4.3.3 Contracts by year – postpaid mobile

Figure 4.8 summarises all contract announcements recorded for vendors with four or more postpaid system contracts announcements during the period.

Figure 4.8: Summary of contracts announced 2000-2004 – postpaid mobile systems

Vendor	2000	2001	2002	2003	2004	Grand Total
Amdocs	13	8	11	8	5	44
Convergys	3	12	14	7	8	42
Portal Software	1	8	14	7	5	35
Protek	2	6	4	2	2	15
SoftPro (CBOSS)		1	6		8	15
SchlumbergerSema		1	1	11		13
AsiaInfo		3	7	2	1	13
Cerillion Technologies	1	2	1	6	3	13
CSG Systems			6	2	4	12
Telebilling	3	3	1	3	2	12
Sema Group	5	6				11
Sentori		4	2	2	3	11
ADC	3	3	2	1	1	9
VeriSign				8		8
Peter-Service	1	6			1	8
Aris		3	2	2		7
Lucent		6				6
UshaComm	2	1	2	1		6
TelesensKSCL	1	4	1			6
Computer Answers	5					5
Info Directions		1	3	1		5
Mind CTI			1	2	1	4
Geneva Technology	2	2				4
Hansen Technologies		1	2		1	4
Martin Dawes Systems			1	3		4
Open			2	1	1	4
Primal Solutions	1	1		2		4
Sepro	1		2	1		4
SunTec		1	2	1		4

Source: Informa Telecoms & Media

Although it is the overall leader, Amdocs announced sales have shown a decline over the last two years. Convergys showed a marked jump with its acquisition of Geneva Technology: the current version of the Geneva rating and billing engine forms the core of Convergys's BCC offering, Infinys. CSG Systems' announcements have shown a marked increase since its acquisition of the Kenan range. We expect Intec to feature in future tables as a result of its acquisition of both Digiquant and ADC's Singl.eView range.

Many of Portal's installations are to support GPRS and 3G services as an adjunct to existing billing arrangements, rather than providing an end-to-end solution.

TelesensKSCL has been the largest casualty over the period. Other vendors have shifted their emphasis. In December 2000 Computer Answers was chosen as a preferred supplier by Vodacom South Africa, but subsequent mergers have led to a change of emphasis by the vendor and Vodacom has since purchased Convergys's Geneva.

4.3.4 Contracts by year – convergent

Figure 4.9 summarises all contract announcements recorded for vendors with convergent system announcements in the table.

Figure 4.9: Summary of mobile contracts announced 2001-2004 – convergent systems

Vendor	2001	2002	2003	2004	Grand Total
ADC			1		1
Amdocs		1	1		2
Boston Communications Group (BCGI)			2		2
Comverse			1	1	2
Convergys		2		1	3
LHS				1	1
Lifetree			1		1
Portal			1		1
Protek	1				1
SchlumbergerSema			1		1
Siemens				1	1
SoftPro (CBOSS)				1	1
UshaComm				1	1
Grand Total	1	3	8	6	18

Note: we have not recorded any convergent announcements for 2000

Source: Informa Telecoms & Media

Since there are so few convergent announcements we have commented on some individually, as we feel this gives an indication of the state of the convergent market to date.

ADC (product now owned by Intec)

Telecom New Zealand – announced September 2003

The inference is that the system will eventually be used in a convergent manner.

Amdocs

PT Excelcomindo, Indonesia – announced July 2002

The contract was to supply a converged integrated billing and CRM platform. In February 2003 implementation of the prepaid balance management phase was announced.

Far EastTone, Taiwan – announced November 2003

The announcement was for a contract award – we do not know if it has been implemented yet.

Boston Communications Group (BCGI)

NPI Wireless and Westlink Communications – announced February 2003

These two small US GSM operators have contracted BCGI to supply converged billing on an outsourced basis. BCGI calls the solution TOTALsource, but this appears to be effectively a combination of the company's Voyager and Prepaid platforms presented as a virtual converged solution to the operators.

Comverse

Mobile-8, Indonesia – announced December 2003

This is a deployment announcement. We believe that Comverse has worked with a partner, probably Formula Telecom Solutions, to provide this system.

LuXcommunications, Luxembourg – announced February 2003

We believe this contract also involves postpaid functionality supplied by Formula Telecom Solutions.

Convergys

TMN, Portugal – announced July 2002

The announcement was for the award of a contract to supply the Geneva rating and billing engine to support TMN's postpaid and prepaid customers. In practice we believe that Geneva is operating in conjunction with TMN's IN platform.

PT Telkomsel, Indonesia – announced March 2004

This contract is for the Geneva rating and billing module, integrated with Siemens' charge@once charging solution to provide convergence.

LHS

Azercell Telecom, Azerbaijan – announced November 2004

The announcement was for the implementation of BSCS 8 to support the roll out of Azercell's new GPRS services. It indicated that the system provided the functionality to bill both prepaid and postpaid customers from a single system.

Lifetree

DST Communications, Brunei – announced June 2003 and June 2004

The contract is for a converged system. The prepaid element has now gone live.

Portal

Orange UK – announced December 2003

Orange is using the Portal system to rate convergent content services as an adjunct to its existing billing platform.

SchlumbergerSema (BSCS product now owned by LHS)

Cosmote, Greece – announced September 2003

This contract was the first announced for BSCS 8, which is claimed to be capable of offering the same products to all types of customers.

Siemens

Oman Mobile, Oman – announced December 2004

The contract was an order for the charge@once charging platform, which will be used for both prepaid and postpaid customers.

SoftPro (CBOSS)

Colombia Movil – announced February 2004

The company announced that Colombia Movil had deployed the CBOSS rtBilling for billing convergent prepaid and postpaid mobile voice and data services. The company claims to be offering customers hybrid accounts.

UshaComm

Ghanatel, Ghana – announced June 2004

4.4 Market forecasts

4.4.1 Market forecasts overview

Source of information and definitions

The forecasts are based on data from the *Global Target Locator* database augmented by the *World Cellular Information Service*.

The forecasts only consider operators offering mobile service. These fall into two broad categories:

- mobile only – that is operators offering only mobile services
- multi-service – that is operators offering mobile in conjunction with another service, for example fixed telephony, cable services.

For the purposes of the forecasts we have treated them as a single group. The dataset includes both operators with their own network, for example Vodafone, and resellers and MVNOs (mobile virtual network operators), for example Virgin, since both categories require billing systems. We have not differentiated between the two groups in the dataset.

The forecasts relate only to systems used for prepaid and/or postpaid mobile end user billing. They do not include systems used exclusively for paging services, satellite services, interconnect or intercarrier. They do include systems used for billing mobile and another service, for example fixed and mobile. Again such systems are not differentiated in the forecast.

The forecast looks at systems for mobile and multi-service operators, including systems used for billing more than one service by the latter in the following categories:

- postpaid
- prepaid
- convergent – the term convergent in this case refers to a single platform used for rating and billing postpaid and prepaid customers.

Methodology

Our strategy has been to keep our methodology simple and take a conservative approach.

Forecasts are based on the following formula:

Total installations = replacement market + net new entrants

Replacement market

This is the number of replacement BCC systems that will be required each year by existing operators. The structure of the *Global Target Locator* database enables us to link purchasing intentions (see Figure 4.10 which explains the purchase cycle rating) to a particular BCC system and analyse multiple purchase cycle ratings per operator. We have used this information to estimate average system life. This was estimated by creating a probability distribution (see Figure 4.11) based on the purchasing intentions related to a sample of systems in *Global Target Locator*. This was derived as follows:

- **estimating the current age** of each system in the sample using the following formula:

  Current age = current date – installation date

- **estimating the replacement age** of each system in the sample using the following formula:

  Expected replacement age = expected replacement date + 180 days – installation date

We derived the expected replacement date from the purchasing intention stated at the last interview and the date of that interview. We added 180 days to this date to allow for delays in the system selection and implementation process

- **estimating probability distribution** – a probability distribution by region[1] was calculated by performing a rank regression on the expected replacement age of each system. This enabled us to derive the percentage of total systems expected to be replaced at each age
- **estimating the total number of existing systems** using the estimated percentage coverage by *Global Target Locator* of the world's total number of operators offering mobile services and the average number of systems per operator per region to calculate the total population of systems per region.

Figure 4.10: Purchasing intentions

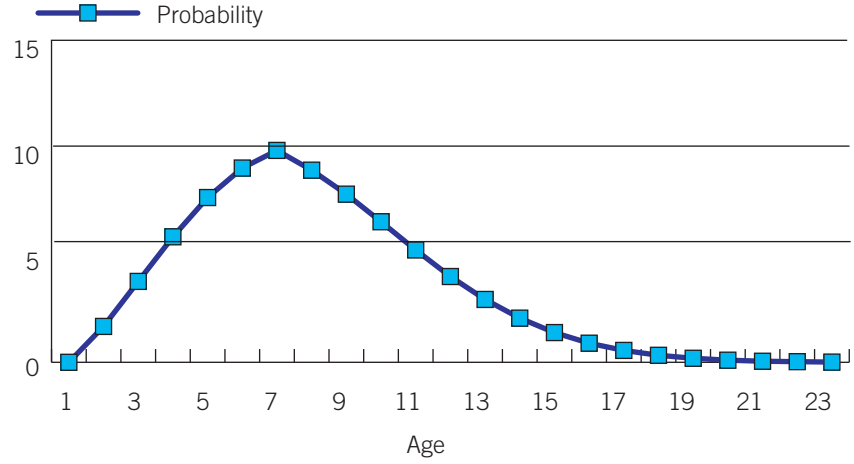
Rating	Purchase intentions
10	Within 6 months from interview date
9	More than 6 months but less than 12 months from interview date
8	More than 12 months but less than 18 months from interview date
7	More than 18 months but less than 24 months from interview date
6	More than 24 months but less than 30 months from interview date
5	More than 30 months but less than 36 months from interview date
4	Don't know
2	No plans or more than 36 months from interview date

Note: * Respondents are asked in which quarter they intend to replace their system. This is converted into a rating based on the scale shown.

Source: Global Target Locator

***1.** The Weibull distribution was used in the model. This distribution is widely used in reliability and life data analysis to due to its versatility. The main reason for choosing this distribution is that it is able to model skewness (the degree of asymmetry of a distribution). As a result, the Weibull model is less restricted than a normal distribution that is symmetrical about its mean.*

Figure 4.11: BCC system predicted average replacement age



Source: Informa Telecoms & Media

New entrants

We have derived this by using forecasts from Informa Telecoms & Media's Data and Forecasting Division of the new entrants into the mobile market. We have determined the initial system requirements of new entrants by reviewing new entrants over the last three years and averaging the percentage launching with postpaid only, prepaid only and both service types to calculate the system requirements of new entrants.

New entrants each year have been added into the replacement cycle for subsequent years.

Total installations

The two components above, the replacement market and net new entrants, were combined to calculate the total number of installations each year as follows:

At time t

Total installations t = ™ (total systems at age X….n multiplied by % replacement at age X…n) + net new entrants t

For the next year the systems installed in the previous year (new entrants plus replacements as calculated above) become part of the existing system total and are subjected to the probability distribution to become part of the normal replacement cycle.

The split between prepaid, postpaid and convergent systems has been calculated on the following basis:

- each new entrant in 2004 is assumed to have:

- one prepaid system if they are offering prepaid services

- one postpaid system if they are offering postpaid services

which means that new entrants offering both services will have two systems at market entry

- we have assumed that new entrants offering both prepaid and postpaid services will gradually tend to adopt a convergent solution, rather than two separate solutions, with a specific percentage adoption at a particular date as shown in Figure 4.12. Thereafter growth in adoption of convergent solutions is assumed to be exponential. We have taken this approach based on the assumption that in time a single solution type will be on offer, with operators choosing the modules and/or functionality to meet their needs
- we have assumed the same scenario for operators replacing existing systems.

We have calculated two forecast scenarios based on:

- a fairly optimistic adoption rate for take up of convergent systems
- a two year delay on the take up of convergent systems.

The two timescales are shown by region in Figure 4.12.

Figure 4.12: Timescales for adoption of prepaid/postpaid convergent billing systems

Region	Scenario 1		Scenario 2	
	Take up	Date	Take up	Date
Africa	50%	2009	50%	2011
Latin America	45%	2008	45%	2010
Asia Pacific	50%	2008	50%	2010
Eastern Europe	40%	2008	40%	2010
Western Europe	45%	2008	45%	2010
Middle East	50%	2009	50%	2011
North America	40%	2009	40%	2010

Source: Informa Telecoms & Media

4.4.2 Number of telecom operators and BCC systems worldwide

Global Target Locator coverage

In order to calculate the global BCC market size we have had to estimate what proportion the *Global Target Locator* database represents of the total mobile telecom market worldwide.

This is not entirely straightforward:

- there are a number of resellers, virtual operators and facilities-based operators. Many of them will require a billing system
- there are several multinational operators who bill for all their subsidiaries on a centralised basis. Should these be treated as a single entity or as many companies?

- the *World Cellular Information Service* includes all mobile operators, but not resellers or MVNOs. Some of the mobile operators in the EMC database also offer fixed or other services, either directly or as a reseller. Other operators offer various combinations of fixed, mobile, cable and IP services either directly or on a reseller or virtual basis. These may use a billing system per service type, or may use a single, sometimes described as convergent, system

Figure 4.13 shows our estimates of the coverage of *Global Target Locator* data for all companies offering mobile services and likely to be of sufficient size to purchase a BCC system. Market estimates obtained from *Global Target Locator* data have been multiplied by the appropriate amounts to derive estimated total market size.

Figure 4.13: Estimated *Global Target Locator* coverage of operators offering mobile services worldwide (%)

Africa	Asia Pacific	Eastern Europe	Western Europe	Latin America	Middle East	North America
99.00%	90.00%	99.00%	99.00%	90.00%	99.00%	95.00%

Source: Informa Telecoms & Media

We have treated Eastern and Western Europe separately for our market forecasts because of their differing stages of development.

Number of billing systems per operator

Global Target Locator enables us to link purchasing intentions to the BCC system, and analyse multiple purchase cycle ratings to an operator.

We have therefore, based on our *Global Target Locator* sample, derived an estimated average number of BCC systems, including IN platforms used for prepaid billing, per operator offering mobile services, as shown in Figure 4.14.

Figure 4.14: Estimated average number of BCC systems per operator offering mobile services – by region

Africa	Asia Pacific	Eastern Europe	Western Europe	Latin America	Middle East	North America
2.55	3.29	2.65	3.14	2.91	2.78	2.29

Source: Informa Telecoms & Media

4.4.3 The changing world telecoms market

New entrants

The rate of growth of the overall number of operators offering mobile services is on the whole declining, although certain factors still fuel some growth:

- the awarding of 3G licences
- new demand from MVNOs
- deregulation in emerging markets – mobile markets are still growing in Africa, China and India.

Saturation

Much of the telecoms market in Western Europe and North America can now be described as mature: although operators are introducing new services, there are not a great many new operators entering the market. To a certain extent, the number of new entrants is also offset by mergers, takeovers and other attrition due to financial failure. Cellular penetration passed 90% for the Western European region in December 2004 according to the *Global Mobile Subscriber Database*.

However, some factors are still fuelling market growth in the mobile market:

- cellular penetration is still growing in Africa and the Middle East, Eastern Europe and China, although per capital income in some of these regions means that saturation will be reached at lower levels than in more developed markets. The *Global Mobile Subscriber Database* recorded that cellular penetration in Eastern Europe had grown to over 43% in September 2004 compared with only 14% at the end of 2001
- emerging markets in Africa, Asia-Pacific and Latin America are opening up, leading to the establishment of competitive operators. Due to lack of infrastructure and the terrain, in practice we expect much of this growth to be in the mobile sector.

Estimated number of new entrants to 2009

We have used Informa Telecoms & Media's Data and Forecasting Division forecasts for the number of new entrant operators to 2010, which are shown in Figure 4.15. We have not taken into account growth in MVNOS, preferring to remain conservative in our estimates.

Figure 4.15: Estimated new mobile operator entrants to 2010

	2004	2005	2006	2007	2008	2009	2010
Africa	8	6	0	0	0	0	0
Latin America	6	14	4	1	0	0	0
Asia Pacific	5	10	3	0	1	0	2
Eastern Europe	3	9	13	10	2	0	0
Western Europe	10	2	4	1	2	0	0
Middle East	2	4	0	2	0	0	0
North America	0	0	0	0	0	0	0
Total	34	45	24	14	5	0	2

Source: Informa Telecoms & Media Data and Forecasting Division

We have looked at the incidence of new entrants launching with prepaid only services, postpaid only services and both over the last three years. From this data we have determined an average pattern. This has been used to determine the initial system requirements. Based on current practice most operators offering both services will require two billing systems, one for prepaid and one for postpaid. However, as time passes we expect new entrants offering both services to move towards purchasing a convergent system.

If the system market develops as we expect, eventually all new entrants will purchase a convergent system, selecting whatever functionality they require.

We have applied the same assumptions to the replacement cycle – expecting replacement systems to gradually become 100% convergent.

4.4.4 System requirements per year to 2009

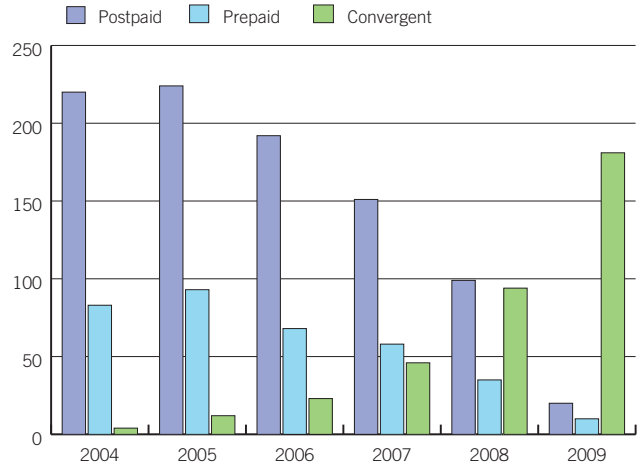
Total systems

Figures 4.16 and 4.17 shows the total number of systems we expect to be purchased each year to 2009 in each scenario. These are consolidated figures that include:

- replacements
- systems required by new market entrants.

The growth in the western markets in the early years of the forecasts is driven largely by new entrants offering 3G services, but overall the trend in all regions is downwards.

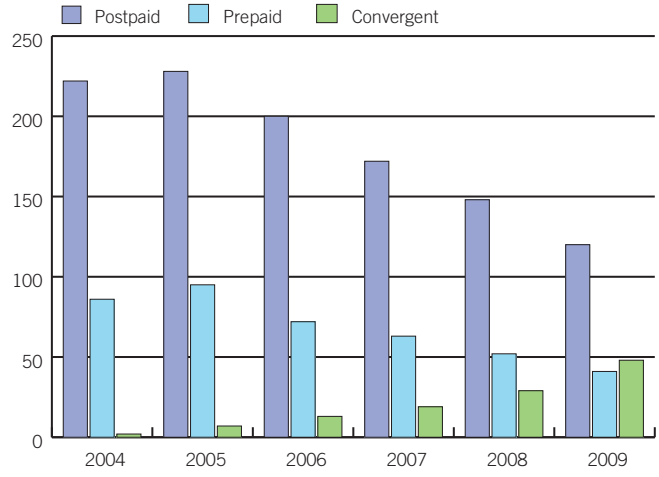
Figure 4.16: Annual demand for BCC systems to 2009 – total scenario 1



Source: Informa Telecoms & Media

We expect a peak in sales in 2005 due to new entrants launching 3G services and the effects of liberalisation in the emerging markets, but that there will be a gradual decline as markets mature throughout the world. The total market is also affected by attrition in the number of systems used by existing operators. Even where operators continue to have separate systems for prepaid and postpaid services there is a tendency to reduce the total number of systems over time, for example separate systems for voice and data or business and residential customers will be replaced with a single system.

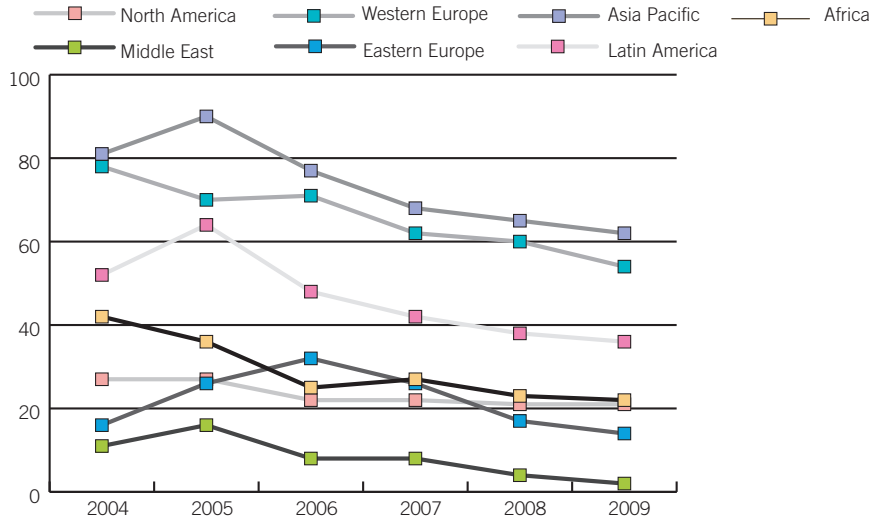
Figure 4.17: Annual demand for BCC systems to 2009 – total scenario 2



Source: Informa Telecoms & Media

Figures 4.18 and 4.19 show the estimated system total sales by region for each scenario.

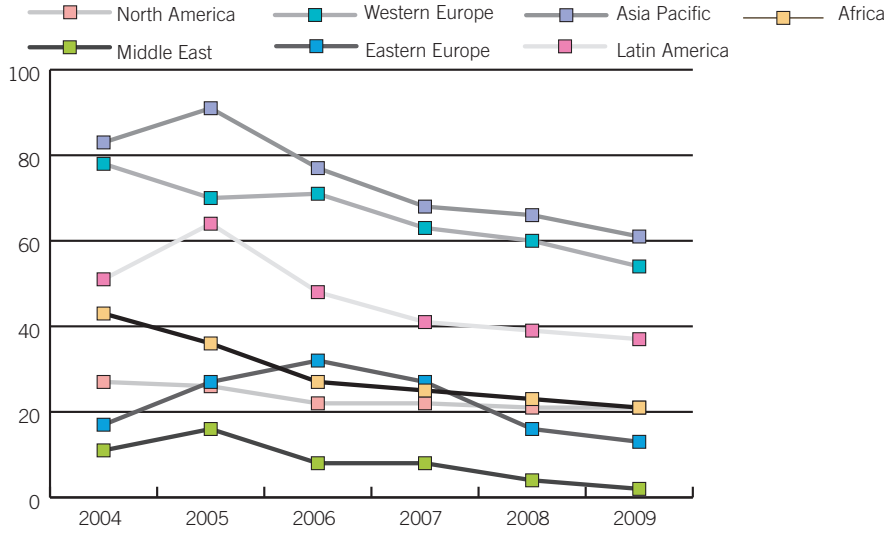
Figure 4.18: Total system sales by region – scenario 1



Source: Informa Telecoms & Media

We expect a greater peak in sales in some emerging regions, that is areas of Asia Pacific, Latin America and Eastern Europe for the next two years or so, but that in the longer term these markets will level off and they will display the similar characteristics to the other regions as they mature.

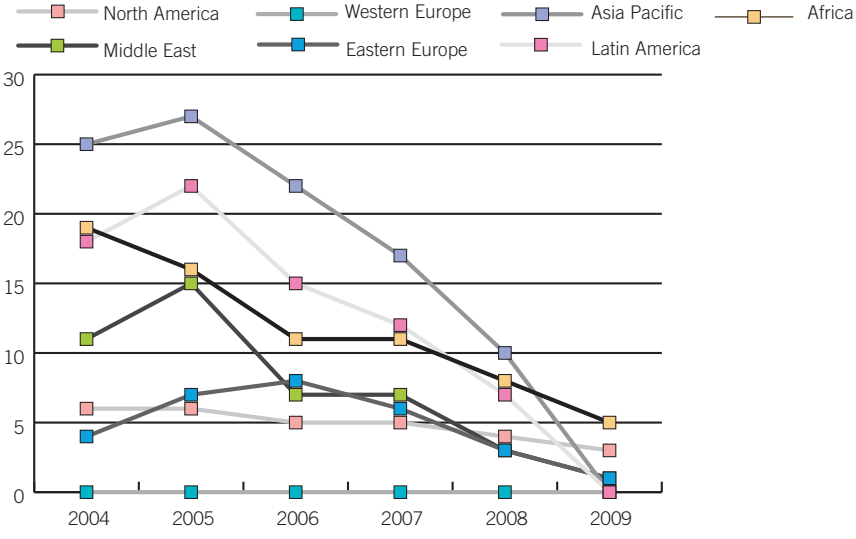
Figure 4.19: Total system sales by region – scenario 2



Source: Informa Telecoms & Media

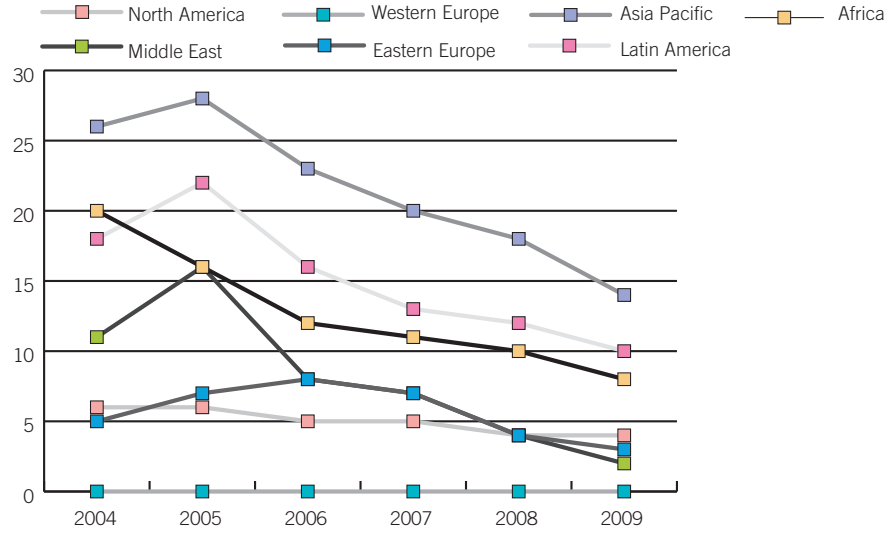
Figures 4.20 and 4.21 show the forecasts for prepaid system sales by scenario.

Figure 4.20: Prepaid system sales by region – scenario 1



Source: Informa Telecoms & Media

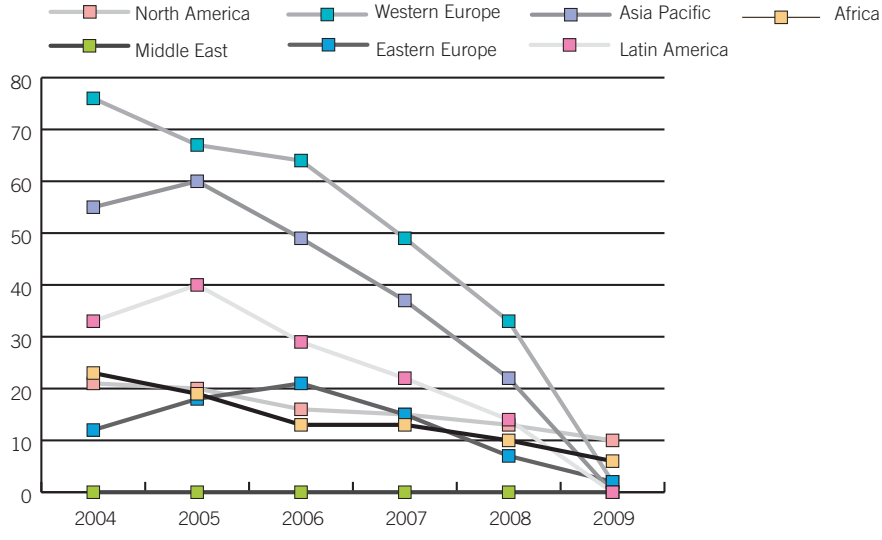
Figure 4.21: Prepaid system sales by region – scenario 2



Source: Informa Telecoms & Media

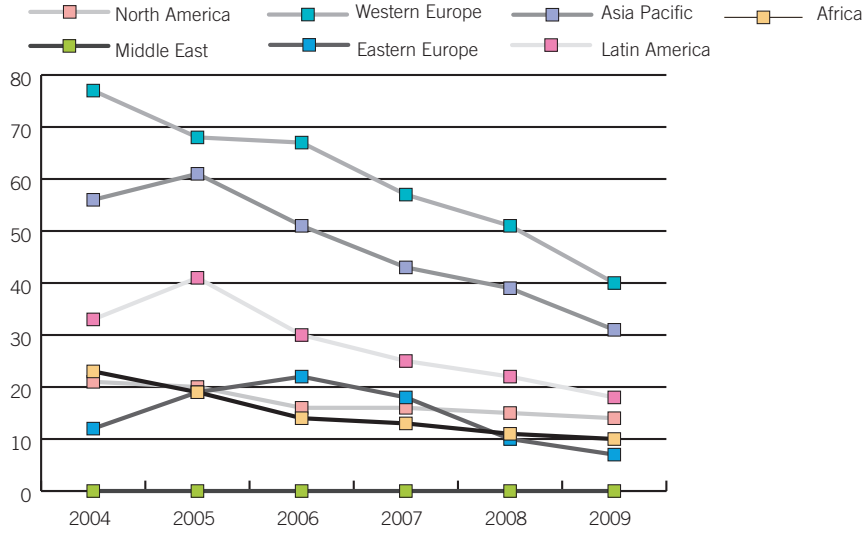
Figures 4.22 and 4.23 show the forecasts for postpaid systems by region and scenario.

Figure 4.22: Postpaid system sales by region – scenario 1



Source: Informa Telecoms & Media

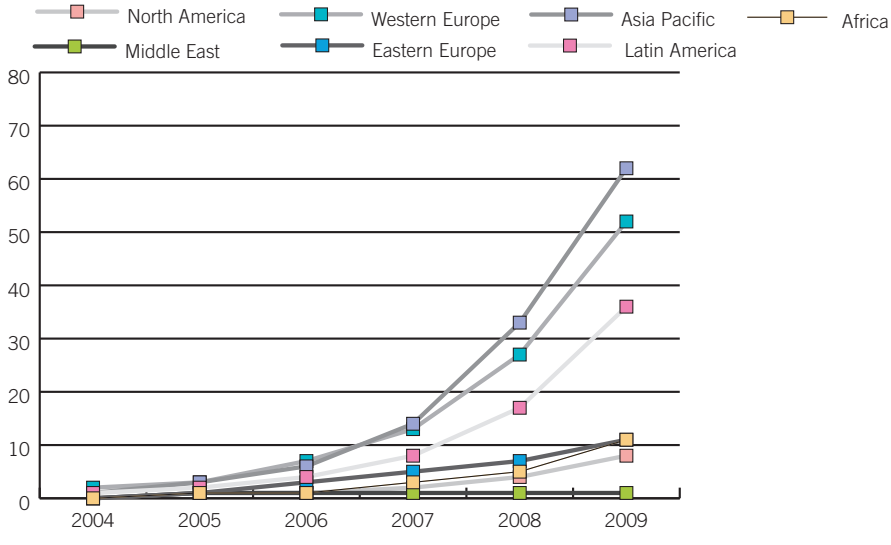
Figure 4.23: Postpaid system sales by region – scenario 2



Source: Informa Telecoms & Media

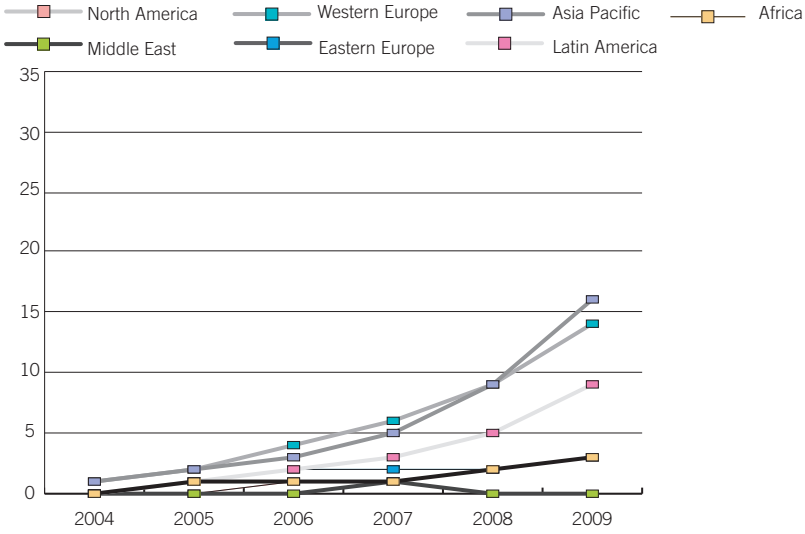
Figures 4.24 and 4.25 show the forecast sales for convergent systems by region and scenario.

Figure 4.24: Convergent system sales by region – scenario 1



Source: Informa Telecoms & Media

Figure 4.25: Convergent system sales by region – scenario 2



Source: Informa Telecoms & Media

Our forecasts demonstrate a significant difference in the level of sales of all system types, depending on the take-up timescale for convergent systems. As Figures 4.18 to 4.25 show, the sale of prepaid and postpaid systems will decline as the convergent market develops. In scenario 1, where most regions will have at least 50% take-up of convergent systems by the end of our forecast period, sales of the individual system types will decline to almost negligible levels. On the other hand, if take up of convergent systems is delayed, either by lack of will on the operators' part, or lack of suitable product, then both markets will remain relatively buoyant until the end of the forecast period.

The way the market will develop is influenced by a number of variables:

- depending on the definition of a convergent system, as far as we can establish few vendors at present offer a truly convergent prepaid/postpaid system
- a number of vendors have developed systems in conjunction with partners. One of our dilemmas in forecasting is whether a sale of a 'solution' incorporating, for example, Convergys's Infinys with Siemens' IN platform represents a single converged system sale or a postpaid and a prepaid system sale
- we believe that in due course true converged systems will evolve – this may or may not involve 'converging' of the vendors of the elements.

We believe that many existing operators are not as eager as some vendors believe to adopt a converged approach. They have made a significant investment in their current billing platforms. They will be keen to gain maximum ROI and reluctant to embark on major re-engineering of their infrastructure unless they believe the investment and risk is justified.

On the other hand, many vendors are clearly moving towards offering a converged product. Once such products are actually available, new entrants will, if the costs are right, adopt this approach from the start. Increasingly vendors will only offer converged systems, so eventually operators looking to upgrade their systems will have no option but to purchase a system capable of delivering converged postpaid/prepaid billing.

Some of the vendors' arguments for converged billing are based on perceived customer requirements, for example such systems make hybrid and family accounts simpler and enable customers to cap their expenditure on data services. But are customers driven by payment method or tariff? When prepaid mobile services were introduced they were expected to be the province of the lower spender and those who wish to remain anonymous. Instead they have become the payment method of choice for many different types of user – they are finding that overall the costs are not very different and they prefer the control they have over expenditure in a prepaid environment.

However, we recognise that operators, particularly in Western Europe, have an aim to provide high-value customer segments with more converged services, which may result in investment in adjunct systems to meet those particular needs as opposed to a complete system replacement.

Chapter 5
Operator requirements

5.1 Sources of information

This section draws material from two sources. In late 2003, as part of our ongoing interview programme, we included some questions to gauge operators' attitudes to convergent and realtime billing. The results of this exercise are summarised in Section 5.2.

In December 2004 we carried out another survey to test how far operators had moved towards converging their mobile billing arrangements and their immediate plans. The results of this exercise are summarised in Section 5.3.

5.2 Survey 1 – unified billing

In late 2003 as part of our ongoing interview programme we asked certain mobile operators for their views about unified billing. Respondents were based in Europe, Africa and Asia Pacific. Our findings were:

- all were using separate systems to bill prepaid and postpaid services, although one European respondent was using a postpaid system to rate prepaid and another was using a single mediation platform for the two user types
- only two respondents expected to unify their system within two years (one in Europe and one in Asia Pacific). The general consensus was to move towards unification over the next three to five years
- the preferred approach to unified billing was fairly evenly divided. Most European respondents preferred the idea of a single realtime system, although one thought the (perceived) costs were not justified. African and Asia Pacific respondents preferred the idea of using a more traditional postpaid system as a base, with add-on functionality for prepaid users. They felt that the (perceived) costs were not justified and also that a fully realtime system would not be able to handle discounting
- most respondents intended to adapt to unified billing by a full system replacement. Some were already at various stages in the selection process. One intended to move to a new environment gradually by adding/replacing modules.

5.3 Survey 2 – convergent mobile billing

Figure 5.1 shows the questions and response options in the questionnaire. The rest of this section explores the operators' responses.

Figure 5.1: Convergent mobile billing questionnaire

Q1	**Do you currently offer both postpaid and prepaid mobile services?**
Q2	**Do you plan to offer both postpaid and prepaid mobile services by the end of 2005?**
Q3	**Do you use a single (converged) platform for postpaid and prepaid billing?**
	Who is the vendor and what is the function of your system(s)
Q4	**Do you have a postpaid billing system(s)?**
	Who is the vendor and what is the function of your system(s)
Q5	**Do you have a prepaid billing system(s)?**
	Who is the vendor and what is the function of your system(s)
Q6	**Is this part of your IN platform?**
Q7	**Do you currently offer any converged/unified tariffs (where a single user can use a combination of prepaid and postpaid payment on a single SIM)?**
	Please describe briefly how this is billed
Q8	**Do you currently offer any 'family' tariffs (where a group of users can have a combination of postpaid and prepaid tariffs on a single 'bill')?**
	Please describe briefly how this is billed
Q9	**How do you intend/need to modify your billing platform to facilitate converged billing?**
	I have no plans to modify/My system is already suitable/By adding a module/modules/By replacing my system/systems
Q10	**When do you intend to modify your billing platform to facilitate converged billing?**
	By the end of June 2005/After the end of June 2005 by the end of 2005/During 2006/During 2007/I intend to modify my system, but don't know when
Q11	**Please rate each of the following potential benefits of a converged billing solution in terms of their importance to you (Very important/Important/Not very important/Not at all important)**
	Realtime billing and the ability to impose credit limits for all subscribers
	Support for hybrid accounts
	Reduced revenue leakage/exposure to risk from high cost services
	Reduced purchase and ongoing costs
	Realtime usage information available to support marketing programs
Q12	**Please rate each of the following issues related to choosing a converged billing solution vendor in terms of their importance to you (Very important/Important/Not very important/Not at all important**
	Proven experience in a traditional postpaid billing environment
	Proven experience in a traditional prepaid billing environment
	An innovative approach, unencumbered by legacy products
	A presence in and understanding of your region/country
	A clearly defined product road map
Q13	**Have you any other comments you would like to make about the convergence of prepaid and postpaid mobile billing?**
Q14	**What type of operator are you?**
	Mobile only, postpaid only/Mobile only, prepaid only/Mobile only, postpaid and prepaid/Multi-service (eg mobile plus fixed, satellite, cable), mobile services only postpaid/Multi-service (eg mobile plus fixed, satellite, cable), mobile services only prepaid/Multi-service (eg mobile plus fixed, satellite, cable), both prepaid and postpaid mobile services/No mobile services
Q21	**How many prepaid mobile subscribers do you have?**
	None/250,000 or less/250,001 to 500,000/500,001 to 1 million/over 1 million/Decline to answer
Q22	**How many postpaid mobile subscribers do you have?**
	None/250,000 or less/250,001 to 500,000/500,001 to 1 million/over 1 million/Decline to answer
Q23	**What country do you operate in?**

Note: Questions 15-20 related to personal details of the respondent.

Source: Informa Telecoms & Media

5.3.1 Do you currently offer both postpaid and prepaid mobile services?

Most respondents (90%) already offered both types of service. Half of those who did not said that they planned to do so by the end of 2005.

One respondent was a reseller of postpaid only, with no intention of adding prepaid within the next year. The company was billing on a bespoke system based on EPPIX from Computer Answers – in other words a very old system. The operator was based in Europe. It has been excluded from the other calculations.

One respondent did not currently have any prepaid subscribers, but hoped to introduce the service within the next year. The company was still trying to decide how to cope with convergence, but expected to have to replace its system.

Another operator that currently did not offer prepaid, but intended to introduce the service during 2005, expected to be able to do this by adding a module to its existing system. However, there is no indication in the vendor's literature that the system can in fact do this.

5.3.2 Do you use a single (converged) platform for postpaid and prepaid billing?

Only 14% of respondents claimed to be doing this. The systems in use included:

- Intec Singl.eView
- LHS BSCS
- Viziqor (ex Protek)
- CSG Arbor
- Bercut SMSC
- AsiaInfo BOSS
- Suntech SP.

Only a Singl.eView user claimed not to be using any other billing systems. We suspect that this user was a 'greenfield' site, without legacy systems to affect the strategy.

In practice, we do not feel that most of the respondents were using a converged system in our strict definition (see Chapter 2) – rather that they were using a 'work round' based on their prepaid and postpaid systems.

5.3.3 Do you have a postpaid billing system?

95% of respondents claimed to have a postpaid system – although in some cases respondents repeated the names of the systems claimed to be in use for convergent billing – reinforcing our view that they were in fact using a work round.

There was a wide range of systems in use, including in-house developed and some fairly elderly systems. Some respondents were still using Jupiter from TelesensKSCL. The company was liquidated some four years ago and Convergys acquired most of the sites – with the intention of retiring the products as soon as it could. This snapshot suggests that operators are not necessarily eager to purchase a new system if they can get by with what they already have.

5.3.4 Do you have a prepaid billing system?

About 70% of our respondents claimed to have a prepaid billing system – with Siemens the dominant supplier. Some described in more detail how they managed their prepaid subscribers. For example, many were using a Teligent charging gateway in conjunction with their IN to manage data services. About 7% claimed to be using in-house systems to manage some or all of their prepaid subscribers.

5.3.5 Is this part of your IN platform?

Just over three quarters of respondents with a prepaid solution said that it was part of their IN platform.

5.3.6 Do you currently offer any converged/unified tariffs?

This question and the next one (Section 5.3.7) were asked to try to identify how far operators were interested in, or already offering, offerings that might be facilitated by converged billing. About 25% claimed to be offering some kind of unified tariff. The offerings they described were:

- postpaid customers had a contract that included a credit limit – once they reached this they were treated as prepaid
- subscribers were allowed to top up prepaid accounts by charging a postpaid account
- subscribers were allowed to charge, for example, SMS to a prepaid account but value added service charges to a postpaid account
- a combination of billing recurring charges via a postpaid system, but usage charges on a prepaid basis
- community tariffs that could accommodate both types of subscriber

- SIMs could have multiple numbers – postpaid and prepaid – with each number being treated as a separate account by the system
- prepaid roaming for postpaid customers (for example to avoid the need of a security deposit)
- postpaid roaming for prepaid customers.

Many of the operators offering these services were doing so via a traditional prepaid/postpaid environment – suggesting that work rounds were delaying the need to invest in a converged system.

5.3.7 Do you currently offer any 'family' tariffs?

Family tariffs, in this context, are a group of users with a combination of prepaid and postpaid tariffs, billed in a single hierarchy. Only about 10% of respondents claimed to be offering anything in this area, perhaps because current systems could not cope. Comments included:

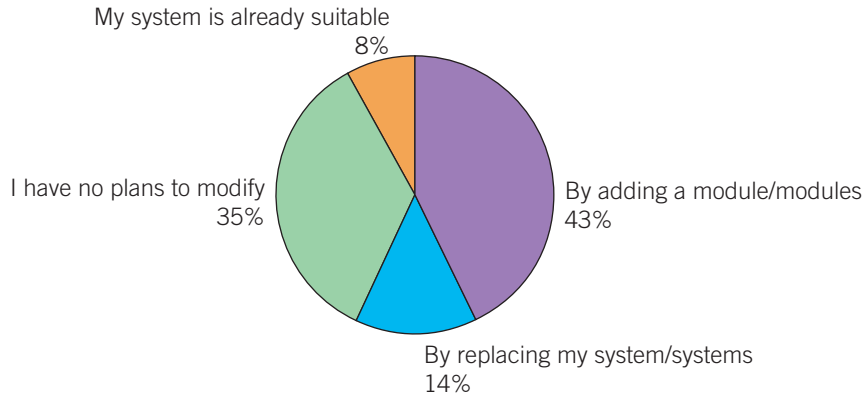
- one offered the same 'friends and family' discounts to both types of customer
- calling groups including both types of customer
- multiple accounts, both prepaid and postpaid, within a single customer hierarchy.

5.3.8 How do you intend/need to modify your billing platform to facilitate converged billing?

Figure 5.2 shows the responses. Vendors may well be concerned that only 14% of respondents said that they intended to totally replace their systems. Almost half planned to deal with any need for convergent billing by adding a module or modules to their existing system. There is already evidence of this is some of the contract announcements. Operators are adding rating engines or upgrading their mediation platforms rather than facing the pain of a complete system replacement.

Over one third had no plans to modify their system – indicating that, in the short term at least, they have developed ways of dealing with the situation that are adequate for their current needs.

Figure 5.2: Upgrade plans



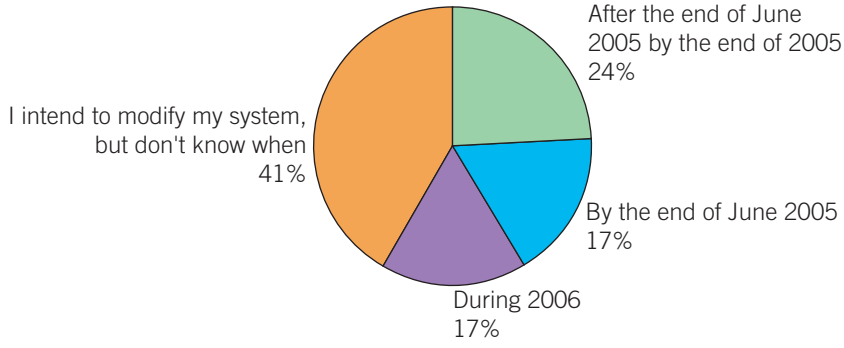
Source: Informa Telecoms & Media

5.3.9 When do you intend to modify your billing platform to facilitate converged billing?

Figure 5.3 shows the responses to this question. It only includes those operators who said that they intended to modify or upgrade their system.

Again, if our results are typical, then vendors have cause for concern. Only about 40% had plans to make changes during 2005 and a similar number had no idea when they would upgrade.

Figure 5.3: Upgrade timescale



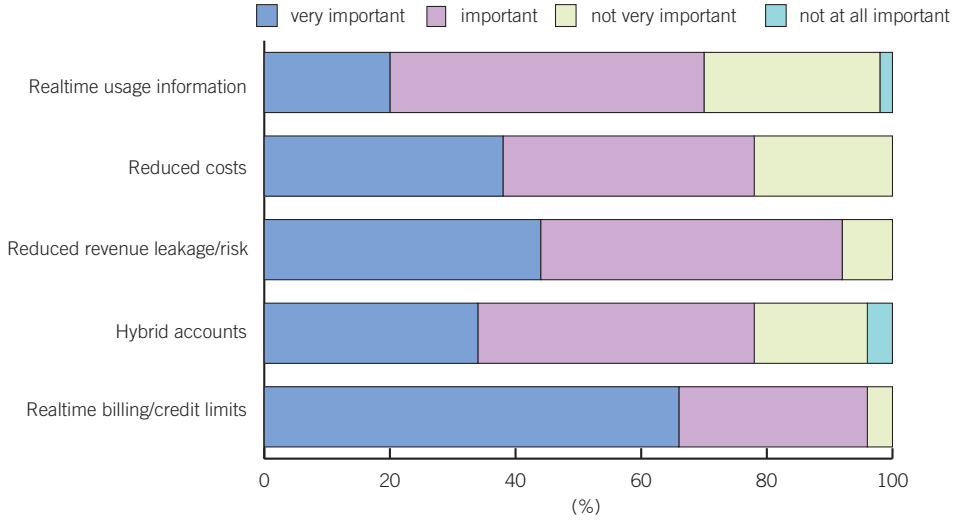
Source: Informa Telecoms & Media

5.3.10 Please rate the potential benefits of a converged billing solution

Figure 5.4 shows the responses. The largest number gave most importance to the ability provided by realtime billing to impose credit limits for all subscribers – 96% felt it was important or very important. The second most important potential benefit was the reduced risk from revenue leakage, in particular in relation to high value services. Respondents seemed less concerned about the more customer-related benefits – usage information to drive marketing/CRM and hybrid accounts. This suggests that costs and revenue assurance issues will

drive the move to convergent billing. Our survey was targeted at billing managers. Had we surveyed marketing and customer care staff they may have been more concerned about customer-centric issues. In Section 5.3.12 we report 'other comments' from respondents. Only one mentions customers.

Figure 5.4: Importance of converged system benefits



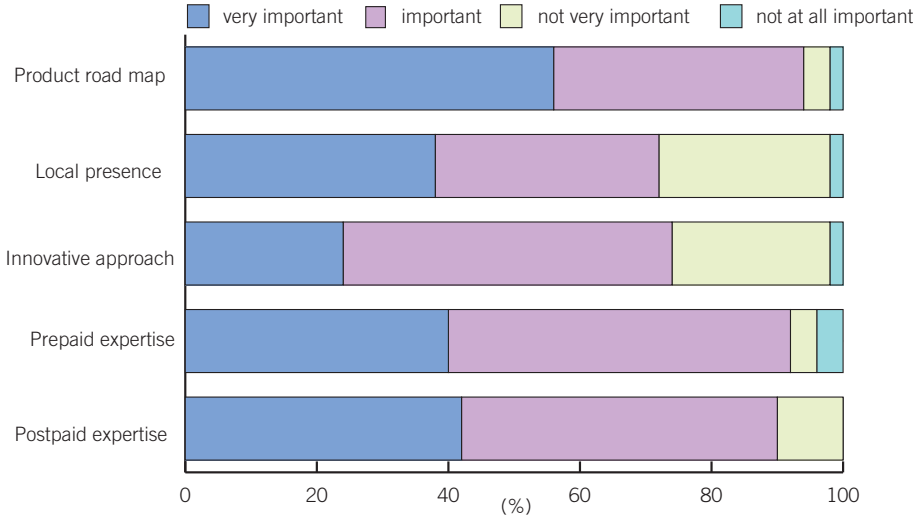
Source: Informa Telecoms & Media

5.3.11 Please rate the following issues related to choosing a converged billing solution vendor

Elsewhere in this report we have discussed the polarity of the present billing arrangements for postpaid and prepaid mobile subscribers, both in terms of operators' organisation and the vendors supplying software. Figure 5.5 demonstrates the factors that our respondents thought important in relation to vendors.

All put a great weight on expertise in both billing environments – suggesting the alliances and working relationships being forged by vendors such as Comverse/Formula, LHS/Tango and Convergys/Siemens might inspire most confidence in operators. They were less concerned with an innovative approach – reinforcing the relatively conservative approach taken by most operators to such major decisions.

Figure 5.5: Vendor selection issues



Source: Informa Telecoms & Media

5.3.12 Have you any other comments about prepaid and postpaid mobile billing convergence?

Respondents' comments included:

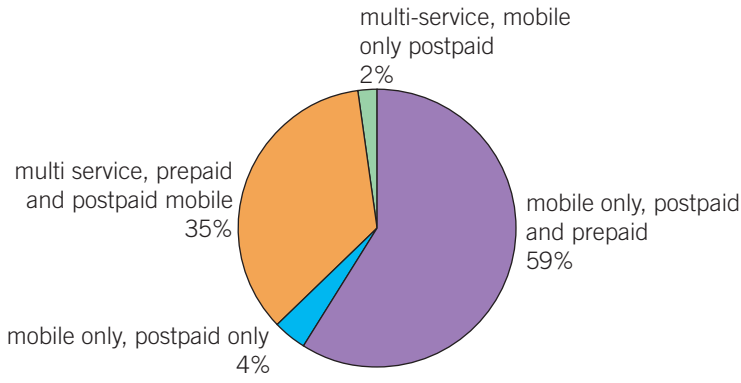
- we are very concerned about the performance and availability of the system
- because we are a service provider with no direct access to the system we are unable to implement this type of functionality
- we expect to continue to have separate systems for each type of subscriber
- a converged solution would give a much better ROI, but the best-of-breed approach still offers more flexibility for managing postpaid and less leakage for prepaid at an acceptable cost overall
- we separate the customers because the two markets are very different – but convergence would simplify the billing operation
- it will be a good move for us and our customers
- it is essential to enable us to manage customers with multiple subscriptions
- I don't know how best to do it – but would like to be able to converge my systems
- there is no sense in doing this unless the system can also support other services, such as fixed and broadband

- there are two concerns; is there proven realtime ability in the traditional postpaid systems and politics – IT and engineering both want control. Also the vendors are not helping us – they won't give us open APIs because they don't want to lose potential markets
- the end user really does not care how we bill – they are only concerned with functionality. Billing vendors' hype has not really been turned into a workable solution yet. In the current financial market it is hard to see how the massive costs involved can be recovered in a short enough time to make it a reasonable business case
- there are cost issues related to creating a high availability environment for postpaid – it is only necessary to converge some services. The ideal would be to have cooperation mechanisms between the traditional systems, without having to carry out a full migration to a new system
- we would like any new platform to also support other services, such as IP, PSTN, VoIP
- it is not that important, but on the other hand it is complicated to build common services for the two customer groups if they are on different systems
- vendors should all open their systems to the world – at present they are not meeting all of our needs
- our concern is not only the convergence of prepaid and postpaid. Our main problem is the ability to bundle services and be able to charge for everything, for example GPRS, WAP, MMS
- it has to be the way forward
- the convergence model needs to take into account three elements – fixed, mobile and Internet access – and the ability to provide a single bill for all of these services
- realtime rating is important for both groups of customers. It would be better to empower this with action related to customer behaviour. For example postpaid customers, especially corporate, ask for credit limits with service being suspended when limits are reached.

5.2.13 Demographic overview

As Figure 5.6 shows, about 60% of respondents only offered mobile services. However, over one third were multi-service operators. Their comments (see Section 5.3.12) clearly reflect their interest in a broader convergent model – one that provides the ability to bill all services on a single platform.

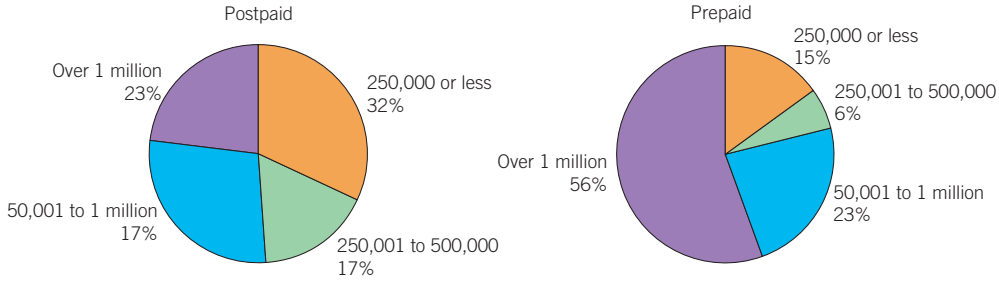
Figure 5.6: Respondents by type



Source: Informa Telecoms & Media

Figure 5.7 shows the approximate subscriber numbers for those respondents that were willing to disclose the information. On the whole the multi-service operators had lower numbers of mobile subscribers and were most concerned with converging all of their billing onto a single platform.

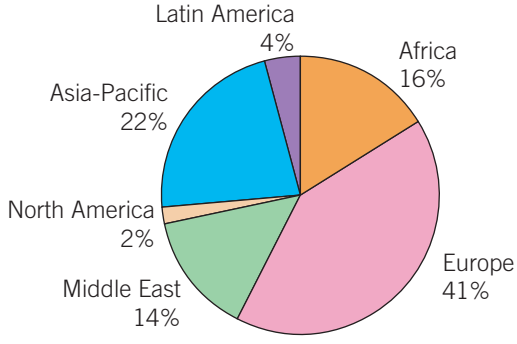
Figure 5.7: Subscriber numbers



Source: Informa Telecoms & Media

Figure 5.8 shows the source of respondents. Unfortunately, in this self-selected group, the Americas were not well represented.

Figure 5.8: Source of respondents



Source: Informa Telecoms & Media

Glossary

3G: Third Generation. The next generation of cellular services (analogue was the first and digital the second).

AAA: Authentication, authorisation and accounting

ADSL: Asymmetric Digital Subscriber Line

Advice of charge (AoC): Pre-rating or advice of charge involves running a rating engine in realtime to calculate how much a particular service offering will cost and supplying this information to the end user.

AoC: See advice of charge

API: Application Programming Interface

ARPU: Average Revenue Per User

Authentication: The process that verifies the identity of someone requesting access to a service or resource.

Autodiscovery: The ability to automatically detect and identify devices forming part of a network

BCC: Billing and Customer Care System (alternative to CCBS)

Bill generation: This is the part of the billing process that determines how much is owed to the biller. In a telecoms environment it involves mediation, rating and bill generation itself.

Bill payment: This involves the customer initiating payment of the bill (whether this is an electronic funds transfer or a cheque posted to the biller), the actual clearance of the payment (the money being moved from the customer's account to that of the biller) and an adjustment to the billing and accounting system to show that the bill has been paid in full or part.

Bill presentment: The process of actually communicating the bill (whether paper or electronic) to the customer.

Billing: Billing is a request for payment for services supplied. There are two main types of billing: wholesale billing - paying partners and suppliers for the services and products used in the process of supplying the end customer; retail billing - billing and receiving payment from end customers for the services used and products supplied.

Broadband: Telecommunications systems capable of simultaneously supporting different formats, such as voice, high-speed data and video, at relatively high speeds on demand. Overall transmission speeds are many times faster than those of narrowband systems, offering channels with a bandwidth of at least 1.5Mbps.

BSS: Business support systems

Business support systems (BSS): Software to support an operators' business processes including customer care, churn management, billing, and fraud management and revenue assurance

CAMEL: Customised Applications for Mobile Network Enhanced Logic, an evolving standard for mobile telephony that allows prepaid roaming

CAPEX: CAPital EXpenditure

CCBS: Customer Care and Billing System

CDR: Call Detail Record

Churn: Subscribers that leave a service or network. Churn is usually measured as the percentage of the user base that stops using the service over a given period (usually a year).

CORBA: Common Object Request Broker Architecture

Customer relationship management: see CRM

Customisation: The process of tailoring a piece of software to meet a customer's specific needs

EAI: Enterprise Application Integration

E-commerce: Conducting transactions over a telecoms network.

Electronic bill presentment and payment (EBPP): Uses software and communications services to allow the viewing and payment of bills electronically - typically via an Internet site.

EJB: Enterprise JavaBeans

Event: A manifestation of network behaviour which may be detected and forwarded to a network management console. Event messages might include data relating to faults, alerts, traps, exceptions, and exceeded thresholds

GPRS: General Packet Radio Services

GSM: Global System for Mobile Communications

GTP: GPRS tunnelling protocol. It operates over the top of TCP/IP protocols to encapsulate IP or X.25 packets so they can be forwarded between the SGSN and the GGSN.

HLR: Home Location Register. A database containing data on mobile subscribers belonging to a network (ID, number and subscribed services) and the reference of the corresponding VLR.

Hot-billing: Hot-billing essentially offers operators a half-way house between batch-processing of call data and true realtime solutions, collecting call data only after the completion of a call.

HTML: HyperText Markup Language

HTTP: Hyper Text Transfer Protocol

IDEN: Integrated Digital Enhanced Network, a Motorola technology combining the capabilities of a digital cellphone, two-way radio, alphanumeric pager and data/fax modem in a single network.

IMEI: International Mobile Equipment Identity

IMSI: International Mobile Subscriber Identity

IN: Intelligent Network

IN platforms: An intelligent network (IN) platform transfers the network control mechanisms from the switches to a specialised computer system. It provides a centralised realtime connection between the switch itself and the BSS platform.

IP Internet protocol (IP): The method by which data is sent across the internet

IPDR: Internet protocol detail record

IT: information technology

Java: Java is a platform-independent programming language used for World Wide Web applications. It was developed by Sun Microsystems.

LAN: Local Area Network

LATA: Local Access Transport Area

LDAP: Lightweight Directory Access Protocol

MMS: Multimedia Messaging Service

MMSC: Multimedia message services centre. Used to store-and-forward MMS messages.

MVNO: Mobile Virtual Network Operator. An MVNO leases access to radio spectrum from a mobile network operator in order to offer cellular services. It has independent branding, marketing and price plans that differentiate it from its host network.

OMIP: Open Mobile Internet Platform

OPEX: OPerational EXpenditure

OSS: Operational Support System(s)

PC: personal computer

Platform: The operating system software over which the applications and services run

Postpaid: Postpaid is where a customer uses services and pays for them afterwards. This involves the service supplier billing the customer, usually at regular intervals (eg monthly).

Postpaid billing: Postpaid billing is where a customer uses services and pays for them afterwards. This involves the supplier of these services 'billing' the customer.

Postpaid services: Services provided to customers who are later billed for them. Postpaid users have a contractual relationship with their service provider and are essentially extended credit as a result. They are therefore known to their service provider, and must have a bank account and a credit rating.

Prepaid: This involves the user of a service paying for the service before they receive it. It has been usual to pay for some elements of telecoms service in advance for many years (for example, line rental), but this term is often used to refer to mobile services that are paid for in advance. Users charge their mobile accounts with value (for example, by buying vouchers) and then depreciate it. Prepaid mobile services have grown at a phenomenal rate since they were introduced in 1995 and have been credited with expanding the mobile telecoms market in many countries. (compare: postpaid)

Prepaid services: Services where the user pays up-front before using them. This involves depositing credit in a prepaid account, which is then debited as services are used. Prepaid services can be contrasted to postpaid services, which are paid for after the service is used and are billed for.

PSTN: Public Switched Telephone Network

Realtime: The transmission, receipt and processing of data at virtually the same time, feeding back or forwarding immediate results

Recharge: Recharge is the means by which prepaid users replenish their credit balance. There are a variety of ways they can do this including: vouchers; via ATMs; direct debit and credit cards; via the Internet; handset- or retailer-based recharge.

Retail billing: This involves billing and receiving payment from end customers for the services used and products supplied. For example, sending a mobile telecoms customer a bill for calls made or for content accessed.

Revenue assurance: The aim of revenue assurance is to plug any drain on revenue, and so to maximise profits. Telcos currently fail to capture up to 15% of all possible revenues. This is for a variety of reasons, including poor processes, technical failure, fraud and bad debt. In some markets, operators stand to gain more 'new' revenues by minimising revenue leakage than they do from trying to grow their revenues in other ways.

RFI: Request for Information - a precursor to a Request for Proposal

RFP: Request for Proposal

Right of paternity: This is a moral right conveyed by copyright legislation that gives the creator the right to be acknowledged as such. It has to be asserted.

Roaming: Ability to take a mobile phone from one network/country to another and to make and receive calls on different networks. Operators must have agreements to allow users to do this.

Roaming billing: A process whereby a visited network rates and bills for calls from subscribers whose primary relationship is with a home operator. The visited network operator reconciles this network usage through intercarrier billing processes, based on a roaming agreement with the home operator, which must itself conform to regulatory standards.

ROI: Return on Investment

SCP: Service Control Point (mobile networks)

SDH: Synchronous Digital Hierarchy, an advanced means of transmission

SDP: Service Data Point (mobile networks)

SGSN: Serving GPRS support node. The point of access to the GPRS network.

SIM: Subscriber Identification Module. A card that is placed into a handset and holds all the necessary information to identify and bill a user.

SIP: Session Initiation Protocol

SM: Short Message

SMP: Symmetric Multi-Processing. A parallel configuration of computers for achieving rapid throughput.

SMS: Short Message Services is a technology that is available on all GSM handsets that makes it possible to send text messages of up to 160 characters to another mobile phone. It is specified as part of the GSM and ANSI 41 (CDMA and TDMA) standards.

SMSC: Short Message Services Centre. Used to store-and-forward SMS messages.

SNA: Systems Network Architecture

SNMP: Simple Network Management Protocol, a key protocol first specified by IBM that allows software to manage a network

SQL: Structured Query Language - a standard interactive and programming language for getting information from and updating a database.

SS7: Signalling System 7. A new generation network signalling system that accommodates advanced services such as virtual private networks.

TAP: Transferred Account Procedure. A standard for CDRs on GSM networks.

Tariff: A set of schedules and rates published by a carrier governing provision of telecoms services

UMTS: Universal Mobile Telecommunication System. A third-generation (3G) cellular standard being developed under the auspices of ETSI.

USSD: Unstructured supplementary services data. A technology that allows mobile users to interact with a premium messaging application. USSD is similar to an IVR system. However, unlike IVR systems, USSD avoids moving the handset back and forth from the ear to the eye in order to type in numerical options, since it is entirely based on text.

USSD callback: Most operators are still using unstructured supplementary services data (USSD) callback-based services for roaming. To do this, the user prefixes the number they wish to call with the '#' symbol on their keypad. This passes the number back to the home network and the operator then calls the user back before connection.

VAS: Value Added Service

VLR: Visitor Location Register. A database containing data on the localisation of mobile phones, which registers visitors in the zone of the call.

VMS: Voice Message System or Voicemail System

VoIP: Voice over Internet Protocol

WAP: Wireless Application Protocol

WCDMA: Wideband Code Division Multiple Access. The GSM community's 3G system standard

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Informa Telecoms & Media
• Mortimer House • 37-41 Mortimer Street • London W1T 3JH • UK
Telephone: 020 7017 5555 • Fax: 020 7017 5556 • email:telecoms.enquiries@informa.com